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CONTENTS

Research Papers

Synthesis and Biological Activity of Mixed Ligand Complexes of Zinc (II) With Paracetamol and L-Serine

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ABSTRACT

The study was aimed at investigating the suitability and biological activity of Paracetamol-amino acid novel metal (II) complexes. Synthesis of mixed ligand zinc (II) complexes of the type [M(par)(L)].2H$_2$O have been carried out by using Analgesic drugs Paracetamol (par) as a primary ligand and Amino acid (HL) such as L-Serine, L-Proline and L- Isoleucine as a secondary ligand. Synthesized metal (II) complexes have been subjected for characterization using physical methods such as M.P., solubility, elemental analysis, electrical conductance, room temperature magnetic susceptibility measurement and spectroscopic analysis such as UV spectra, FTIR and XRD techniques. An electrical conductance study indicates non-electrolyte nature and magnetic susceptibility measurement revealed the diamagnetic nature of the complexes. UV spectra show intra-ligand, charge transfer and d-d transition and IR spectra confirm bonding of metal ion through O or N donar ligands which further indicates complexation and chemical environment of protons is confirm by NMR studies. Metal (II) complexes were also screened for antibacterial activity of the complexes against pathogenic bacteria such as S. Aureus, C. Diphtheriae, S. Typhi and E. coli using agar cup method and tube dilution method. The results were compared with those of tetracycline as a standard material and all complexes have found mild biologically active.

Keywords: mixed ligand complexes, paracetamol, amino acids, metal ion.

INTRODUCTION

Transition metals elements comprise of incomplete d or f shells and they have tendency to accept electrons from the ligand which make them able to form coordination complexes. Transition metal complexes have been found to be important for their major applications as antibacterial and antitumor agents and biological properties such as antibacterial, antifungal, antimalarial and anticancer activities [1]. Mixed ligand pharmaceutical active molecules play an important role in complexation with numerous transition metals. As such complexes of metals with mixed drugs molecules complexes show wide-ranging pharmaceutical activity, which place them in several biochemical processes [2]. A series of novel Zn (II) mixed ligands complexes with paracetamol and amino acids were synthesized and characterized and found biologically active [3]. Recently, similarly a series of novel Cu (II) mixed ligands complexes with paracetamol and amino acids were synthesized and characterized and screened for biological activity [4]. These mixed complexes models provide information about how biological activity achieve, as well as improve [5]. Paracetamol (acetaminophen) is commonly used for relief pain and fever alone or mixed other medications. It is a major ingredient in many flu andcold remedies as it exhibits anti-inflammatory property [6-7]. Dose is typically given orally, rectally or intravenously [8]. The chemical structures of such pharmaceutical drugs lead to act as ligand in coordination with many transition metals as it alone or as a mixture of two of them. Paracetamol (Para), has IUPAC name N-(4-hydroxyphenyl) acetamide and it is considered as bi-dentate ligand as it is composed of two functional groups such as –NHCOCH$_3$(amide) and –OH (hydroxyl)[9]. Synthesis of complexes derived from two or more ligands that are known as pharmaceutically active medications is a very good strategy to improve both the pharmacokinetic and pharmacodynamics properties of the parent drug [10]. Amino acids have at least two principal active sites which lead in formation of metal complexes [11-14]. The important applications of those metal complexes with pharmaceutical drugs are the increasing solubility and bioavailability as well as reduced side effects and toxicity. Also, by using an active metal complex of two active organic molecules (as ligands) gives dual-action drugs which may be more effective than the parent organic drug and are characterised by their biological and the rapeutic properties[15].Those complexes have been found to exhibits anti-tumour, biological and metabolic enzymatic activities [16-17].

Therefore it was decided to study synthesis and characterization of novel mixed ligand Zn (II)-pharmaceutical drugs complexes with amino acids such as L-Serine, L-Proline and L-isoleucine and to determine biological activity of such complexes by screening those complexes against pathogenic stream S. aureus, C.diphtheria, S. thyphi and E. coli. This is continuation of the research activities of our group on search for biologically active metal (II) complexes that could serve as lead compounds in drugs research for pain management and analgesic and as flavouring agents in food and perfume antibacterial studies

EXPERIMENTAL

MATERIALS:

Zinc chloride dehydrate $ZnCl_2. 2H_2O$ Analytical Grade (A.R) is used and amino acids used such as L-Serine, L-Proline and L-isoleucine are purchased from S. D. Fine Chemical Mumbai ,India .Solvents like ethanol, chloroform, DMSO (L.R grade) whenever used were distilled and purified according to standard procedure.Pure paracetamol was obtained from sigma-Aldrich[18-20].All chemicals of high purity were used and purchased without any further purification

Preparation and methods

Mixed ligand Zn (II) complexes were prepared by adding Zinc chloride dehydrate $ZnCl_2.2H_2O$ solution over mixture of Paracetamol as primary ligand and Amino Acid as secondary ligand solutions at specific experimental conditions. In actual Practice to an aqueous solution ($10cm^{-3}$) of Zinc (II) chloride dehydrate (172.3mg, 1mmol), ethanol solution ($10cm^{-3}$) of paracetamol (138mg, 1mmol) was added. The reaction mixture was stirred and kept in boiling water bath for 10 min. To the hot solution, an aqueous solution, ($10cm^{-3}$) amino acids solution (1mmol) was added with constant stirring. The mixture was again heated in a water bath till the temperature reached at 50^0C.The complexes were obtained by raising pHof the reaction mixture by adding dilute ammonia solution. The mixture was cooled & solid complexes obtained were filtered, washed with water followed by ethanol. The complexes thus prepared were dried under vacuum.

INSTRUMENTATION

To ascertain the purity of metal complexes their Melting point were determined. Actually the Melting point was measured using melting point electro thermal IAg100 apparatus. The complexes were analysed for C, H, N& S contents on thermos Finnegan elemental Analyser, Model No. FLASH EA 1112 Series at Department of Chemistry, I.I.T. Mumbai. Metal content was estimated complex metrically by standard procedure [21-22].

For all complexes molar Conductance were determined in DMSO (10^{-3}M) on an Equiptronics auto ranging Conductivity Meter Model No. EQ-667 with a dip type conductivity cell fitted with platinum electrodes (cell constant= 1.0 cm^{-1}).

The room temperature magnetic susceptibility measurements of the complexes reported in the present study were made by the Guoy's method using Hg [Co(SCN)$_4$] as calibrant at Department of Chemistry, I.I.T. Mumbai.

The electronic absorption spectra (U.V.) of all the complexes in DMSO solution ($10-^3$M) in the ultraviolet & visible region were recorded on Shimadzu UV/VIS-160 spectrometer at GNIRD, Mumbai, using quartz sample cuvette of 1cnpath length..

Infrared spectra of all the ligands& their metal complexes were recorded in KBr discs on a PerkinElmer FT-IR spectrophotometer model 1600 in the region 4000-400 cm^{-1} at Department of Chemistry, I.I.T. Mumbai. The pellets were prepared taking necessary precautions to avoid moisture. The instrument calibration with respect to wave number and percent transmission was confirmed by recording the spectrum of standard polystyrene film. From the spectra, the characteristic groups were assigned by using respective IRfrequencies [23].

The Thermo gravimetric (TG) & Differential Thermal Analysis (DTA) measurements were carried out in controlled nitrogen atmosphere on a Perkin-Elmer Diamond TG-DTA instrument at the Department of Chemistry, I. I.T. Mumbai by recording the change in weight of the complexes on increasing temperature up to 900℃ at heating rate of 10℃ per min.

ANTIBACTERIAL SCREENING

Agar cup method

In the Agar cup method, a single compound can be tested against number of organisms or a given organism against different concentrations of the same compound. The method was found suitable for semisolid or liquid samples & was used in the present work. In the Agar cup method, a plate of sterile nutrient Agar with the desired test strain was poured to a height of about 8mm diameter was cut from the centre of the plate with a sterile core borer. Thereafter, the cup was filled with the sample solution of known concentration & the plate was incubated at 37℃ for 24hrs. The extent of inhibition of growth from the edge of the cup was considered as a measure of the activity of the given compound. By using several plates simultaneously, the activities of several samples were quantitatively studied.

Tube Dilution Method

The test compound (10mg) was dissolved in DMSO (10cm^3) so as to prepare a stock solution of concentration 1000μg/mL. From this stock solution, aliquots of 50 to 1000μg/mL were obtained intestbroth. The test compounds were subjected to in- vitro screening against Staphylococcus Aureus, Corynebacterium Diphtheriae, Psedomonas Aeruginosa & Escherichia coli using Muller Hinton broth as the culture medium. Bacterial inoculums were prepared in sterilized Muller Hinton broth incubated for 24 hrs. at 37℃. They was dispersed (5cm^3) in each borosilicate test tube (150×20mm). The test sample solution was added in order to attain final concentration at 50 to 1000 μg/mL The bacteria inoculums 0.1cm^3 of the desired bacterial strain (S. aureus, C. diphtheriae, P. aeruginosa & E. coli) containing 106 bacteria/cm^{3}were inoculated in the tubes. The tubes were incubated at 37℃ for 24hrs. & then examine for the presence or absence of growth of the test organism. The lowest concentration which showed no visible growth was noted as minimum inhibitory concentration (MIC).

RESULTS & DISCUSSION:-

Elemental analysis and conductivity measurement

The physical properties and analytical data of the Zn (II) complexes are presented in table 1.Elementalanalysis data of the synthesised complexes were represented in table 2.According to Elemental analysis data and physical property data it is concluded that complexes were formed in 1:1:1 proportion of M, L$_1$ & L$_2$. Their structures have been proposed on the basis of conductivity and magnetic moment measurements. The molar conductance of 1x10^{-3}M solution of the complexes in DMSO were measured at 30^{0}C. The molar conductance values which found less than one indicate that the complexes are non-electrolytic in nature [24-25].

MAGNETIC STUDIES

The observed value of effective magnetic moment (μ_{eff}) of Zn (II) complexes at room temperature are given in Table 2. Magnetic moment values in BM ranging between (1.90-1.94) which explains the extreme environment and diamagnetic behaviour of Zn (II) complexes. The octahedral geometry has been proposed for zinc complexes on the basis of conductivity and magnetic moment behaviour [26].

Electronic spectra

The electronic spectra of the metal complexes were recorded in 10^{-3} DMSO at 30^{0}C.(Table 4). The spectra show three transitions in the range 272-280 nm (36765-35714 cm^{-1}), and 333-339 nm (30030-29762 cm^{-1}) and 386-398 nm (25907-25126 cm^{-1}) ascribed π   π*, n   π*and the charge transfer transitions (LMCT) from the ligands to the metal, respectively [27-29]. All those band shows bath chromic shift in complexes in comparing to ligands indicating the coordination process.

FTIR Studies:-

The formation and purity of desired complexes was monitored by TLC and FTIR spectroscopy. FTIR spectra of the metal complexes were recorded in KBr discs over the range 4000-400 cm^{-1}. Some important frequencies are shown in table 4. Various absorption bands were seen in spectra of ligands and metal complexes. Some of this band in these ligand disappeared from complex while some of the bands were shifted. This phenomenon indicates coordination of metal to ligands leads to form metal complexes.

The strong and medium band at 3467, 3452 cm^{-1}and 3412.08, 3527 cm^{-1} in paracetamol and serine were due tov (OH). This band in paracetamol and serine found to be disappearing in metal complexes this clearly indicates complexations of metal ion through phenolic oxygen of paracetamol.

There is a sharp band in the range of 1622-1595 cm^{-1} in paracetamol which assign due to ν (CO) stretching vibration. This band was found to shift to 1759-1553 cm^{-1} in metal complexes conforming complexation of metal ion through carbonyl oxygen of paracetamol. Furthermore, there are new absorption bands in the range of 596-504 cm^{-1} in metal complexes which were absent in ligand this band were assigned to ν(M-O) and not ν(M-N) as absorption band at 440-425 cm^{-1} were absent. The broad band at 3500 cm^{-1} in the metal complexes were assign to ν(OH) of coordinated water

By comparing the spectra of free amino acids, it has been proved that there is decrease in the N-H stretching frequency on complex formation [30-31]. Character and strength of the M-N bond has been correlated to the shift of N-H stretching band. A [32-34] broad band observed in the region between 3412.08-3527.80 cm^{-1} due to asymmetric and symmetric O–H stretching modes and a weak band in the range 1578-1570 cm^{-1} due to H–O–H bending vibrations indicating presence of water molecules further confirmed by thermal studies

NMR Spectra

NMR Spectra of complexes in DMSO exhibits a single at δ = 2.8ppm (2H, NH$_2$) due to amino group and broad multiples in the region of δ = 6.6-7.8 ppm (m, 4H) due to aromatic protons. The presence of water molecule is by newly appearance of signal around δ = 3.5ppm.

In case of serine a triplet at δ = 2.5 ppm (t, 1H) ofCH proton was obtained due to-CH-CH3 and doublet at δ = 3.9 ppm (d, 2H) of CH2 proton was obtained due to-CH-CH2OH.A singlet δ = 5.9 ppm (S, 1H) of OH and A singlet δ = 3.9 ppm (S, 2H) of -NH Proton.

A complex of L-Isoleucine shows a triplet at at δ = 1.0 ppm (t, 3H) of CH3 proton was obtained due to-CH2-CH3,doublet at at δ = 1.0 ppm (d, 3H) of CH3 proton was obtained due to-CH-CH3,multiplet atδ = 1.5 ppm (m, 2H) of CH2 proton, another multiplet at 1.6 (m,1H) due to CH proton and a doublet δ = 1.5 ppm (d, 1H) of CH proton.

XRD

Like most of the metal organic complexes, these complexes also decompose to a fine powder of metal oxide i.e. ZnO. The constant weight plateau in TG after 610C indicates completion of the reaction. The ZnO formed was confirmed by X-ray diffraction pattern of the decomposed product [35].

Table1. Empirical formula, molecular weight, colour of the Zinccomplexes studied

Sr. No.	Complex	Empirical Formula	Molecular Weight	Colour	pH
1	[Zn(Par)(Ser)].2H$_2$O	ZnC$_{11}$H$_{19}$O$_7$N$_2$	356.574	Yellow	7.00
2	[Zn(Par)(Iso)].2H$_2$O	ZnC$_{14}$H$_{25}$O$_6$N$_2$	382.760	Yellow	6.97
3	[Zn(Par)(Pro)].2H$_2$O	Zn C$_{13}$H$_{21}$O$_6$N$_2$	366.717	Yellow	6.98

Par. represents the deprotonated primary ligand paracetamol, whereas Val, Thr and Ser. represent deprotonated secondary ligands: respectively.

Table 2:- Elemental analysis data, molar conductance & magnetic moments of Zn(II) complexes.

Sr. No.	Complex	Elemental Analysis Found(Calculated)					Molar conductance (Mhoscm2mol-1)	μ$_{eff.}$ (B.M.)
		%M	%C	%H	%N	%S		
1	[Zn(Par)(Ser)] .2H$_2$O	18.34 (18.31)	37.36 (37.35)	05.37 (05.33)	07.86 (07.85)	---	0.020	1.90
2	[Zn (Par)(Iso)] .2H$_2$O	17.08 (17.05)	43.93 (43.91)	06.58 (06.55)	07.59 (07.63)	---	0.019	1.97
3	[Zn (Par)(pro)] .2H$_2$O	17.83 (17.80)	42.57 (42.55)	05.77 (05.75)	07.63 (07.60)	---	0.021	1.94

Abbreviations see Table 1.

Table 3:- IR Spectral values of Zn (II) complexes

S.N.	Complex/ Ligand	-C=C	-C-N	-O-H	-C=O	-N-H	C-O	M-N (AA)	-M-O (Par, AA)
1	Paracetamol	1444.68 -566.20	1107.14-1257.89	3467,3452	1622, 1595	3382 str. 1566 b	1012.63	-	-
2	Amino acid	-	1909.07-1255.66	3412.08-3527.80 str.	1687 1755.2	-	1026.13 - 1141.86	-	-
3.	[Zn (Par)(Ser)] .2H$_2$O	1440.83-566.06	-	1321.24 (Phb)	1656.9	3327.21	1016.49	420	596,417 605
4.	[Zn(Par)(Iso)].2H$_2$O	1442.83-1562.27	1107.14-236.37	1371.39 (Phb)	1658.85	3330.21	1014.56	410	596,504 600
5.	[Zn(Par)(Pro)].2H$_2$O	1430.3-1550.77	1109.07-321.24	1325.10	1666.5	3332.7	1011.63	419	596, 503, 610

Table 4:- Electronic Spectral Data of Zn (II) Complexes

Sr. No.	Complex	λ (nm)	ν (cm⁻¹)	Proposed Assignments
1.	[Zn (Par)(Ser)].2H$_2$O	274	36496	→ π π*
		334	29940	→ n π*
		394	25381	Charge transfer
2.	[Zn(Par)(Iso)].2H$_2$O	272	36765	→ π π*
		336	29752	→ n π*
		288	25773	Charge transfer
3.	[Zn(Par)(Pro)].2H$_2$O	280	35714	→ π π*
		333	30030	→ n π*
		386	25907	Charge transfer

Table 5. Antibacterial activity (mm) of zinc complex by agar cup method

Sr. No.	Complex	Test			
		S. aureus	C. diphteriae	S. typhi	E.coli
1	[Zn(Par)(Ser)].2H$_2$O	22	12	20	12
2	[Zn(Par)(Iso)].2H$_2$O	19	13	16	13
3	[Zn (Par)(Pro)].2H$_2$O	15	12	19	14

Table 6. MIC (mg/ml) data of zinc complexes.

Sr. No.	Complex	S.aureus	C. diphtheriae	S. typhi	E.coli
1	[Zn(Par)(Ser)].2H$_2$O	15	30	10	25
2	[Zn(Par)(Iso)].2H$_2$O	10	20	15	30
3	[Zn (Par)(Pro)].2H$_2$O	15	25	20	25
4.	Tetracycline	1.5	2.0	1.5	2.5
5.	Paractamol	90	150	120	50

The proposed structures for the complexes are,

[Zn(Par)(ser)].2H$_2$O   [Zn(Par(Iso)].2H$_2$O   [Zn(par)(Pro)].2H$_2$O
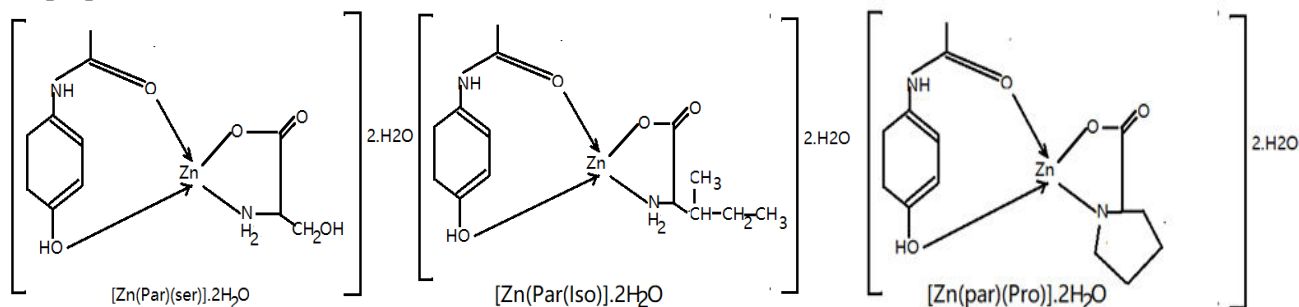
BIOLOGICAL STUDIES

All the metal complexes were screened against Staphylococcus aureus, Corynebacterium diphtheriae, Salmonella typhi and Escherichia coli.

The biological studies are based on agar cup method which revealed that the complexes are more sensitive against S. aureus and S. typhi. While less sensitive against E. coli and C. diphtheriae

The minimum inhibitory concentration (MIC) of metal complexes ranges between 50-150 μg/cm³ while that of metal complexes ranging between 10 to 30μg/cm3 which clearly indicates that the complexes are more sensitive against S. aureus and S. typhi. While less sensitive against E. coli and C. diphtheriae

The results show that, as compared to the activity of metal salts and free ligands the metal complexes show higher activity (Table 5 and 6). An enhanced biological activity of metal complexes is because of chelation. The chelation reduces considerably the polarity of metal ion I the complexes which in turns increases the hydrophobic character of the chelates and thus enable its permeation through the lipid layer of microorganism. On the basis of the physio-chemical studies, all complexes exhibit good antimicrobial activities. The tested mixed ligand complexes showed higher activities against selected strain microorganism so they are potential antimicrobial agents.

CONCLUSIONS

The method has used is very suitable and efficient for synthesis a mixed paracetamol-amino acid drug metal complexes where both the paracetamol and the amino acid found to act as a bi-dentate chelating ligand. These mixed ligand complexes were flexible organic backbone and their complexes contains five and six membered chelate rings, which do not contains strain. An electrical conductance studies shows non-electrolyte nature and magnetic studies indicate paramagnetic nature of the complexes. Electronic absorption spectra of the complexes show intra-ligand and charge transfer transitions. IR spectra show bonding of the metal ion through N-and O-donor atoms of the two ligands. On the basis of above results, square planar structure is proposed for copper complexes under study. The antibacterial study shows that complexes are found to be more active against S. aureus and P. aeruginosa as compared to C. diphtheria and E. coli compared to standard antibacterial compound, tetracycline, and the complexes show satisfactory activity against selected strains of microorganisms, so they are poetical anti-microbial agents.

ACKNOWLEDGMENTS

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Heavy Metals Analysis and Physico-Chemical Properties of *Pongamia Glabra* Seed Oil from Western Rajasthan

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ABSTRACT

Heavy metals are among the major environmental contaminants and pose a severe threat to human and animal health due to their long-term persistence in environment. Pongamia glabra is a medium-sized tropical tree belonging to Legumes family that is also known as Karanja in Hindi. Industrial polluted areas were selected for collection of seeds. Pongamia glabra seed samples were collected from nearby industrial area of Jodhpur, Rajasthan. Seed oil extracted from powdered seed sample by soxhlet extraction techniques using petroleum ether (40-60°C) as solvent. Physico-chemical properties and heavy metal analysis of seed oil are performed. MP-AES technique was used for determination of heavy metals such as Cd, Zn, Fe, Ni, Cu, Mn and Pb etc. present in seed oil of P. glabra. The physico-chemical properties of P. glabra seed oil was found to be iodine value 88.72 g/100g, moisture 3%, protein content 15.32%, ash content 2%, acid value 4.92 mg KOH/L, unsaponified matter 2.83% and saponification value 186 mg KOH/L. Hence the P. glabra seed oil tested during instant study could be an economical input material for biodiesel production. Methyl esters were synthesized from karanja oil by acid hydrolysis and then esterification process was performed with methanol and sulfuric acid (H_2SO_4) as catalysts. The fatty acids composition was determined by GC-FID of the P. glabra seed oil was palmitic acid 10.90%, stearic acid 6.28%, oleic acid 59.88%, linoleic acid 12.38%, lignoceric acid 1.35%, arachidic acid 1.53%, eicosenoic acid 1.34% and behenic acid 4.31%. This oil is a rich source of Omega-9 (oleic acid), which is a mono-unsaturated fatty acid, known to improve heart conditions by lowering cholesterol and reducing inflammation. The findings with this study might contribute to phytoremediation of heavy metal from polluted soil.

Keyword: Pongamia glabra, Heavy metals, FAME, GC, MP-AES.

INTRODUCTION

Pongamia Glabra is a medium-sized leguminous Indo-Malaysian fast-growing tree found in alluvial and coastal environments from India to Fiji, at an elevations range of 1200 meters above sea level (1-2), but also has ability to grow on marginal land and some tropical regions of Rajasthan. P. Glabra synonyms are Pongamia pinnata Merr., Millettia pinnata (L.) Panigrahi, pongamia glabra Vent., Derris indicia (Lam.) and Bennett Millettia novo-guineensis Kane. & Hat is a nitrogen-fixing plant that belongs to the leguminous family. P.glabra is also known as indian beech, kanji, karum, karanj, ghrtakarauja, pongam tree and karanja tree, depending on where it grows and what language it is spoken in.

The seeds of P. glabra are used for medicinal purpose and as a therapeutic product to treat different human disease, including skin problems, ulcers, piles, diabetes, wounds, rheumatism, and tumors, as well as in traditional Indian medicine (1). P. glabra is used in biomedicine as well as energy generation (3). For centuries, the pongamia tree has been used to treat illnesses and wounds (4-6) and its leaf extracts exhibits muscle relaxant and antipyretic properties, as well as corrosion inhibitor properties (7-8). Pongamia seed oil has been used to make biofuel and to protect crops as a bio-pesticide (9-11). P. glabra is recognised for its oils, which are derived from the seeds, bark, and roots which contain Karanjin (furanoflavonol) and Pongamol (12). The leaves, on the other hand, are used for feeding (13).
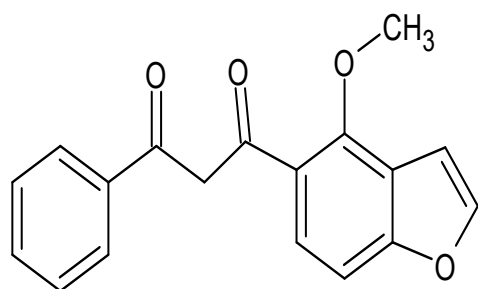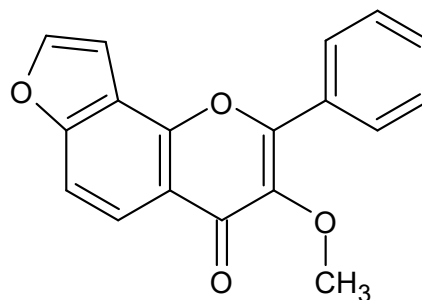
Pongamol   **Karanjin**

It has been cultivated in open fields, gardens and along the roadside in India due to this it consumes a lot of environmental pollutants emitted by vehicles and industrial wastes. Human activities are the primary source of heavy metal pollution. Every year, millions of tonnes of heavy metals are released into the atmosphere, ruining the environment's ecology and ecosystem while also endangering human health (14-19). Heavy metals released from numerous sources accumulate on the soil's surface. Heavy metals such as Zn, Fe, Ni, Pb, Cd, Co and Cu are emitted from various vehicle parts (20-24). Emissions by motor vehicles are a major cause of heavy metal pollution in the environment. Vehicle cables, pipes, battery, alloys, and tyres release heavy metals such as zinc (Zn), iron (Fe), lead (Pb), cadmium (Cd), cobalt (Co), chromium (Cr), nickel (Ni) and manganese (Mn) into the environment (25-29). Environmental pollution is caused by toxic substances and energy discharged into the air, water and land, affecting the earth's ecosystems. Automobiles industry is mainly identified as the world's leading source of pollution. Automobiles emit nitric oxides, carbon monoxide, lead, some organic compounds, toxic substances, and tiny particles (30-33). Heavy metals can be found in leather tanning, lead-acid batteries, fluorescent lighting, thermal power plants, fuel and the battery industries (34).

MATERIALS AND METHODS

Materials Collection and Sample Processing

For sample extraction, Fresh fruits of P. glabra were collected from industrial waste lands in Jodhpur district, Rajasthan (India). Fruits were washed with tap water to remove dust and other impurities from collected fruits. Collected fruits were dried further for fifteen days in sun light until fruit capsule were opened. Mature seeds from sun dried fruits were collected after removal of fruit capsule. Collected seeds were further dried in oven at 105 ^{0}C for 6 hrs. Seeds were further grinded to powder form using mortal-pestle and seed powder was used for analysis immediately. Seed powder was processed for oil extraction through soxhlet method through repeated washing with hot solvents (35). Two different solvents namely petroleum ether (40-60 $^°$C) and n-hexane were used in study. Petroleum ether and n-hexane solvent was removed completely by creating vacuum using rotary evaporator. The analytical values of seed and seed oil were determined according to the standard American Oil Chemist Society (AOCS) methods (36). Methyl esters of oil were prepared using trans-esterification technique (37), Direct analytical TLC test (38), 2,4DNP TLC test (39), Halphen test (40), picric-acid TLC test (41) and alkaline picrate test (42) were also performed on seed oil sample for detection of any unusual fatty acid.

PHYSICO-CHEMICAL ANALYSIS

Oil percentage

The seed oil was extracted from soxhlet extraction process. Excess solvents were reduced by processing sample in Rota-evaporator and balance solvent traces were removed by heating sample in oven at 105 $^°$C for 20 minutes. Oil present was weighed on weighing machine for measuring oil content and the percentage of oil in the initial sample was calculated using following formula

$$\text{oil percentage} = \frac{\text{weight of oil}}{\text{weight of flour sample}} \times 100$$

Calculating of oil content is an important indicator of profitability for a given plant to be used as a potential source of oil. Higher oil content in plant seeds implies that oil extraction from particular plant would make economic sense (43).

Specific Gravity

Pycnometer method is used for determining the density of liquids and their specific gravity. Pycnometers are small volume glass or metal containers (around 2 ml) with a determined volume (44-45). The specific gravity (SG) of the extracted oils was determined from the ratio of the mass of a specified volume of oil in pycnometer to the mass of an equal volume of water, at temperatures of 40 $^°$C in water bath.

Acid Value

Acid value also known as "neutralization number" or "acid number" or "acidity" is the mass of potassium hydroxide (KOH) in milligrams that is required to neutralize one gram of chemical substance (46-47). Acid value of sample shows the purity of oil (48).

Iodine Value

For calculation of iodine content, 0.2 gm Oil was weighed accurately by transfer method into a 250 mL iodine flask and dissolved in 20 ml chloroform. 20 ml Wij's reagent was added by pipette method. The flask was stirred and kept in darkness for 1h with intermittent shaking. Then 15% of potassium iodide solution (10 mL) and 50 mL of distilled water were added to the flask and mixture was shaken well. The liberated iodine was

titrated with 0.1 N sodium thiosulfate solution using fresh starch solution as indicator. A blank titration was also conducted simultaneously (49).

Saponification Value or Koettstorfer Value
Saponification or Koettstorfer value is defined as the number of milligrams of potassium hydroxide required to saponify 1 gram of oil (50). Oils having high saponification value containing mainly Fatty Acids of lower molecular mass are useful for soap making industry (51).

Unsaponifiable Matter
For determining unsaponifiable matter content, saponification with alcoholic potassium hydroxide (0.5 M) was done on oil sample. Diethyl ether was added to saponified sample and sample was separated using a separating funnel. Crude extract was washed off with water and the organic solvent was evaporated. Subsequently unsaponifiable matter was dried in oven at $105^{\circ}C$ and weighed to calculate the percentage of unsaponifiable matter. Antioxidant presence was detected in minor quantity in the oil present in unsaponifiable matter thus free radical elimination by antioxidant and other related health benefits can be derived from seed oil for animals and human (52). Shea butter, avocado, sesame, soybean and olive oils have high unsaponifiable fractions thus these plant derived oils are known to be used in cosmetics applications because of higher efficacy on dry and damaged skins (53-55).

Heavy Metal Analysis
For analysis of metals and metalloids, Microwave Plasma Atomic Emission Spectroscopy (MP-AES) was used for heavy metal analysis which is a common and effective method instrumental for metal analysis. For heavy metal analysis, liquid sample was aspirated and mixed with combustible gases namely Nitrogen and air. Ignited temperature of mixture over a flame ranges from 2100 to $2800^{o}C$. Metals which can be analyzed by Microwave Plasma Atomic Emission Spectroscopy include Zn, Fe, Cu, Cr, Pb, Cd etc. and metalloids like antimony, arsenic, selenium and tellurium can also be analyzed effectively using hydride generation atomic absorption spectroscopy (56-57).

Seed Oil Digestion Analysis Method
Samples digestion of sample under study was done using the wet digestion method. For this purpose, approximately 0.2 g of sample weight was placed in a 100-mL volumetric flask and about 4 mL of HNO_3 was added to volumetric flask. Sample was left undisturbed for a few hours and was later heated carefully over a water bath till the time red fumes coming out from the flask ceased completely. After this activity, flask was allowed to cool at room temperature, and added about 4 mL of per-chloric acid. Sample was heated again over water bath to evaporate such that only a small sample remains. Filter the remaining sample through Whatman filter paper No. 42 and add up distilled water to make the volume up to 100 ml.

Preparation of Standard Solution for Metal
In spectrophotometric measurements, we are interested in solutions with very low metal concentrations. As a consequence, the standard solution for analysis will also need to have a very low concentration of the relevant metal. Standards were prepared by dissolving 1 gram of metal cadmium, nickel, iron, lead, and zinc in a minimal amount of aqua regia (3:1) HCl and HNO_3, and then adding deionized water to make up to 1 liter in a volumetric flask. That was a stock solution containing about 1mg/L of the needed metals, and the working standard solution was prepared by further dilution of the stock solution as per requirements.

Fatty Acid Analysis
A two steps process for determination of fatty acids composition of P. glabra plant oil was followed. In first step, mixed fatty acids were obtained through oil hydrolysis and in second step, thus obtained fatty acid mixture was further derivatised to their methyl esters. Thin layer chromatography (TLC) was used to indicate formation of methyl esters. And methyl esters thus obtained were analysed by GC-FID.

RESULTS AND DISCUSSION
Physico-Chemical Analysis Results
AOCS method was used for calculating physico-chemical properties such as oil percentage, moisture content, ash content, iodine value, acid value, specific gravity, saponification value, unsponification matter percentage etc. Physico-chemical parameters value are shown in Table 1 below

Table 1: Physico-chemical parameters value

S.NO	Physico-chemical properties	Value
1	Oil (%)	32.40
2	Moisture (%)	3

3	Ash content (%)	2
4	Protein content (%)	15.32
5	Acid value (mg KOH/L)	4.92
6	Iodine value (g/100g)	88.72
7	Saponification value (mg KOH/L)	186
8	Unsaponifiable matter (%)	2.83
9	Specific gravity	0.9049

HEAVY METAL ANALYSIS RESULT

MP-AES technique was used for detection of heavy metals during study. Wavelength and nebulizer flow for various metals are shown in Table 2. Nitrogen flame was used as the source gas for detection of heavy metal. Findings of study are shown in Table 3.

TABLE 2: Wavelength and nebulizer flow for various metals used in MP-AES

S.No	Element	Wavelength(nm)	Type	Nebulizer flow (L/min)
1	Cr	425.433	Analyte	0.90
2	Mn	403.076	Analyte	0.90
3	Co	340.512	Analyte	0.75
4	Ni	352.454	Analyte	0.70
5	Cu	324.754	Analyte	0.70
6	Zn	213.857	Analyte	0.45
7	Cd	228.802	Analyte	0.50
8	As	234.984	Analyte	0.75
9	Pb	405.781	Analyte	0.75
10	Fe	371.993	Analyte	0.65

TABLE 3: Heavy metal concentration of Pongamia glabra

S.NO.	Heavy metals	Concentration
1	Zinc (Zn)	25.57 mg/L
2	Manganese (Mn)	2.20 mg/L
3	Iron (Fe)	1.36 mg/L
4	Copper (Cu)	0.25 mg/L
5	Lead (Pb)	0.22 mg/L
6	Chromium (Cr)	0.10 mg/L
7	Nickel (Ni)	0.06 mg/L
8	Cadmium (Cd)	0.02 mg/L
9	Cobalt (Co)	0.02 mg/L

Zn can interrupt the activity in soil thus soil fertility, as it negatively influences the activity of microorganisms and earthworms in soil, thus retarding the breakdown of organic matter (58). Higher Zinc concentration may cause vomiting, renal damage, cramps etc in human body. Fe is essential metals for biological processed such as phyto synthesis, chloroplast development and chlorophyll biosynthesis in all plant and it is a major constituent of the cell redox system. Fe^{+2} in excess amounts can result into free radical production that impairs cellular structure. The damage caused by free radicals is generally irreversible and results into damaged membrane, DNA and Proteins (59-60).

GC-FID Analysis

As determined from GC-FID analysis, P. glabra seed oil contains more unsaturated fatty acids, especially Oleic acid and Linoleic acid. It can be deduced from Graph 1 and Figure 1 that palmitic acid was the major saturated fatty acid (10.90%) followed by Stearic acid (6.28%). The unsaturated fatty acids are major constituent of P. glabra seed oil (containing 73.60% UFAs). Oleic acid (59.88%) was the major unsaturated fatty acid followed by Linoleic acid (12.38%).Table 4 show all the fatty acid compositions. Other fatty acids present in minute quantity are Behenic acid (4.31%), Arachidic acid (1.53%), Lignoceric acid (1.35%), Eicosenoic acid (1.34 %), in P. glabra oil seeds.

TABLE 4: Fatty acid composition of Pongamia glabra

S.NO.	Name of fatty acids	Lipid number	Fatty acid %
1	Oleic acid	18:1	59.88

2	Linoleic acid	18:2	12.38
3	Palmitic acid	16:0	10.90
4	Stearic acid	18:0	6.28
5	Behenic acid	22:0	4.31
6	Arachidic acid	20:0	1.53
7	Lignoceric acid	24:0	1.35
8	Eicosenoic acid	20:1	1.34
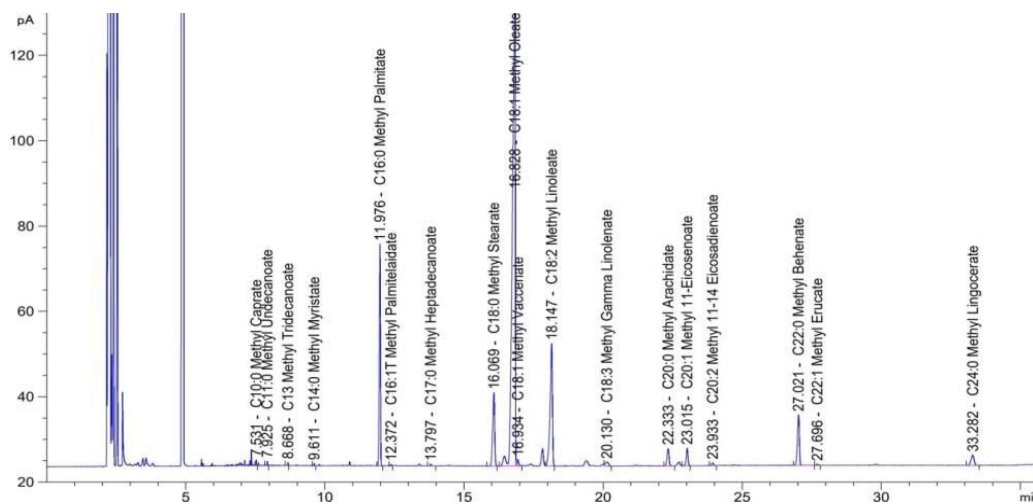
Figure 1: GC-FID of Pongamia glabra
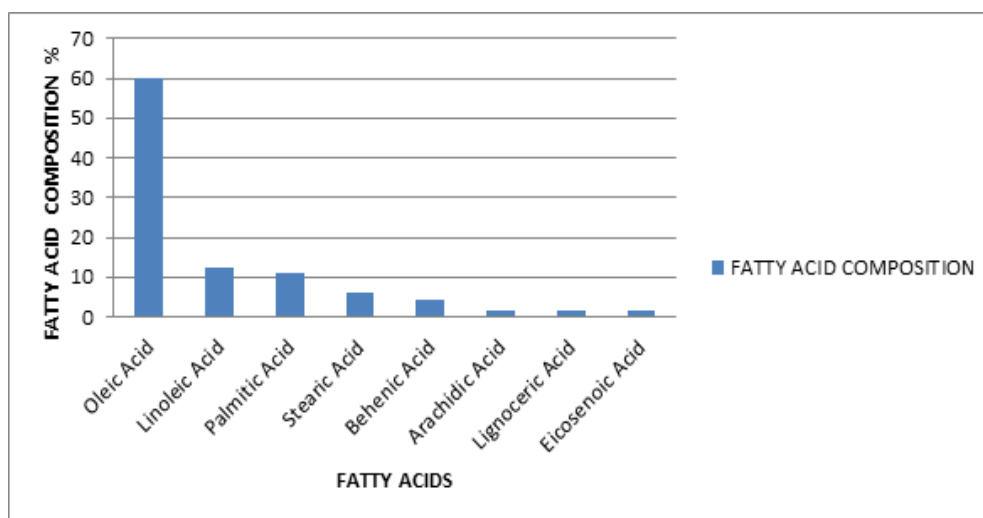
Graph 1: Plot shows composition of fatty acids

CONCLUSION

In conclusion, the seed oils of the Pongamia glabra species, which are extensively dispersed in Rajasthan, seem to be a viable source of polyunsaturated fatty acids, according to the current study. The predominant unsaturated fatty acids were oleic acid and linoleic acid. Oil from Pongamia glabra seeds has the potential to be a healthy supply of oil for people in developing countries. High levels of oleic acid (omega-9) and linoleic acid (omega-6) were detected. Omega-9(oleic acid) is a mono-unsaturated fatty acid, known to improve heart conditions by lowering cholesterol and reducing inflammation. Oleic acid is an important fatty acid that is utilised in cosmetics as well as ayurvedic therapeutic remedies and Linoleic acid is a fatty acid that is required for human survival. Because of the zinc-rich soil in the area, the value of zinc (Zn) was discovered to be substantially greater throughout the current examination. Excessive concentration of zinc replaces other essential minerals including iron, manganese, copper and a variety of others in hundreds or possibly thousands of enzyme binding sites.

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Synthesis, Spectroscopic, Thermal and Antibacterial Studies of Mixed Ligand Lanthanum (III) Complexes with Polydentate Ligands

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ABSTRACT

Preparation of Lanthanum (III) complexes of type [M (Q) (L).H_2O] have been takes place by using 8-hydroxy quinoline (HQ) as a primary Ligand and N- and O- donor amino acids (HL) such as L-isolucine and L-hydroxy proline as secondary ligands. The mixed ligand Lanthanum complexes has been characterized by elemental analysis,electrical conductance room temperature magnetic susceptibility measurement,spectral and thermal studies. Electrical conductance studies of the complexes shows their non-electrolytic nature.Electrical conductance room temperature magnetic susceptibility indicates that Lanthanum(III) complexes are dimagnetic in nature.Electronic Absorption spectra of the complexes explains the intra ligand, charge transfer and d-d transitions respectively. The thermal analysis data of the complexes specify the presence of coordinated water molecules. FTIR spectra gives bonding of the metal ion through N- and O- donor atoms of the ligand molecules. Tube dilution and agar cup methods were implemented for the study of antibacterial activity of the complexes against S.aureus, C.diphtheriae, S.typhi and P.auruginosa. The antibacterial activity of the prepared lanthanum complexes have been determined by using tetracycline as standard antibacterial compound and it was found that, the complexes show mild activity against selected stains of micro- organism than standard tetracycline.

Keywords: Lanthanum complexes, characterization, non electrolytes and standard antibacterial compound.

INTRODUCTION

Researchers have studied characterization and biological study of mixed ligand complexes of transition metals [1]-[6].Metal complexes play a very important role in biological process [1],[8]. Mixed ligand metal complexes with 8- Hydroxyquinoline exhibited biological activity [9]-[11]. Mixed ligand complexes are formed with amino acids which are well known for their biological significance [12]. Mixed ligand complexes of Ce(III) showed that anti fungal activity [13]-[14].These complexes are also characterize for their cytotoxic activity[15]. Lanthanum complexes have been assayed for anticancer activity *in vitro* against HL-60 (human leukocytoma) cells,PC-3MIE8 (human prostate carcinoma) cells, BGC-823 (human stomach carcinoma) cells, MDA-MB-435 (human galactophore carcinoma) cells, Bel-7402 (human liver carcinoma) cells and Hela (human cervix carcinoma) cells [20]-[22].

The author therefore thought to undertake the study of mixed ligand complexes of lanthanum, with 8-hydroxyquinoline (HQ) as a primary ligand and N- and/or O -donor amino acids (HL) such as, as L-isoleucine and L-hydroxylproline as secondary ligands. The metal complexes have been characterized by element analysis and various physic-chemical techniques such as molar conductance, room temperature magnetic susceptibility, electronic spectra, IR spectra and thermal studies.

EXPERIMENTAL

MATERIALS

Lanthanum (lll) chloride heptahydrate of analytical grade was used as such without purification. Amino acids, L-isoleucine and L-hydroxylproline were obtained from E. Merck. Solvents like DMF and DMSO whenever used were distilled and purified according to standard procedure (16)-(18).

Synthesis of mixed ligand complexes

The lanthanum (lll) complexes were synthesized from lanthanum chloride heptahydrate with primary ligand (HQ) and as L-isoleucine and L-hydroxylproline as secondary ligand (HL) in 1:2:1 proportion. To an aqueous solution (10ml) of lanthanum (lll) chloride heptahydrate (371mg, 1mmol), ethanolic solution (20 ml of 8-hydroxyquinoline (290mg, 2mmol) was added. The mixture was stirred and kept in boiling water bath for 10 minutes. To this hot solution, an aqueous solution (10ml) of amino acids (1mmol) was added with constant stirring. The mixture was again heated in a water bath till the temperature reached to 50° c. The complexes were precipitated by raising pH of the reaction mixture by adding diluted amino solution. The mixture was cooled and solid complex obtained was filtered, washed, with water followed by ethanol. The complexes thus prepared were dried under vacuum and were used for further studies.

INSTRUMENTATION

The synthesized lanthanum (lll) complexes were analyzed for C, H, and N content on Thermo Finnegan Elemental Analyzer Model no. FLASH EA 1112 series at the department of chemistry, I.I.T.Mumbai. Metal content was estimated gravimetrically by standard procedure [19], [20]. The molar conductance values were measured in DMF (10^{-3}M) on an Equiptronics Auto ranging Conductivity Meter Model No. EQ-667. Room temperature magnetic susceptibility were measured by a Guoy method using $Hg[Co(SCN)_4]$ as a calibrate at the Department of chemistry, I.I.T. , Mumbai. The electronic absorption spectra of all the complexes in DMF solution (10^{-4}M) in the ultraviolet and visible region were recorded on Shimadzu UV/VIS-160 spectrophotometer. FT-IR spectra were recorded in KBr disc on PerkinElmer FT-IR spectrophotometer model 1600 at Department of Chemistry, I.I.T.Mumbai. Thermal analysis (TG and DTA) were carried out in control Nitrogen atmosphere on a Perkin-Elmer Diamond TG-DTA Instrument Department of Chemistry, I.I.T., Mumbai by recording the change in weight of complexes on increasing temperature up to 900° C at the heating rate of 10° C per minute.

Antibacterial Activity of Lanthanum(III) Complexes by
Agar Cup Method

In this method, a single compound can be tested against number of organisms or given organism against different concentration of the same compound. It was found suitable for semisolid or liquid samples and was used in the present work. In agar cup method, a plate of sterile nutrient agar with the desired test strain was poured to a high of about of 5mm, allowed solidified and single cup of 8mm diameter was cut from the central of the plate with sterile cork borer. There after the cup was filled with the sample solution of 1000μg/cm³ concentration. The test solution was allowed to diffuse in surrounding agar by keeping in refrigerator for 10minutes and the plate was incubated at 37°C for 24 hours. The extent of inhibition of growth from the edge of the cup was a considered as a measure of the activities of give compound. By using several plates simultaneously, the activities of several samples could qualitative studied.

Tube Dilution Method

The test compounds were subjected to in *vitro*screening against *Staphylococcus aureus Corynebacterium diphtheriae , Salmonella typhi and P. aeruginosa* using Muller   Hinton broth as the culture medium.

The test compound (10mg) was dissolved in DMSO (10cm³) so as to prepare a stock solution concentration 1000μg/cm³. From the stock solution, aliquots of 5,10,15,20 to …………, 250 μg/cm³ were obtained in test broth. Bacterial inoculums were prepared in a sterilized Muller Hinton broth and incubated for 24 hrs. at 37^Oc.The aliquots were dispensed($5cm^3$) in each borosilicate test tube(150×20mm).The bacterial inoculums 0.1 cm^3 of the desired bacterial strain(S.aureus, C.diphtheriae, S.typhi and P.auruginosa) containing 10^6 bacteria/$cm^3$was inoculated in the tube. The tube was incubated at 37^Oc for 24 hrs. and then examined for the presence or absence of the growth of the test organisms. Tetracycline was used as standard drug again Gram positive and Gram negative bacteria by similar screening procedure. The solvent DMSO was also tested as control to see that it did not affect the growth of the culture .MIC of tetracycline was found to be 1.5μg/cm^3against S.aureus 2.0μg/cm^3against C.diphtheriae 1.5μg/cm^3against S.typhi and 8.0μg/cm^3against P.aeuruginosa.

Results and Discussion
Characterization of metal complexes

The Preparation reaction of mixed ligand La(III) complexes may be represented as $LaCl_3 \cdot 7H_2O$ + 2HQ + HL ------------> $[La(Q)_2(L) \cdot 2H_2O]$ + 3HCl + $5H_2O$ (Where, HQ is 8-hydroxyquinoline and HL is an amino acid).

All the complexes are colored, non-hygroscopic and thermally stable solid (Table 1 and 2).indicating a strong metal-ligand bond. The complexes are insoluble in common organic solvents. Such as ethyl alcohol, acetone, etc. but are partially soluble in DMF and DMSO. The elemental analysis data (Table 3) of metal complexes is consistent with their general formulation as 1:2:1, mixed ligand complexes of the type $[Ce(Q)_2(L) \cdot 2H_2O]$. The molar conductance values of the complexes in DMF at 10^{-3} M concentration are found to be 0.0019 – 0.0023 mhos cm^2 mol^{-1} indicating their non- electrolytic nature [21].

Table 1: Empirical Formula, Molecular Weight and Colour

Complex	Empirical Formula	Molecular Weight	Colour
[La(Q)2(Iso)·2H2O]	LaC24H28O6N3	593.40	Brown
[La(Q)2(HPro)·2H2O]	LaC23H24O7N3	593.36	Brown

Table 2: Decomposition temperature and P^H

Complex	Decomposition Temperature (^{o}C)	P^H
[La(Q)2(Iso)·2H2O]	250	6.99
[La(Q)2(HPro)·2H2O]	240	7.01

Where Q represents the deprotonated primary ligand 8- Hydroxyquinoline whereas Iso and HPro represents deprotonated secondary ligands, L-Isoleucine and L-Hydroxylproline respectively.

Table 3: Elemental Analysis Data and Molar Conductance of Cerium Complexes

Complex	Elemental Analysis found(Calculated)				Molar Conductance (mhos cm^2 mol^{-1})
	% M	%C	%H	%N	
[La(Q)2(Iso)·2H2O]	23.46 (23.41)	48.60 (48.58)	04.79 (04.76)	07.11 (07.08)	0.0016
[La(Q)2(HPro)·2H2O]	23.45 (23.41)	46.57 (46.56)	04.08 (04.08)	07.10 (07.08)	0.0012

MAGNETIC STUDIES:

The magnetic moment of the mixed ligand lanthanum (III) complexes (Table 4) were calculated from the measured magnetic susceptibilities after employing diamagnetic corrections and revealed their paramagnetic nature [22]-[23].

Table 4: Magnetic susceptibility data of Cerium (III) complexes (10^{-6} c.g.s. unit)

Complex	Xg	Xm	μ_{eff}(B.M)
[La(Q)2(Iso)·2H2O]	- 6.30 x 10-7	- 3.57 x 10-4	Diamagnetic
[La(Q)2(HPro)·2H2O]	- 6.78 x 10-7	- 3.84 x 10-4	Diamagnetic

Electronic absorption spectra

The electronic spectra of the metal complexes in DMF were recorded in the UV-Visible region (Table 5). The spectra shows three transitions $\pi \to \pi^*$, $n \to \pi^*$ and charge transfer transition from ligand to the metal respectively [24].

Table 5: The electronic spectra of the metal complexes

Complex	λ nm	ν cm^{-1}	Proposed Assignment
[La(Q)$_2$(Iso)·2H$_2$O]	279	35842	$\pi \to \pi^*$
	335	29851	$n \to \pi^*$
	397	25189	Charge-transfer
[La(Q)$_2$(HPro)·2H$_2$O	275	36364	$\pi \to \pi^*$
	335	29851	$n \to \pi^*$
	398	25126	Charge-transfer

UV-Visible Spectra of Lanthanum (III) Complexes

[La(Q)$_2$(Iso)·2H$_2$O]

[La(Q)$_2$(HPro)·2H$_2$O
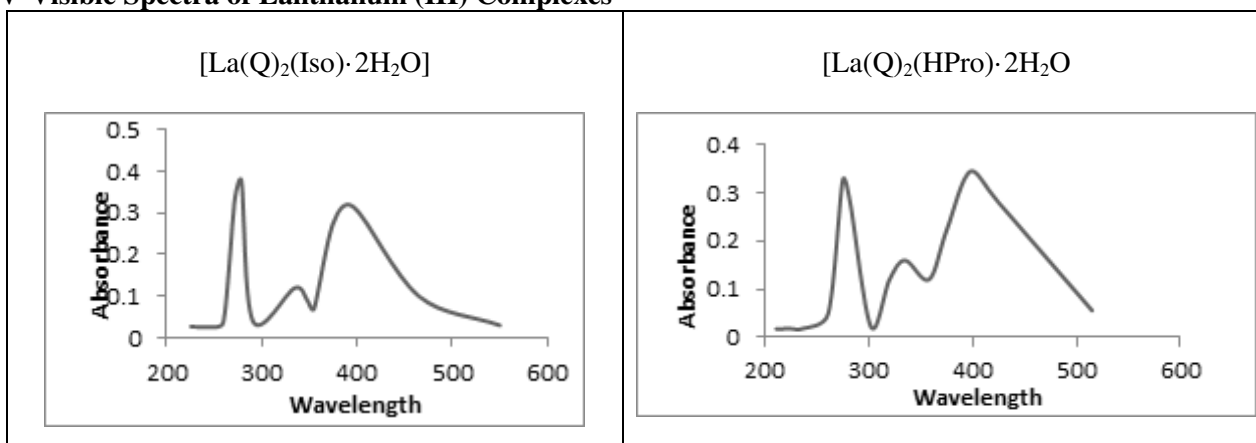
Infra-red spectra

The FTIR spectra of the metal complexes were recorded in a KBr disc over the range 4000-400cm^{-1}.These spectra's were complex due to presence of numerous bands with varying intensities, making the task quite

difficult. However, an attempt has been made to assign some of the important bands on the basis of reported infrared spectra of several N and / or O donor ligands, 8-hydroxy quinoline and their metal complexes. An important feature of infrared spectra of the metal complexes is the absence of band at ~3440 cm^{-1} due to the O-H stretching vibration of the free O-H group of HQ. This observation leads to the conclusion that complex formation takes place by deprotonation of hydroxyl group of HQ moiety. A strong v (CO) band observed in the range of 1110-1105 cm^{-1} in the spectra of the complexes, indicates the presence of the 8-hydroxyquinolate group in the complexes co-ordinating through its nitrogen and oxygen atoms in uninegative bidentate ligand. The v(C=N) mode observed at 1503cm^{-1} in the spectrum of free HQ ligand is found to be shifted to lower wave at 1503 cm^{-1} in the spectrum of the complexes, suggesting co-ordination through the tertiary nitrogen donor of HQ. The in-plane and out-of-plane deformation modes observed at ~500 cm^{-1} and ~780 cm^{-1} respectively, in the spectrum of HQ are shifted to higher wave numbers 504 cm^{-1} and 790 cm^{-1} respectively, conforming co-ordination through the nitrogen atom of HQ with the metal ion. A broad band observed in the region between 3210-3207 cm^{-1} due to asymmetric and symmetric O-H stretching modes and a weak band in the range of 1577-1575 cm^{-1} due to H-O-H bending vibrations indicating presence of co-ordinate water molecule [25] - [27], further confirmed by thermal studies. The N-H asymmetric and N-H symmetric vibrations observed at ~3042 cm^{-1} and ~1372 cm^{-1}, respectively, in the free amino acids are shifted to higher wave numbers i.e. in the range 3178-3082 cm^{-1} and 3055-3050 cm-1, respectively, in the spectra of the complexes, suggesting co-ordination of amino group through nitrogen with the metal ion. The $v_{symmetric}$ (COO-) band of the free amino acid i, e. ~1590 cm^{-1} is shifted to higher wave number, i.e. in the range 1639-1633 cm^{-1} and $v_{symmetric}$ (COO-) mode observed at ~1400 cm^{-1} in the spectra of free amino acids are shifted to lower wave numbers in the range of 1377-1372 cm^{-1}, in the spectra of complexes indicating the co-ordination of carboxylic acid group via oxygen with the metal ion. Coordination through the amino group of the amino acids has been further confirmed by the C-N symmetrical stretching frequency. It is observed at ~950 cm^{-1} in the spectra of free amino acids and found to be shifted to lower wave numbers912 cm^{-1} in the spectra of the complexes. Some new bands of weak intensity observed in the regions around 605-600 cm^{-1} and 409 cm^{-1} may be ascribed to M-O and M-N vibrations respectively. It may be noted that these vibrational bands are absent in the infra-red spectra of HQ as well as amino acids.

IR Spectra of Lanthanum(III) Complexes

| [La(Q)$_2$(Iso)·2H$_2$O] | [La(Q)$_2$(HPro)·2H$_2$O] |
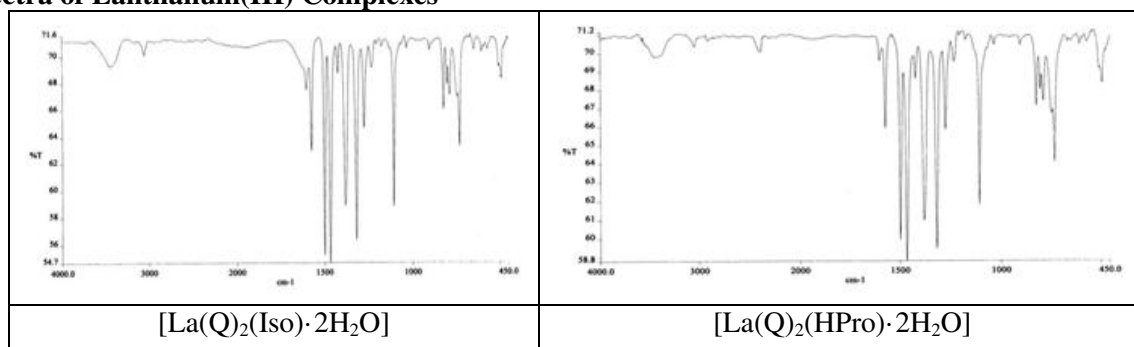
Thermal studies

The TG and DTA studies of the complexes have been recorded in the nitrogen atmosphere at the constant heating rate of 10^{0}C / minute. Thermal study on mixed ligand cerium complexes in controlled nitrogen atmosphere was carried out to understand stages of decomposition and temperature range of decomposition.The most probable decomposition pattern of the complexes is proposed on the basis of the careful examination of TG and DTA curves. The thermo analytical data is summarized in (Table 6, 7 and 8). The thermogram of these complexes shows the loss in weight corresponding to two water molecules in the temperature range 125-160^{0}C, followed by weight loss due to amino acids moiety in the temperature range 230-410^{0}C. The final step of decomposition observed in the temperature range 615-835^{0}C corresponds to two molecules of 8-hydroxyquinoline in the complex. The constant weight plateau in TG of lanthanum(III) after 835^{0}C indicates completion of the reaction.

Table 6: Thermal data of Lanthanum Complexes showing % Loss due to Water Molecules

Sr.No.	Complex	% Weight Loss due to Water Molecules		
		Temperature Range(^{0}C)	Found	Calculated
1	[La(Q)$_2$(Iso)·2H$_2$O]	130-150	6.00	6.07
2	[La(Q)$_2$(HPro)·2H$_2$O]	125-160	6.07	6.07

Table 7: Thermal data of Lanthanum Complexes showing % Loss due to Amino acid Molecules

Sr.No.	Complex	% Weight Loss due to Water Molecules		
		Temperature Range(^{0}C)	Found	Calculated
1	[Ce(Q)$_2$(Iso)·2H$_2$O]	250-405	22.10	21.94
2	[Ce(Q)$_2$(HPro)·2H$_2$O]	240-400	21.95	21.93

Table 8: Thermal data of Lanthanum Complexes showing % Loss due to 8-HQ Molecules

Sr.No.	Complex	% Weight Loss due to Water Molecules		
		Temperature Range(^{0}C)	Found	Calculated
1	[Ce(Q)$_2$(Iso)·2H$_2$O]	620-840	48.65	48.59
2	[Ce(Q)$_2$(HPro)·2H$_2$O]	610-830	48.64	48.59

TG Curves of Lanthanum(III) Complexes

| [La(Q)$_2$(Iso)·2H$_2$O] | [La(Q)$_2$(HPro)·2H$_2$O] |
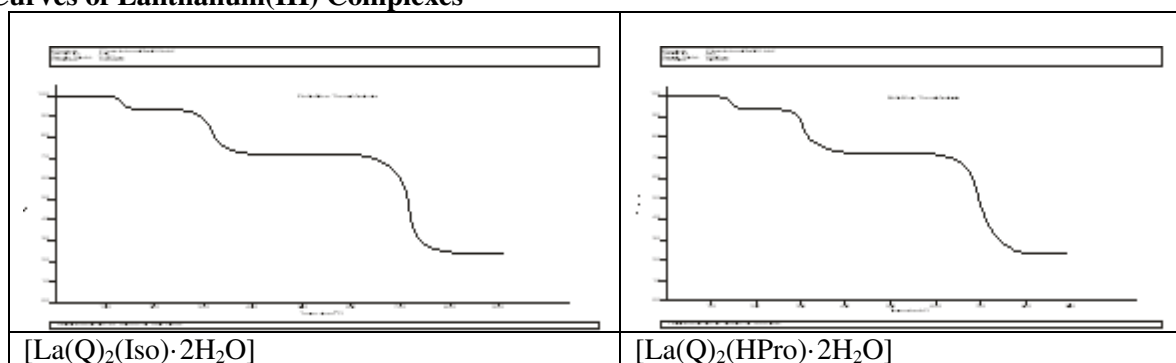
On the basis of physico-chemical studies, the bonding and structure for the lerium complexes may be represented as.
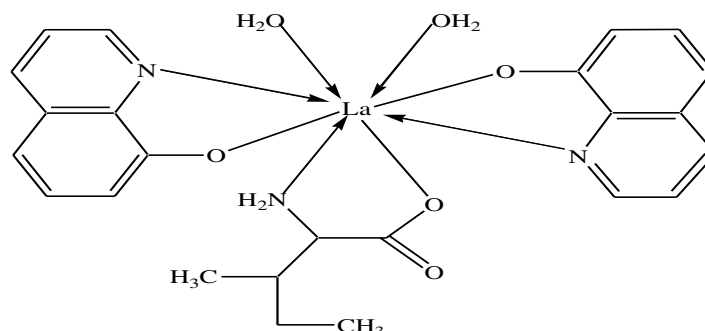
Figure 1: Proposed Structure of [La (Q) $_2$(Iso) ·2H$_2$O]
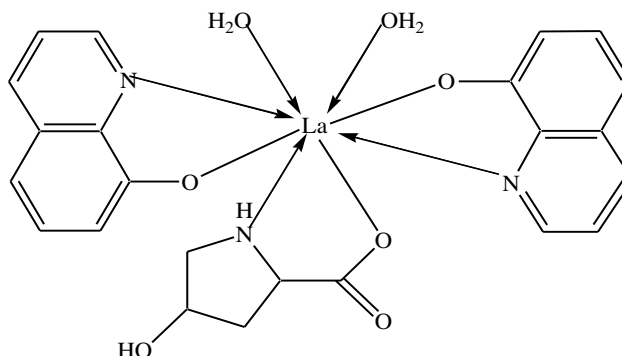
Figure 2: Proposed Structure of [La (Q) $_2$(HPro) ·2H$_2$O]

BIOLOGICAL STUDIES

The lanthanum complexes were screened against Staphylococcus aureus, Corynebacterium diphtheriae, Salmonella typhi and P. aeruginosa.

The studies based on agar cup method revealed that the complexes are more sensitive against S. aureus and S. typhi while less sensitive against C. diphtheria and P.auruginosa. (Table 9) The minimum inhibitory concentration (MIC) of ligand and the metal salts ranges between 50 and 300 µg / mL while that of metal complexes ranges between 5 and 35 µg/mL (Table 10).The complexes are found to be more active against S. aureus and S. typhi as compare to C. diphtheria and P.auruginosa. As compared to standard antibacterial

compound tetracycline, the complexes show moderate activity against selected strains of microorganisms. The results show that, as compared to the activity of metal salt and free ligand, the metal complexes show higher activity [28]. The activity of metal complexes is enhanced due to which in turn increases the hydrophobic character of the chelate and thus enables its permeation through the lipid layer of microorganism [29].

Table 9: Antibacterial Activity (mm) of Cerium Complexes by Agar Cup Method

Complex	Antibacterial Activity (mm) with			
	S. aureus	C. diphtheria	S. typhi	P.auruginosa
$[La(Q)_2(Iso)\cdot 2H_2O]$	26	15	23	13
$[La(Q)_2(HPro)\cdot 2H_2O]$	24	14	22	12
Tetracycline	30	25	26	18

Table 10: MIC (µg/mL) Data of Cerium Complexes

Complex	MIC (µg/mL)			
	S. aureus	S. aureus	S. aureus	S. aureus
$[La(Q)_2(Iso)\cdot 2H_2O]$	10	20	15	35
$[La(Q)_2(HPro)\cdot 2H_2O]$	05	20	15	25
8-hydroxyquinoline	50	200	150	250
Tetracycline	1.5	2.0	1.5	8.0

CONCLUSION

On the basis of the above observations, following conclusions are made.

The higher decomposition temperatures of the complexes indicate a strong metal-ligand bond.

Electrical conductance studies show non-electrolytic nature of the complexes.

Magnetic studies indicate dimagnetic nature of the Lanthanum complexes.

Electronic absorption spectra of the complexes show intra-ligand and charge transfer transitions .

IR spectra show bonding of the metal ion through N- and O- donor atoms of the two ligands.

Thermal analysis confirms presence of co-ordinated water molecules in Lanthanum complexes.

On the basis of above results, coordination number eight is proposed for all Lanthanum complexes.

The antibacterial study shows that Lanthanum(III) complexes are found to be more active against S. aureus and S. typhi as compared to C. diphtheriae and P. aeruginosa.

The microbial study of lanthanum(III) complexes shows that the potency of the complexes depends on various factors such as the composition of ligand,type of microorganism and the ability of metal ion to coordinate with ligand.

FUTURE SCOPE

The lanthanum complexes can be useful in pharmaceutical field by studying cytotoxic activities of these complexes.

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A Perspective on Patient Centricity in Health Ecosystem: A Call for an Enabling Culture

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ABSTRACT

Today, patients are more empowered and informative than ever because of which the aim of the health ecosystem is to centre on the patient centred goals. The term patient centricity is no longer a health care buzzword; however, a lot needs to be done to implement this concept in the real world. Therefore, the objective of the current article is to bring in the importance of cultural change in the health ecosystem for the smooth flow of patient centricity.

The current article is exploratory in nature that tried to explore the concept of patient centricity in the health ecosystem through various works published. The article utilized secondary sources such as Journal articles, reports, and such others to draw how OCTAPACE culture is important in health ecosystem for promoting patient centricity. The eight strong pillars of OCTAPACE are Openness, Confrontation, Trust, Autonomy, Proactivity, Authenticity, Collaboration, and Experimentation and its relationship with patient centricity is proposed. The readers can reasonably deduce that patient centricity requires a changed mindset and vision shared by all the stakeholders. For this, support from regulators, pharmaceutical companies, health care professionals etc. are required.

The article highlights the importance of OCTAPACE culture in health ecosystem. This construct to meet patient centric goals is worthy of additional study. From the practical standpoint, training can be provided to all the employees of the entire health ecosystem to incorporate the OCTAPACE culture and to meet the demands of the patients and caregivers.

Keywords: Culture, health ecosystem, OCTAPACE, patient centricity.

I. INTRODUCTION

"No decision about me, without me"
-NHS Britain

There is no doubt in the fact that one in twenty google searches is now related to health- related information. Revolution in Digital technology and social media have reached the plethora of patients in bringing awareness of patient centricity. Because of which today patients are voicing about the type of care they get, the medicines that are being developed, its applicative use, and about the regulatory path they can have[1]. This highlights the growing need of patient centricity in the entire health ecosystem. However, the question arises how to develop a patient centric approach within and between stakeholder organizations of health ecosystem? To answer this question, one will have to think about why there is a move towards patient centricity?, Why OCTAPACE culture is required to promote it? and what measures can be taken in order to endorse it in health ecosystem?

II. A MOVE TOWARDS PATIENT CENTRICITY

A move towards patient centricity was started when Food and Drug Administration (FDA) was working on the patient focussed Drug Development Initiative in 2012, and the term patient centricity was heard in 2014 when FDA Commissioner Margaret Hamburg's was delivering speech at New York BIO. Dr. Hamburg focused how FDA was collaborating with patients and advocacy groups in understanding the diseases better and how effective and user-friendly medical interventions can be developed[2]. Since then all the stakeholder organizations started working seriously towards patient centred goals.

The current article tries to associate the notion of patient centricity to the Customer Focussed Theory (CFT)[3]. The theory talks about gathering and understanding customer's requirement, collecting and utilising customer information, receiving the customer feedback and improving relationship with the customers. Similarly, patient centricity in the health ecosystem requires understanding the patient's needs and wants, capturing patient information and feedback and building relationship with the patients.

Today, Patient centricity is gaining importance because it is observed that a) there is an increase in usage of personal health monitoring devices among patients, b) patients have realised their decision making power and independence in healthcare system, c) patients are willing to share personal data in return for greater health

insights, d) patients are now more proactive and informed with access to medical information given in digital (web/internet sources) and non-digital sources (books, scientific literature, newspapers etc.), and e) new treatments are quite expensive[4]. In addition to it, patients are also demanding their involvement and engagement in the drug development process[5].

Patient centricity is defined as putting the patient first in the continuous engagement to achieve the best experience and outcome respectfully and compassionately for the patient and their family[6]. The focus is on education and information, co-creation, access, and transparency as the pillars of patient centricity. It means reaching out to patients and making them understand the disease with the assumption that better they are informed - better they will be able to take control and adhere to the treatment[7]. Construct of patient centricity revolves around communicating with patients about their preferences, needs and wants, exchange forums (e.g. patient advocacy groups), marketing practices, design and execution of clinical protocols and drug development process to meet the specific needs of individuals and their caregivers[8].

The approach to patient centricity if followed in the right manner, will be a win-win situation for the patients and the stakeholders of health ecosystem. As it will improve the patients' satisfaction, quality of care, clinical outcomes and along with reduced cost for healthcare. In turn, positive patient experiences will lead to increased brand reputation, better financial performance, new acquisitions of patients, and word of mouth advocacy for stakeholder organizations[9].

III. CHANGING ROLES OF DIFFERENT STAKEHOLDERS

Health ecosystem is evolving into a complex network of interconnected stakeholders that serve patients with different business models i.e. payers, hospitality, technology, manufacturing, regulations etc. having diverse approaches. It comprises of all the players which directly or indirectly are involved in catering to the patient's needs. Now, there are more stakeholders than before and there is an opportunity for each stakeholder to choreograph the others in a way that drives true patient centricity[10]. Different stakeholder organizations such as payers, hospitals, insurers, pharmaceutical companies, regulators etc. in the health ecosystem need to understand the implications of creating a patient centric culture in terms of decision-making processes, institutional habits (rules and norms), and information flow. Health ecosystem could gain patient centricity by collaboration with various organizations that are already experienced in patient interaction and work under defined protocols and regulatory framework. E.g. there is an ongoing collaboration between the FDA and European Medicines Agency (EMA) on patient involvement which enables the agencies to share the best practices in different domains. The role of different stakeholders in the health ecosystem is discussed as follows:

Payers (Government, Private insurers, and employers): Today, reimbursements of medicines are becoming increasingly dependent on the demonstrated value of medicines to patients. Therefore, payers are seeking confirmation in the form of Patient Reported Outcomes (PROs) and are involving Health-Technology Assessments (HTAs)[11].

Health Care Professionals (HCPs): HCPs are the first point of contact for the patient when he/she enters the health care system[12]. Therefore, it becomes imperative for HCPs in knowing the preferences, needs and experiences of the patients in their journey of treatment which will further help pharma companies to become more patient centric for their drug development process.

Government Agencies (FDA, EMA etc.): In the current scenario, Government agencies in the health ecosystem are taking initiatives by laying down standards and protocols for patient centricity. For instance, Regulatory bodies such as EMA, the National Institute for Health and Care Excellence (NICE) and different HTA groups have already established frameworks for patient engagement. Moreover, Consensus Framework for Ethical Collaboration is a multi-stakeholder platform that guides the conduct of various actors in health ecosystem on shared principles of ethical patient care[13].

Clinical Research Organizations (CROs): Today, CRO's help sponsors and pharma companies by improving their connections with patients by addressing the challenges of identifying and recruiting the appropriate patients for trials with better methods of identification, engagement, and interaction with patients. CROs engages with patients in a meaningful way throughout the design and execution of a clinical trial to meet patient centric goals[14,15].

Pharmaceutical Industry: Pharma is one of the stakeholders of ever evolving health ecosystem that has the intellectual and financial means to take on the role to choreograph the other stakeholders to drive the patient centricity as it has the right capabilities, relationships, and insights to integrate the ecosystem[10]. To cater to patient goals, continuous engagements with patients and other stakeholders are required from the product development stages to commercialization stages and even beyond that[16]. PROs are becoming important in trials

as it captures relevant information for patients, identify their preferences, and better inform treatment decision making[17].

Patient Advocacy Groups (PAGs): PAGs are non-profit groups whose primary mission is to combat a particular disease or disability and to improve the health and wellbeing of patient. PAGs offer practical advice and emotional support to patients by showing empathy and understanding. PAGs can be formal organizations like the American Heart Association and March of Dimes, or they can be informal cooperatives like the Diabetes Online Community[18]. PAGs also campaign to make sure that patients' needs are recognized and supported within healthcare systems at national and international levels to ensure patient centricity[19].

Healthcare Technology Facilitators: Nowadays, healthcare facilitators are evolving day by day. Technology-enabled healthcare is the future and its growth is fuelled by increasing reach of the internet and rising consumption of data. Blockchain, Artificial Intelligence (AI), Internet of Things and such other technologies have the capability to integrate various patient services and stakeholder partnerships in the health ecosystem. Therefore, digital mind-set is crucial for patient centricity[20].

IV. Enabling Patient Centric Culture Through Octapace- A Way Forward

Entire health ecosystem must strategically align towards increase in patient centricity by being transparent, building trust, improving Research and Development, and by refining the overall experience of patients[21]. Vaida maintained that advancements are required within and between stakeholders in the healthcare system[22]. Few researchers maintained that there is a need to build a good culture in the system[10]. The culture of patient centricity should be adopted at every level in the health ecosystem. This will not only bring positivity for patients but a lasting change in the organizations as a whole and enlarge the employee's engagement and experience[23]. Therefore, the intent of the current article is to build OCTAPACE culture within and between the different stakeholder organizations of health ecosystem to imbibe the true essence of patient centricity.

Organizational culture (OC) can be outlined as the underlying spirit of character of an entity that is made up of its beliefs, customs, and practices. OC includes the values, beliefs, behavioural norms, and shared expectations among the members of the organizations. In terms of patient centricity, patient centric culture in any organization is defined as an architectural configuration of values, tasks, functions, policies, and practices that puts the patient at the core of the system. This culture allows the organization to focus on patients in their end to end journey. Patient centricity is also considered as the mindset that is infused throughout the organization from top to bottom[24]. A healthy OC rests on the eight strong pillars of OCTAPACE referring to Openness, Confrontation, Trust, Authenticity, Proactivity, Autonomy, Collaboration and Experimentation which were pioneered by Udai Pareek and T.V. Rao[23].

The eight dimensions of OCTAPACE culture[25] and their outcomes in health ecosystem are discussed. The article proposes the model based on the collected works as shown in Figure 1.

OPENNESS

Openness means when employees feel free to discuss and exchange ideas and information with one another which results in better performance. It is a tool to promote unbiased performance feedback and facilitate in problem solving ability. Organizations in health ecosystem should also create the open environment where employees can discuss freely on the patient centric goals. Openness will promote setting of common goals and objectives towards patient-centricity of different stakeholders. It will also contribute to strategies development through free interaction among various team players of the health ecosystem in achieving that common goal. For instance, PROs that are reported directly by the patients such as symptoms, health related quality of life or the health status can be discussed freely within and outside the organizations among clinicians, and policy makers to give the patients best therapeutic treatment and quality care to meet patient centricity[26].

Proposition 1: Openness is positively related to Patient Centricity

CONFRONTATION

Confrontation basically means taking up the challenges upfront and with equity. All the problems should be investigated deeply, and proper discussion should be made without hurting anybody's feeling in solving the problem. If done in the right perspective it will lead to positive mind-set, better role clarity and willingness to solve the problem. Confrontation will allow to reach consensus for patient-centricity by different stakeholders of the health ecosystem if they find deviations in the patient centred goals. For instance, proper confrontation may help reduce the challenges such as: patent/exclusivity, novel therapies and technology, protection of public health, unethical clinical trials, healthcare policies and regulatory framework in the health ecosystem to promote patient centricity[27].

Proposition 2: Confrontation is positively related to Patient Centricity

Trust: Trust is when employees, departments, and groups can be relied upon to do whatever they say they will do. In the organizations, trustworthiness is improved by maintaining the confidentiality of information shared and in not misusing it. If there is low trust in any organization, the credibility of the system goes down. In health ecosystem where diversified stakeholders are involved, trust will help in reduction of stress as well as in simplification of forms and procedures. Trust will also lead to higher empathy and timely support for the stakeholders in achieving the common objective of patient centricity. Furthermore, patients often lack clarity about maintenance of their health records and struggle to access their own data. Data sharing and privacy issues always remain a concern for them, therefore, privacy must be protected, data ownership should be clear, and standards of protection should be followed to promote trust among patients[28]. Trust can also be built through clear communication about medicines' risk benefit profiles and a transparent drug development process. In this case, good relationships between patients, industry, and healthcare practitioners are essential for building credibility towards patient centricity[16].

Proposition 3: Trust is positively related to Patient Centricity
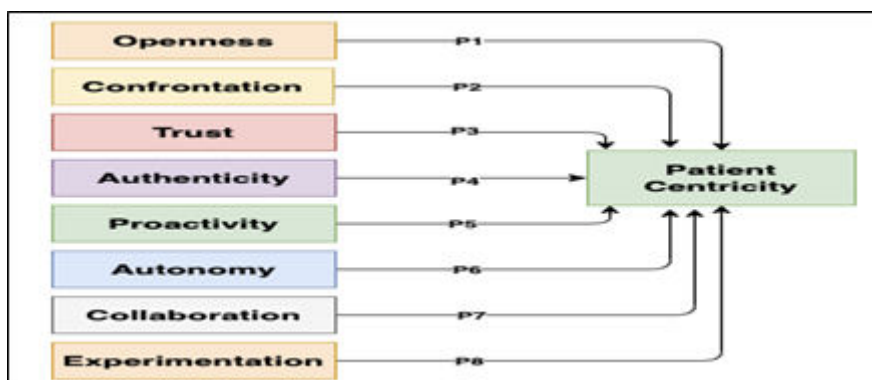
Fig. 1: OCTAPACE Culture elements and its relation with Patient Centricity

AUTHENTICITY

Authenticity means up to what extent the employees are keeping their promises and are truthful. It measures congruence between what one's say, feel and deliver. It also promotes owning up of mistakes without any fear. In health ecosystem where widespread stakeholders are working closely, it is essential to have less distorted communication. For instance, Gritzalis endorsed that authenticity of Electronic Health Records is crucial for the trustworthiness of a Health Information System, especially in networked environments where data is transmitted over insecure channels and where different stakeholders have not met in person[29]. However, sharing the information raises security issues such as: privacy, confidentiality and integrity[30]. Therefore, it becomes necessary to protect the health information from unauthorized access, use, disclosure, disruption, modification or destruction. Hence, authenticity is the only solution towards patient centricity.

Proposition 4: Authenticity is positively related to Patient Centricity

Pro-Activity: Pro-Activity means anticipating issues in advance to take necessary action Proactiveness also implies encouraging employees to take initiative so that culture of innovation and creativity can be developed in the organization. A proactive healthcare approach focusses on what different stakeholders can do to prevent potential health issues before they occur. For instance, proactive healthcare initiatives always strive to involve patients in their own care, allowing physicians, patient advocacy groups, healthcare technologies and patients to work together to address health problems before they advance. This may help patients to improve their health through lifestyle changes, rather than the drastic intervention. With smart AI capabilities, patient monitoring is possible which will proactively detect patient deterioration before-hand[21]. Tech companies are hurrying up in using AI to develop Digital Therapeutics that deliver personalized advice to help people lead healthier happier lives, or maximize their treatment regimens[31] by being proactive.

Proposition 5: Proactivity is positively related to Patient Centricity

Autonomy: Autonomy is the willingness to use the power and freedom to act independently within the boundaries of the role. Organizations must avoid autocratic type of environment and give chance to their employees to use their powers in a positive way. All the stakeholders will be able to take their decisions freely within the prescribed boundaries if autonomy is implemented in the health ecosystem. Through autonomy biggest advantage is that mutual relationships can be developed among different stakeholders which in turn will help in better coordination. Davies and Elwyn maintained that promoting patient autonomy has become a key

imperative in the healthcare. Patient autonomy is the right of patients to make their decisions about their own medical care without the interference of health care providers trying to influence their decision[32].

Proposition 6: Autonomy is positively related to Patient Centricity
Collaboration: Collaboration involves working together in a team for a common purpose. It is a process of exchanging information, sharing resources, enhancing capacity for mutual benefits to achieve a common goal. Individuals solve their problem by sharing their concerns and develop strategies and work together. When working together in achieving the common goal of patient wellbeing, it is vital to share the common resources by different stakeholders of the health ecosystem. Collaboration helps in achieving the objective with improved communication and timely completion of tasks of different stakeholders. For instance, the Consensus Framework for Ethical Collaboration ensures that all the partners in health ecosystem have a mutual interest of patient centricity by ensuring that the relationship between patients, healthcare professionals, the pharmaceutical sector, and other life sciences and healthcare organizations, is based on ethical decision making[16].

Proposition 7: Collaboration is positively related to Patient Centricity
Experimentation: Experimentation involves using and encouraging innovative approaches to solve the problems. It emphasizes on trying out new ways of dealing with problems in the organizations. Achieving patient centricity require lots of innovation and experimentation by different stakeholders of the ecosystem. New procedures, methods and other development programs need to be redefined by all the elements of the ecosystem and experimentation is the only way to promote and support the idea. For instance, The Consensus Framework for Ethical Collaboration promotes for ethical research and innovation in the entire health ecosystem[16] to meet patient centricity. Moreover, recently Yaakov and others argued that crisis in the public health demand to accelerate healthcare innovation[33].

Proposition 8: Experimentation is positively related to Patient Centricity
There could be some perceived benefits of patient centricity in the healthcare if properly applied in organizations by developing the OCTAPACE culture. The benefits could be: a) Increased engagement with all the stakeholders of the healthcare system b) enhanced knowledge about patients c) better decision making regarding patients d) increased competitive advantage for different stakeholders of health ecosystem e) better quality of life and satisfaction for patients and employees of stakeholder organizations[21].

V. IMPLICATIONS
From the practical standpoint, it is important that each stakeholder organization trains its employees to develop the OCTAPACE culture that will help attain the patient centricity. To integrate the OCTAPACE culture in the health ecosystem, good leadership is the key. Efforts could be made in developing leadership competencies to act as a change analyst for bringing change in the culture of the organization. *Second,* programs could be designed to make employees understand patient needs and evolve offerings such needs. In addition to it, employees should be motivated to think out of the box where they try new ways of doing work and their ideas which are patient centric must be heard, appraised, and rewarded. This might promote Experimentation in the health ecosystem. *Third,* organizations could organize some Information sharing Summits wherein employees from different teams and stakeholder organizations can come together to share patient experiences on patient centric initiatives as well as could also resolve the conflicting issues in the interest of the patients. As a consequence, it would lead to Openness and Confrontation in the entire system. *Fourth,* stakeholder organizations could possibly conduct patient engagement sessions wherein employees could directly engage with patients to understand their lifestyle and how these patients could cope with diseases. This might perhaps enhance the Trust and Collaboration levels between the patients and different stakeholder organisations. *Fifth,* the performance of the stakeholder organizations towards patient centricity could be measured by developing patient feedback mechanisms and periodic evaluations. Actual feedback from patients and their carers on their experience with the stakeholder's offerings could be collected which could act as a tool to continuously improve on the performances. This can be done through surveys and interviews. Periodic evaluations of changes in internal practices could be done to maintain value-based outcomes for the patients. Incorporating the more informed perspectives of the patients at regular intervals, may well lead to more Proactive decisions in the organisations. *Sixth*, the stakeholders in the health ecosystem should share the electronic health records and others patients related information in a manner which does not raise the issue of privacy, confidentiality and integrity. Only then Authenticity could be claimed or maintained in the system leading to better patient centred results. Last but not the least, patients should be given the freedom to choose the services or products from the stakeholder organisation of their choice. This might promote Autonomy among patients in the health ecosystem.

The current article tries to answer the raised question i.e. how to develop a patient centric approach within and between stakeholder organizations of health ecosystem, through the suggestions proposed in this section by bringing OCTAPACE Culture in the health ecosystem.

VI. CONCLUSION

It can be reasonably deduced with confidence that patient centricity requires a vision shared by all the stakeholders. There is a need to change the mindset of the whole healthcare system. There is a need for continuous patient engagement for capturing their views, preferences, and experiences in the entire health ecosystem. Simply talking to patients is not enough but involving them in every aspect is required. Extended emotional support should be given.

To achieve patient centricity in health ecosystem, it is maintained that employees' capabilities should be continually developed, sharpened, and used. For this an enabling OC is essential[23]. When employees take initiatives, take risks, conduct experiments, promote innovations, and make things happen, the organizations may be said to have a patient centric culture[34].

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Role of Social Media in Marketing

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ABSTRACT
Social media platforms are the method to interact socially. Social media plays various roles in creating relationships with people. Social media is an emerging phenomenon in marketing of businesses. The blast of social media phenomenon is astonishing. It is helping businesses to create a bond with its consumers. Many businesses are trying to do their best to promote their brands on social media platforms. Companies are incorporating various types of social media marketing strategies in order to expand their business. They are able to create brand awareness. With the help of distinct social media marketing tools. Social media is helping businesses in developing a wide audience and loyal customers which in turn helps in the growth of the business.

Keywords: Social media, social media marketing tools, customer relationship, social media marketing, marketing strategies.

1. INTRODUCTION
The world has changed dramatically since the rise of the Internet. Eventually the Internet overtook the power of controlling the human mind. However, anything that is shown on the internet has become the truth for today's generation. There are a number of different things available on the Internet for everyone to see, there are many other things that people can use for the purpose of Entertainment. And the most important part of that is "Social media". Social media is being increasingly embraced by this new generation. Nowadays, being active on social media and having access to social media has become the basic need of human beings. Not only the new generation is crazy about social media but also every person of every generation is shifting to social media as it is the best platform for entertainment as well as very informative at the same time. Creating social groups or communities has become easy with the help of social media. Anyone can be a part of that community and use this social platform for their own wellbeing.

Businesses and Companies however are using social media as a platform for marketing their products and services. As social media is used by every second person in the world; it's easier for them to convey their message to the public and get more and more people to buy their product or service. Social media helps marketers to understand the consumers purchasing behaviour and know about a suitable market for them. Social media marketing allows marketers to conversate with their customers directly through any social media platform they're using. There are many such platforms such as Facebook, Instagram, Twitter, and WhatsApp and so on. Using these platforms, marketers are trying to build a direct relation between their customers and trying to provide them with assurance about their brand. Marketers not only try to keep a good relation between their regular customers but they also try to attract new customers by providing them the experience of their old and regular customers.

It is examined how social media has taken marketing to the level where marketers can easily influence their customer towards their brand and turn the customers minds into buying the same. The objective is to identify the role that social media is playing in marketing and how it influences consumer behaviour.

2. SECTOR OVERVIEW
When looking at social media as a mode of communication, it has evolved enormously from the earlier modes of communication. The evolution starts from the ancient method such as cave paintings, carrier pigeons to the effective way such as postal system, newspapers, radios, telephone, television etc. Now all these modes were not only meant for communicating to the family and friends but also about sharing the worldwide events. There was one discovery which is remarkable, useful till date and not lagging behind is the discovery of the internet. Discovery of the internet has laid the newer and convenient perspective for the communication amongst individuals and peers. Now-a-days every small activity revolves around the use of the internet starting from education to businesses. Email was the first way of online communication which is till date a formal way to communicate. With the development of mobile phones, text message facility was available for informal communication. Later a lot of social media sites were discovered and gained importance for different perspectives.

Social media is a networking term which is popularly known for applications that are mainly used for communication purposes. It acts as a platform for the world to be connected. Today, Instagram, Facebook,

WhatsApp are the most popular social media applications. All of these applications are collectively called social media networking sites.

It generally operates with the help of internet connectivity. One cannot use social media without having an active Internet connection. To engage on social media, users use different electronic items like a smartphone, computer, tablets, TV etc. There are many social media sites launching every year. People can have their account on these various social media applications, all they need to do is to fill in their authentic details for their identity verification and immediately their account gets created.

Social media applications are used by a wide audience to communicate with friends and family and to stay in touch with what's happening in the world. Social media not only allows people to hear what others say but also enables to respond. It connects people all across the world to interact with each other and share their opinion, views and thoughts. Along with that people also share their personal photos, videos, documents and their information through social media. Additionally, social media is being used as a medium to document memories; learn and explore about different things, advertise oneself and form friendships with people along with the growth of ideas from the creation of blogs, podcasts, videos, and gaming sites. Today, Ideas of people all across the world are being shared on these virtual networking platforms.

These social platforms not only help in improving an individual's sense of connectedness with real or online communities but also it can be an effective communication (or marketing) tool for corporations, entrepreneurs, non-profit organizations, influencers, advocacy groups, political parties, and governments. Therefore, it is adopted by businesses wanting to take advantage of a popular new communication method to reach out to their customers which is nothing but marketing. It has also been observed that there has been a rise in social movements using this, as a tool for communicating and reaching towards a larger audience for gaining broader perspective about different kinds of social awareness. Because it is known to connect an individual or group of people to new ties and social networks, and is found to increase entrepreneurship and innovation, especially for those individuals who lack conventional information channels due to their lower socioeconomic background.

It is believed that the power of social media is the ability to connect and share information with anyone on Earth or with many people simultaneously. Therefore, it is a platform with a wide range of utilities to choose from.

Although it has a lot of positive impact on human beings, it has been observed that there are negative impacts as well when it comes to the use of social media.

Social media roughly falls under following categories:

Modes	Examples
Audio sharing	Podcast
Blogs	Huffington Post
Business networks	LinkedIn, Indeed
Business mails	Microsoft business mail, Gmail
Encyclopaedia (online)	Wikipedia
Forums	Quora
Microblogs	Twitter
Photo sharing	Flickr
Products/services review	Amazon, Flipkart
Social bookmarking	Pinterest
Social networks	Facebook, Instagram
Video sharing	YouTube

3. ROLE OF SOCIAL MEDIA IN MARKETING

Earlier social media was used mainly by individuals to basically communicate with each other but today it's used in many more ways other than just communication. The role of social media in marketing is very important than what people think. Social media is an extremely flexible platform where both businesses and customers are able to know about the needs of each other. Businesses nowadays are enjoying the full benefit of social media. With creating and developing websites, businesses are using social media to expand their brand, to connect with the audience. It is important for marketers to know that social media marketing will lead to more and more success. It helps the marketers to give a voice to communicate with potential consumers as

well. Traditional methods of marketing like printing in brochures or in newspapers or any other modes are less preferred as it reaches a lesser audience and also is not cost-effective. But now-a-days, starting from small businesses to the biggest companies from the entire world are using social media to spread a word about their brand, products as well as services.

There are no restrictions as to who can enjoy the benefit of social media. It's something any kind of brand can leverage. The brand doesn't have to fit in to a certain category to be on social media. The right way to promote a brand is what helps engage more audience. Social media marketing is an important tool which if used rightly does wonders for the brand.

In addition, social media provides relevant statistical information about their target market, such as their likes and dislikes, demographics, etc. which they otherwise would have to collect through extremely expensive market research companies. Social media plays primary role in digital marketing because of its extensive reach and the fact that it is very unlikely for a business to grow without the assistance of social media.

Creating brand awareness is a key step in promoting any product. Social media helps businesses to create their own identity or space in the market where everybody can review it. Businesses can showcase their products and services online by creating various campaigns or strategies. There are various social media tools for marketing research, communication, sales promotions/discounts, informal employee-learning/organizational development, relationship development/loyalty programs, as well as e-Commerce. Brand awareness and credibility will be developed and sales will increase when the product or business is talked about on social media. Collaborating with influential people with a large social media following that can lead these followers to follow the brand is an important way to grow brand's word-of-mouth on social media. Social media is a good source of information of industry trends for a business to embrace changes to get a higher level of recognition and association to avail the product and services.

It is safe to say that the main role of social media marketing is to drive online traffic. The term online traffic refers to the visitors landing on the home web page through various digital platforms. It is considered to be the biggest contributor to increase the branch website tracking to stop in getting the right target audience and provide more reach. Reach refers to the number of people who can see the content. Getting reach is the most important thing especially if it's a start-up. After Google's regular search, social media is the second most likely source of digital traffic and is considered as one of the best sources of traffic for websites. Research and patience are important components in this process. Social media plays an important role in marketing, the purpose being to find the right target group through social media.

Social media has a wide range of audience from different age groups and different areas. Everyone cannot be included in targeted audience. A targeted audience is a set of people who are most likely to purchase the product. Social media provides different rules to keep a track on the targeted audience like gaining valuable information about their customers which will help to make smarter business decisions.

Any business or brand has the advantage of interacting with its customers, so they can quickly respond and have direct conversations with them. Businesses can know who is interested in their business because they've chosen to follow that business's account. The business or the brand can also take feedback from their customers and deal with their concerns and problems, helping businesses to perform better.

Communicating through social media also helps businesses to create brand loyalty. One of the main objectives of businesses is generally building loyal customers. Loyal customers help the business to maintain its profits. Regular contact and interaction with the help of social media with customers helps to create a brand loyalty which is the positive and genuine image of the brand. As channels for direct communication with the company, these platforms are seen as ways of serving consumers.

Constant interaction also helps in creating consumer's trust which is one of the main parts of business. Different factors of social media marketing can help businesses to create that consumer trust which in turn helps the brand to grow. Interaction not only includes communicating with consumers but also following the trends in the social market, carrying out new campaigns according to festivities round about the corner, creating different contest alerts, reaching out for the promotions etc. Promotions may include pay-per-click advertising, influencer outreach, PR, email marketing, newsletters, display advertising, affiliate marketing, etc.

A strong content promotion strategy will include a multi-channel approach. Digital marketing is not an either-or choice. However, digital platforms work best when its used in conjunction with one another. When creating

a strategy, it is also important how many of the resources a brand is willing to consider if it wants to reach a specific goal.

In today's market landscape, as there are many brands trying to gain reach for the audience, the quality and transparency of content as well as the product/ service is also very important as there may be possibility that the brand reaches wider audience but if the product/service is not genuine it is not going to last for a longer period.

All of this effort puts brand in a specific algorithm which gets picked up making the brand fetch the larger audience apart from its existing customers.

4. CONCLUSION

- The use of social media is increasing day by day and marketers are taking proper advantage of it by marketing their brands on social media and making an impact on their targeted consumers.

- Many marketers have embraced social media as a platform for communication and for research of customers.

- Marketing on social media improves brand awareness and reputation and can improve the business to consumer relations.

- Due to the ever-increasing popularity of social networks, small as well as growing companies must use several different social media platforms to market their products.

- Overall, it is concluded that social media has a great impact on marketing.

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Sustainability of Corporate Social Responsibility in Indian Corporate With the Advent of Digital Platforms

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ABSTRACT

The purpose of this paper is to review the sustainability of Corporate Social Responsibility in Indian Corporate in terms of current digital technology. Corporate Social Responsibility is not a new concept that is aware of the society as well as the companies after the amendment of companies act, 2013. This paper shows that the various literature survey which studies the Corporate Social Responsibility activities in Indian companies and how they are developing and positively promoting the CSR practices with good impact with digital platform strategies. The COVID year 2020 changed the dynamics of almost everything. Work was stalled for months in organisations. However, the CSR fraternity continued their projects albeit in a tweaked way. The changing environment also brought many new learning in administering the CSR activities. The foundations established by organisations and Trusts learned how to continue outreaching the communities and helping them without doing mass gathering. The idea of designing a digital platform integrating the co-operative communities, charitable trusts, corporate CSR foundations, Non-Governmental Organizations, NOT for profit institutions, Health centres into one platform to cater the needs of the people at various levels with just a click away.

Keywords: Corporate Social Responsibility, Digital Platform, Digital Strategies, CSR foundations, Indian Corporate.

1. INTRODUCTION

Corporate Social responsibility (CSR) is an ongoing commitment by business and not a just philanthropic activity which needs to integrate the social activities and environmental conscious in their regular day to day operations. Each and every corporate /company need to play an active role and has a moral responsibility in delivering the social obligations and to integrate the concerns of both social and environmental into their strategic management. However, this completely depends on the financial health of the company in the Indian industry.

2. CSR CONCEPT IN INDIA

During April 2014, following the amendment to Companies Act 2013, Corporate Social Responsibility has been made mandatory for the companies in India. India became the pioneer in the world to make CSR mandatory for the companies listed in India by investing their profits, in areas such as Health, Poverty, Education and hunger as part of any CSR compliance. A legislation has been made by India the need to undertake CSR initiatives and activities and mandatorily report under the new Companies Act 2013. Even before 2013 it was mandatory to disclose their CSR spending. Corporate social responsibility can be seen and broken into four categories: environmental, philanthropic, ethical, and economic responsibility.

2.1. CSR Trends in India

The corporate world in India, started realizing to take up and integrate CSR activities with their businesses. Within the company, the managements are setting up specific teams to develop processes, policies and goals for their CSR initiatives / projects and allocating separate budgets to support them.

In the Indian pre independence era, the CSR idea has been followed by the businesses who pioneered industrialisation while fighting for independence. They started execution of CSR initiatives by setting up CSR foundations, educational and healthcare institutions, and trusts for development of community. The donations for the CSR are either in the form of money or other means were not properly maintained as part of philanthropy and derived out of personal savings which are not related to either stakeholders or form part of an integral business.

With the changing dynamics of almost everything during the year 2020 and 2021 due to Pandemic, work was on hold for months in organisations. However, in a squeezed way the CSR foundations continued their activities / projects and the changing environment also brought many new learnings in administering the CSR activities. The foundations emanated from organisations and Trusts started and learned how to continue outreaching the different sections of society and helping them with social distancing or without mass gathering.

The advent of digital technology became a big saviour for many CSR projects, especially in the education and healthcare sector. The learnings during the pandemic can be utilised by CSR stakeholders to make their CSR projects ready to challenge the technological advancements. Implementation and execution are two integral parts in technology adoption while working. (*Ref Article*: *International Journal of Corporate Social Responsibility by Carol A Tilt dt. 5th July 2016*)

3. ROLE OF DIGITAL PLATFORMS IN CSR IN INDIA

Sustainability and Digitization have become two significant business trends over the past few years. While the one deals with human's natural world and latter deals with virtual world. *(Ref: Article: 'Corporate responsibility in Digital Era' by Michael Wade, April 2020)*

Though the digital aspects of sustainability not entirely overlooked, they have been spread moderately across various corporate departments. These much needed and fragmented essentials together under a single roof allows them to be processed in an efficient manner. This can be hypothetically called as corporate digital responsibility as a consolidated focus and this is a subset of CSR which is an already established entity in many companies.

As sustainability and digital technology trends continue to grow, companies need to study how their digital infrastructure and practices impact their stakeholders and society at large. At the same time, in future, Corporate Digital Social Responsibility become increasingly relevant for the performance of the company, both in terms of mitigating risks and to make happy the digitally and sustainability-savvy consumers in innovative ways. Failing to take CDR in a synergistic approach and in a coordinated way, companies to may find themselves in trouble with stakeholders and regulators.

The most important factors in the world are CSR and digital transformation for global competitiveness in the current scenario. With the emergence of digital platform and digital strategies, the business environment is continually changing and these changes are highly influenced by technological advancement. The fourth industrial revolution has brough many changes in the digital technology in civilization and social communities resulting the ongoing research projects or programs being executed with the support of World Economic Forum, Davos.

It can be thought that the digital transformation is most important paradigm shift of our time and the technological advancements indicates the fundamental change for the humankind. For any innovation, the most important two pillars are the knowledge and the source which is filled with right content that gives birth to the innovative ideas viz., Big Data, warables, Mobility, Nano-technology, Digital platforms, IOT, Renewable Energy, Circular economy, Share-economy.

Klaus Schwab, founder and chairman of the World Economic Forum, called emerging challenges the fourth industrial revolution. While the 1st and 2nd industrial revolutions have become the driving forces of industrialization, the effects and innovations and the new digital trends are the results of fourth industrial revolution from the foundation of 3rd industrial revolution

Between 3rd and 4th Industrial Revolution, the changes in organizational and technological are stressing the need for transition into digital transformation emerged from digital technologies. All processes and systems in the industries are being changed along with radical improvements in the work environment and the way of communication. Hence, this is clearly evident from these improvements that the digital strategies and digital platforms will help and support the execution of social activities to cater the needs of rural villages of India.

3.1. Approach to Digital Sustainability of CSR

For every corporate, changing the course to implement digital transformation strategies and technology has not been an easy task though the current competitive world requires it. Businesses must afford to get up-to-date, quick and readymade solutions that meet to cater the needs of the community and stay relevant.

The digital aspects of four categories of CSR i.e., Social, Economic, Technological and Environmental responsibility have been taken care by many organizational processes, and practices with much lower coordination or optimization. For example, while the responsibility of Cybersecurity is with IT team, the automation of workforce fall under the purview of operations, and still the other essentials may be with other business functions of the company.

To ensure ethical and sustainable business practices and better mitigation of risks, these areas should be coordinated in a collective way of approach. It will have a much needed impact if the responsibility for this

consolidated approach is given to a Digital Corporate Social Responsibility office that coordinates and manages the role of digital infrastructure and technologies.

It has been noticed that during the current phase of fourth industrial revolution and with the pandemic constraints, the Corporate companies have adopted digital technologies into CSR as well though not much successfully able to cater to the needs of the community. The basic lifestyle of the community and humankind has been changed with the emergence of "Digitization" which proves how the spread of technologies have changed completely.

It has also been noticed that the firms are now doing CSR projects based on digital technology like provision of free broadband and setting up of technology research labs in the rural villages and provision of WiFi hotspots around the towns and cities across India by companies like Reliance JIO, Bharti Airtel, Alphabet Inc.(Google), Apple and Microsoft and strive to bring net neutrality, as a part of their CSR in the current scenario.

In the corporate businesses, digital innovation is the key for all evolutions. Many corporates are transitioning to a fully digital approach in all critical functions of the business. For every corporate who wants to focus on a committed and honest image, corporate social responsibility is crucial. To engage employees to perform in philanthropic projects in an efficient manner, a digitalized CSR platform is the easiest way to foster measurable change.

4. CONCLUSION

It is evident from the above that the technology playing a vital role in CSR and the gaps where technological advancements needed in the CSR execution. To make the process more efficient, the communication and digital technology needs to be improved. The identification of technological gaps and framing better CSR policies that are focused on removing the gaps is the way forward. This study is a review from historical literatures and has limitations. This study to be refined with quantitative analysis to get a clearer picture as this is solely based on the qualitative analysis. The scope purely depends on the meta-analysis, selection of sample and sample group to evaluate the digital CSR efficiency.

In the coming years, with the advent of digital platforms, we can expect that the brands team up with the governments and influencers will be larger part of CSR initiatives and to fight global issues like climate change, environmental issues, and more.

Even after the pandemic turned out to be endemic, online volunteering prospects are only expected to grow in future. In a hybrid working environment, working from home options are here to stay. Companies are now offering these options to their employees and they'll be offering online volunteering prospects to match.

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Challenges Faced by the Organization in Managing Overseas Employees during Covid 19

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ABSTRACT

Sudden outbreak of COVID 19 and subsequent lockdown over around two years changed drastically the way corporate world worked till then. It brought with itself both opportunities and challenges that no one expected before. Virtual work which was once thought of as a fantasy became the reality. Employers and employees both were confined to their homes and worked from their using digital platforms. Work from Home (WFH) became a new norm. Though both employers and employees gave their best in adjusting themselves to the new way of working, it was challenging especially in case of the employees who were working for their organizations on the foreign lands. It was equally challenging for their organizations to ensure the safety, physical and mental well-being of these employees, especially with the limited access to mobilize the employees and the constraints put up by COVID 19. This research paper tries to understand the challenges faced by the organization while managing their overseas employees during COVID 19 and the ways adopted by them to handle these challenges.

Keywords: Overseas employees, COVID 19, Pandemic, Onsite Employees, Virtual work

INTRODUCTION

One of the most challenging and costliest functions for HR to handle successfully is undoubtedly managing the overseas employees. Sudden outbreak of COVID 19 and subsequent lockdown over around two years changed drastically the way corporate world worked till then. It brought with itself both opportunities and challenges that no one expected before. Organizations were required to make crucial decisions in a very short span of time that included decisions about who would continue working and who would be required to leave; how, when and where employees could be shifted into digital workplace. They were required to prioritize about their commitments to the business and employees at the same time; and also decide how these priorities be best communicated to the staff. (Caligiuri et al, 2020)

HR professionals as strategic business partners, especially in the organizations that had/ have presence in multiple countries had to undertake cautious yet major decisions to alleviate the adverse impact of COVID 19 on the business and the employees working overseas.. In most instances these decisions were related to managing distance as well as to rethinking boundaries. This became the primary focus of the HRs of such organizations. (Caligiuri et al, 2020)

A survey conducted by Ernst and Young in 2019 of 500 top management executives revealed that only 20% of their organizations were prepared to handle large adverse risk effectively. (EY, 2020). COVID-19 pandemic that arrived only a few months later confirmed the concerns strongly. The pandemic did not only bring concerns related to global supply chain management and financial resilience to the fore, but also concerns related to crucial strategic human resource talent. COVID-19 pandemic has become a ''people-based crisis.'' It started emphasizing the role and importance of Human Resource function in successfully allowing their organizations to sail through the pandemic. (Caligiuri et al, 2020)

Anderze´n et al (1997), Richards (1996), Stahl et al (2005) discussed how employees when they face novel and/ or uncertain situations, experience stress and anxiety. They respond to such anxiety and stress by leveraging their dispositional traits and defence mechanisms. This kind of anxiety and stress affects the emotional well-being of the employee and also their emotional intelligence. (Caligiuri et al, 2020)

Research shows that when an individual experiences periods of anxiety and stress, he/she reaches out to seek and find comfort in people, places, and even food that they are familiar with. This explains why there are expat communities, demographic fault-lines, and comfort food in every culture around the globe. When employees are facing high levels of anxiety and stress and they are emotionally vulnerable, they find it difficult working effectively in foreign land and with colleagues coming from diverse cultures. This has been a case with most of the employees working overseas for their organizations since the pandemic began.

Organizations and especially their HR teams are constantly trying to manage and to provide necessary support to their overseas employees during this crucial period. They are putting emphasis on three competencies while

selecting their employees for the overseas assignments: 1. tolerance for ambiguity, 2. resilience, 3. curiosity. Employees who are working virtually and interact with clients, vendors, or colleagues from diverse cultures too need these competencies to be effective. Selecting the right candidate for such overseas assignments is a key. Organizations are trying to assess their bench strength for culturally agile talent in order to understand who will be most effective in situations of growing novelty and uncertainty. (Caligiuri et al, 2020)

When one is in the state of anxiety, one experiences a natural desire for affiliation. In order to address this issue, the organizations are especially trying to involve their overseas employees into the activities that foster cross-cultural cohesiveness and validate expectations of reliability since the health-related stress is prevalent all over the world. Training to support relationship formation is being conducted by the organizations at this crucial time when every overseas employee, irrespective of their geographical boundary, is going through a similar stressor.

Takeuchi et al (2009) found out that an individual's success depends on the comfort level and/ or fit within a given environment. Organizational support is found to be positively related to an employee's capacity to adjust in a novel situation and/ or environment. Organizations with the employees working overseas have started support practices to help ease out stress related to such issues and the ambiguity and uncertainty arising out of COVID 19 pandemic. Such practices are found to be especially useful for overseas employees who face greater stress due to being away from their people. Overseas employees were found to be more vulnerable to social isolation and fear about uncertainty related to their health on the foreign land, employment, and overall future. This made them more susceptible to mental stress and affected their mental well-being. The companies hence started educating these employees vigorously about empathy, emotional intelligence, and many of them started offering practical support for ensuring the health and safety of these overseas employees. "We have leveraged collaboration platforms across geographies for bringing employees together. In addition, we conducted webinars for learning yoga and live cooking sessions. Virtual connect with families of employees and children has also invited tremendous response," says Chief Human Resources Officer of TCS, Milind Lakkad. TCS organized sessions for their overseas employees that were designed to help them handle stress and maintain work-life balance. "We are continuing with our journey to reimagine and transform the HR value chain by leveraging technology," says Lakkad.

While these companies were primarily concerned about safety as well as well-being of their overseas employees, they were facing another major problem. The demand for the onsite employees fell down drastically due to COVID 19 pandemic. This meant that there was either no work for the onsite employees or it was considerably reduced. Moreover the onsite employees were also working from remote places in the foreign countries as they were not allowed to report to their offices physically. This meant an additional and unnecessary expense to the organizations that were having their employees working overseas. This formed a strong business case for bringing back these employees to the home country. "It helps to save or realign the cost also for service providers. If someone who is not required overseas is kept overseas, it adds to the cost for service providers," said a founder of one of the outsourcing advisory firms working with international clients. "This is a proactive measure by service providers to realign their operations and cost without waiting for commercial travel to become normal," he concluded. (ET, 2020)

Companies faced the instances wherein the onsite employee's visa was about to expire and then there were few employees who were sent abroad for short-term assignments. However, many of them got stranded in those foreign countries because the countries closed their boundaries owing to COVID 19 pandemic and the flights thus got cancelled. IT giants in India including TCS arranged chartered flights to get back their employees who were stranded abroad, especially in the US, UK and Europe. Vande Bharat Mission flights were very helpful to these companies in getting their stranded overseas people to India. These organizations indulged in thorough due diligence to decide whom to get back and whom to retain on the foreign land taking into account not just the financial implications, but also issues related to people management. They reduced traveling to onsite locations, especially for initial transitions and knowledge transfer.

However, expansion of the business in other countries also posed a challenge for the organizations as embassies and consulates of the most countries were closed for the operations and so were the flights operating between these countries. Moreover, in the last two years even the lockdown periods of the countries belonging to different continents varied and at many time they clashed with each other, making it nearly impossible for the organizations to facilitate travelling of their employees from the home country to the foreign land, let aside making arrangements for these onsite employees to live there comfortably.

Tax liabilities with respect to onsite employees again posed a major challenge to the organizations as the outbreak of COVID pandemic began around February/ March 2020 which was almost the end of the financial

year and making projections related to the compensation and tax liabilities of the overseas employees in those situations, were difficult tasks to perform.

Measures undertaken by the Organizations to face these Challenges:
Employers adopted various measures including asking onsite employees to avail paid leaves which were either accrued or unused, reduction in the salaries of the employees; deferment of salary increment, paying bonuses and other recognition rewards; and implementation of furloughs.

Those onsite employees who had valid visas to continue their stay in the respective countries, but had no work either because the project was over or it was terminated, were accommodated by placing them in some other project team in the same country, whenever and wherever possible.

The HR teams of these companies were in constant touch with these onsite employees and were checking regularly on their physical and mental health. The counselling sessions were specially organized to help these employees. Some companies including TCS even ensured that these onsite employees had their regular stock of groceries in place during the lockdown.

These organizations prioritize which employees could be sent back to the home country based on the validity of their visas, the status of their current assignments, possibility of shifting these employees to some other projects in the same country overseas, cost of continuing the stay of such employees in the foreign country, etc.

The employees working overseas were also extremely worried about their families in the home country and good employers such as TCS ensured that they took good care of the families of these employees back in India that included the vaccination of the family members, home isolation and/ or hospitalization of the family members who contracted COVID 19, regular follow-up after they were declared COVID negative and counselling facilities for these family members.

CONCLUSION
Though COVID 19 pandemic posed a major challenge to the HR functions with respect to their overseas employees, most of the companies could effectively and efficiently managed handling this challenge by taking proactive and reactive steps that included checking on the mental and physical health of such overseas employees and also their family members back in the home country, providing medical assistance and quarantine facilities whenever and wherever required, getting the employees back to the home country either by arranging the chartered flights and/ or by using Vande Bharat flights, etc. What remains to be explored now is: how these employees will be getting the work allocation after the world starts to stabilize now, as COVID 19has started becoming "endemic" rather than "pandemic".

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To Study the Consumer Buying Behaviour Pattern Regarding Online Shopping

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ABSTRACT

Online shopping industry has been booming now days, and after the current pandemic situation everything becomes more convenient on online shopping sites where websites like Amazon, Flipkart, Myntra, E-bay and other sites where one can find literally everything under a single roof leads to a great shift for online and E-commerce industry. Knowing the factors affecting consumer buying habit and their behaviour could create a great buzz and hike in online industry, This research paper focuses on various factors affecting consumer's buying habit and their buying behaviour which when analysed could work in favour of online industry and entrepreneur and they can use this data for marketing and advertising their product to create a greater impact on their consumer and also form a strong brand base creating a loyal customer. This research paper also shows the impact of factors like social , economic , monetary , sale , coupons , variety, great quality and authenticity .It is observed that when there is a sale like Big billion day or Great Indian festival people tend to buy more as well as when brands use various techniques like social media marketing, influential marketing and digital marketing, where a survey was conducted which justifies the fact that various factors do affect buying behaviour and buying habit of consumer and also profits the business.

Keywords: Online shopping, social media marketing, Influential marketing, Factors affecting consumer buying habit, Consumer behaviour.

1: INTRODUCTION

In these global pandemic eras, where people were locked inside their house feeling basic necessity was a difficult task for many people, this was the moment when the E-commerce business rise to its pick of around 18% which was 13.6% in 2019 and is said to be around 21% in 2024.This rise in the market was influenced by various factors observing the current environment ,with the rise of E-commerce the industry has also seen an elevation   for technology.The online market is a rapidly marketplace, and online buying is a fastgrowing condition. Increasing numbers of people are shopping for things online. For online buying, the quality of the services and products is quite crucial. [1] As a result online shopping environment are becoming more important in the overall connection between marketers and consumers creating wonderful opportunity for brands like Amazon, Flipkart, Myntra, Lens-kart and many more to create a market where they can market their product effectively leading to profits for their business. Online shopping has seen a sudden rise as there is a shift observed by Gen-z and millennials, as now we can easily buy or find anything and everything online creating a greater demand of online shopping which is used as an advantage by many firms in influencing consumers buying habit. Marketing on social media not only helps in promotion of products at minimum cost but also reaches to maximum people as now-a-days right from children to adults they all have one thing in common that is mobile phone and internet where you can literally buy your favourite pair of shoes or any apparel all around the world at just a single click by sitting in your comfort zone. [2]. Technology is like cherry on cake for E-commerce websites as it makes the marketing of product quite convenient and interesting. Technology has introduced us to numerous new brands and website similarly new areas to analyse consumers buying habit and understand their behaviour and use this information to their own benefits and form a brand's base. Brand is a reference to a business which helps people identify a product, or company , It is said to be a promise to consumer that the product they are using is of a superior quality like Nike ,Audi, Apple all the brands mentioned here are a statement. Consumers have a blind faith on these brands and these products do serve its purpose, once you have a strong base over brand you don't need to market your product the brand itself brings in customer loyalty which is one of the essential thing for an Entrepreneur.

For retail shoppers, the internet is a more useful shopping medium. In recent years, online stores have become incncreasingly crucial in terms of services and time savings. People's desire to shop via the Internet is largely motivated by the need to save time [3]

One of the most significant challenges to internet buying is a lack of consumer trust in the product. The link between knowledge and quality, on the other hand, is undeniable.
Millennials are the primary consumers and followers of social media, which has become one of the most boomi

ng areas. Regardless of whether they are in the private or public sector, social media marketing (SMM) has beco me the trendiest medium of promotion for most busines.

The majority of entrepreneurs, whether small, medium, or large, use social media to promote their businesses an d generate leads.

Entrepreneurs have recognized the value of social media in terms of brand awareness and consumer relationships. [4]

In comparison to traditional shopping, the internet platform adds a more convenient and appealing place to shop for consumers, such as the ability to view and buy new products at any time, visualize their needs with products, compare different brands of products with other consumer options up on delivery, and so on. [5]

2:-SECTOR OVERVIEW

Online shopping was introduced long ago, with a limited number of company but as the consumer sales increased, we saw a rise in companies providing their product online. Online shopping has seen an increase of around 25% from the year 2020, witnessing a pandemic rise, as majority of consumer found it very convenient to buy products online right from electronics to basic essential necessity, consumers could find it all under a single roof. However for online shopping ,consumer satisfaction holds an important spot as with the rise in consumer shift there is also a rise in competition so it is very essential for a brand or company to witness consumer loyalty by providing them superior services and products [6].Amazon, Flipkart, Myntra ,Lens-kart are some of the leading online shopping websites who have succeeded in online selling of their products by successfully understanding consumer's buying behaviour and using it for their own benefit to market their product as they had a brief understanding of what exactly does a consumer looks upon for buying a product online . This sector increased its sales drastically as consumer gets a wide range of varieties, along with quite reasonable pricing , Here one can compare two or more products quiet easily and also could return the product if you are not satisfied without going anywhere which saves a lot of time on consumers end and the consumer is satisfied as he gets what he wants by sitting at any corner and order goods from any website he wishes to[7].With this basic understanding of consumer companies can market their product quite conveniently by providing ads of the product and also promoting their product on social media like Facebook marketing, Instagram post , WhatsApp marketing, linked in marketing , also on twitter these social media application has laid a helping hand in rise of online shopping .As today's generation has a screen time of around 6-8 hours a day , while the maximum time spend is on Instagram and other social media application , hence the company have got a new approach of starting to market and advertise their product on social media app so as they can get maximum views leading to an increase in demand of consumer buying the goods. On an average around 2.14 billion people have purchased goods online till 2021, [8]because of global pandemic and also various lucrative offers provided by online shopping websites like "Big Billion day ", "Great Indian Festival "and many other seasonal sales which motivates people to buy more and more products online leading to a higher profit for online shopping websites.

3:-LITERATURE REVIEW

1. Factors Influencing Online Shopping Purchases

Yi jin lim, abdulla Osman, shahrul Salahuddin,abdul Rahim romle along with safizal Abdullah in their paper discussed about how internet became an essential tool used for marketing in the business world and predicted their results with the help of proper analysis and research conducted on around 600 people by the data was then evaluated using analytic software such as SPSS and AMOS.

The Theory of Planned Behavior serves as the foundation for this study (TPB). [12]

.claim that the modified TPB model has superior interpretation ability than the pure TPB and TRA models. Bec ause online shopping is technologically oriented, it is appropriate to alter TPB model in this empirical investigat ion to provide a more complete architecture of online shopping behaviour. The theoretical foundation for this st udy was updated to suit the current study by adding one variable (perceived usefulness) to the TPB model in ord er to improve Ajzen's Theory of Planned Behavior (TPB).Obtained from three assumptions were found to be su pported.

2. Consumer Online Purchases and Social Behaviour

This paper has its major focus on few techniques used for marketing like Search engine optimisation where advertisers pay to certain search engine as a part of mechanism where when people search for that word if directs them their shopping site or for instance when a person looks for a particular products on search engine ,that product is seen flashing over all the social media site visited by the user as a part of marketing strategy

used by giants like amazon ,Flipkart ,Myntra and other shopping sites .It is said to be one of the most useful and effective form of social media marketing where either by consumers will or due to being annoyed due to repetitive ads ends up buying certain product which leads to increase in sale of online products also depicting a major part of behaviour of consumers on online shopping site.[13]

The purchasing funnel (also known as the purchase funnel, buying cycle, or purchase cycle) is a staged process by which customers purchase a product from the first time they become aware of it to the ultimate act of acquiring it [14]   Advertisers who are familiar with the buying funnel will be able to better monitor and   consumer behaviour throughout the sales cycle. This tunnel includes various phases like
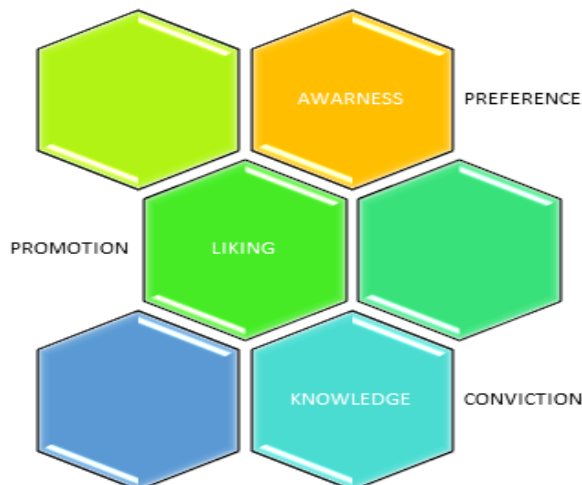
Whenever a consumer wants to buy a good he needs to be aware initially after which he will gain more knowledge on the same after which the consumer most probably develops liking for product.

The three key roles of advertising are represented by the six steps listed here [15]

(1) Information or concepts are associated to awareness and knowledge, (2) attitude or sentiments about the object are related to liking and preference, and (3) the next two phases, conviction and purchase, are tied to action.

3. Influence of Social Media on Consumer
As per author Dr.Vinoth and Dr. Dilip in their research paper concludes that, in comparison to traditional shopping, the internet platform adds a more convenient and appealing place to shop for consumers, such as the ability to view and purchase products at any time, visualize their needs with products, compare different brands of products with other consumer games up on delivery, and so [16]

Now a days we can witness a shift in consumer buying behaviour as maximum people have started shopping online and lead to a shift of segmented market to standard , Which leads to a conclusion of a great potential of social media and online shopping sites with digital marketing as to comprehend their customer's post purchase behaviour ,author also emphasize on future research should include customer concerns with social media marketing, engagement , post purchase behaviour and the influence on promotional campaigns as per this study

Numerous obstacles have hampered the expansion of e-commerce in these economies.

According to Uwemi and Fournier-Bonilla), [17]

Consumers in industrialised nations have grown accustomed to using the Internet and have benefited from e-commerce, which has changed their lifestyles.

Consumers in poor countries, on the other hand, are accustomed to face-to-face transactions, do not trust computerised systems, and cannot afford the risk.

This situation highlights the importance of researching the critical aspects that may lead customers in developing countries to adopt e-commerce in order to reap the same economic and social benefits as developed countries.

The goal of this study is to evaluate the key ideas concerning consumer behaviour and decision-making from a social psychology approach. Here they even try to understand aspects of culture in consumer behaviour   and   they   have   a   great   impact   on   national   culture. As per indices of the features that characterize the national culture, [18]

4. Impact Of Social Media Celebrity's Post On Consumers.

According to author Abaid ullah zafar and Mohsin Shahzad, multiple interacting variables, social commerce has changed the consumption experience users are more likely to buy impulsively in such environment in case of S-commerce, with help of latent state trait theory this study looks into influence of celebrity's post authenticity, emotion polarity, observational learning and impulse purchase behaviour. [19]

4: -RESEARCH METHODOLOGY

PRIMARY DATA

Primary data is referring as data which is collected in form of questionnaires, survey data, examination and other form in order to generate more detailed view of research topic and get a better idea on the same.

For the research 95 samples were collected by providing a questionnaire consisting of around 16 questions based on various marketing techniques and consumer's buying behavior and analyzing it and understand various factors affecting consumer's buying decision

SECONDARY DATA-

Secondary data refers to a part of organizational record maintenance using existing data created by huge government institute, healthcare services and others, which is then retrieved from a variety of data files.

SAMPLE DESIGN-

A sample design is a method for selecting a representative sample from a sample of participants which refers to method or strategy used by the study to pick things for the sample.

OBJECTIVE-

1. To analyze consumer behavior -

2. To understand consumer's buying habit

3. To recognize factors affecting buying habit

4. To understand influence of social media marketing and various tools used for marketing

To facilitate the transition to online activities, particularly in commercial aspects, demand for online data servic es and logistics has expanded. Although the sale rate has been considerably greater for seller as evidenced by the aforem ioned data, negotiating power has migrated to the customer because they can acquire more information about products and compare costs more easily before purchasing.

This has resulted in an increase in online purchases of items and digital services, which may influence consumer s' attitudes toward online shopping as a result of the convenience. This makes it more competitive to satisfy buy ers in an online market, and it makes brand loyalty less important. [9]

In the current pandemic scenario we all noticed increase in sales and purchase of particular products like mask, sanitizer, gloves etc. similarly consumers buying habit depends on the external environment like we see rise in clothing apparel sales during Diwali, Ganpati, or other such occasion whereas during months of February to April we observe a decline in apparel purchases and in case of any sale or big billion days we observe consumer ends up buying much more than what would be needed indicating variation in consumers buying habit .

Similarly, there are various factors affecting buying habits of consumer

Consume buying behaviour is highly influenced at various stages of consumers decision making process during buying.

Consumer behaviour has changed as a result of it. Consumers are no longer waiting for corporations to send them messages; instead, they are searching for information immediately on social media. By permitting mutual connection, social media has drastically impacted consumerbusiness relationships [10] and a new advertising method known as "Social Media Marketing" has emerged.

Consumers' goals for using social media provide insights into their lives. Consumers have three primary goals or purposes while using the Internet as a medium: information, entertainment, and social interaction [11]

5:-DATA ANALYSIS AND INTERPRETATION

1. Familiar Online Shopping Sites-

Sr.No	Particulars	Frequency	Percentage
1	Amazon	35.37	35.37
2	Myntra	23.60	23.60
3	Flipkart	9.8	27.83
4	E-bay	1.6	4.71
5	Shopee	1	2.83
6	Meesho	2	5.66

The above table and chart represent various online shopping websites used by consumer on a regular bases, according to the data collected around 35%no of people are quite familiar with Amazon while few people find Myntra more relevant then flip kart at 23.60% and 27.83% range, with just 4.71%, 2.83%, 5.66% no of clicks E-Bay, Shopee and Meesho were a little fewer known website.

2. Authenticity of Product-

Sr.No	Particular	Frequency	Percentage
1	Trust Completely	28.7	29
2	Had To Trust	34	35
3	Do Not Trust Completely	34	35
4	Do Not Trust At All	3.2	1
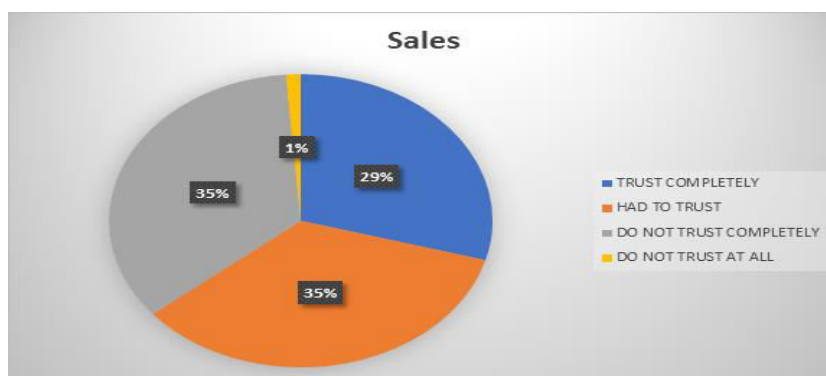
The above data and chart represent consumers experience on authenticity of product which plays a major role in consumer buying behavior as 29% no of people feel they can trust completely, while 35% no of people had to trust the authenticity of product, while 35% with 1% are the people who do not trust authenticity of products online.

3. Attractive Point

Sr.No	Particular	Frequency	Percentage
1	Home Delivery	30.4	31
2	Discount And Coupon	39.1	40
3	Referral Code	4.3	2
4	Convenience Of Return	26.1	27
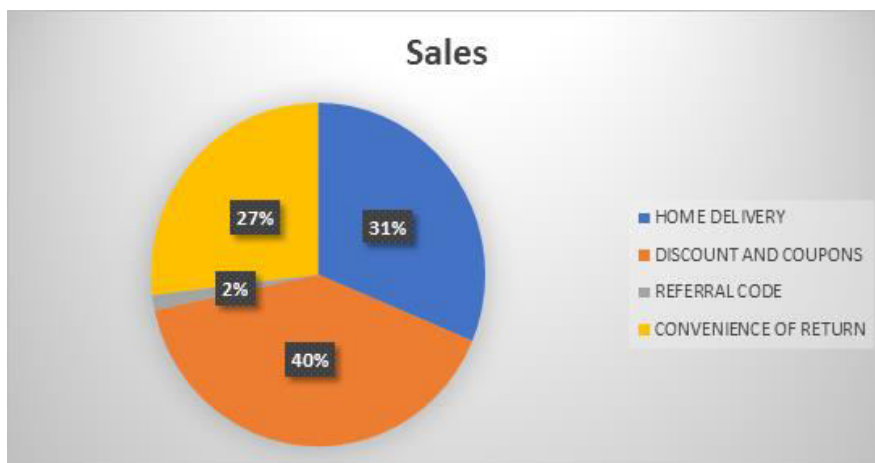
The above data and chart represent several attractive points according to consumer 31% no feel home delivery is an attractive point, while 40% no of people find discount and coupons as an attractive part of online shopping where as convenience of return is an important point for 27% people and only 2% people feel referral code as a main point.

4. Last Viewed Advertisement

Sr.No	Particulars	Frequency	Percentage
1	Amazon	22.6	43
2	Myntra	14	23
3	Flipkart	22.6	14
4	Ebay	15.1	4
5	Shopee	4.3	1
6	Meesho	1.1	15
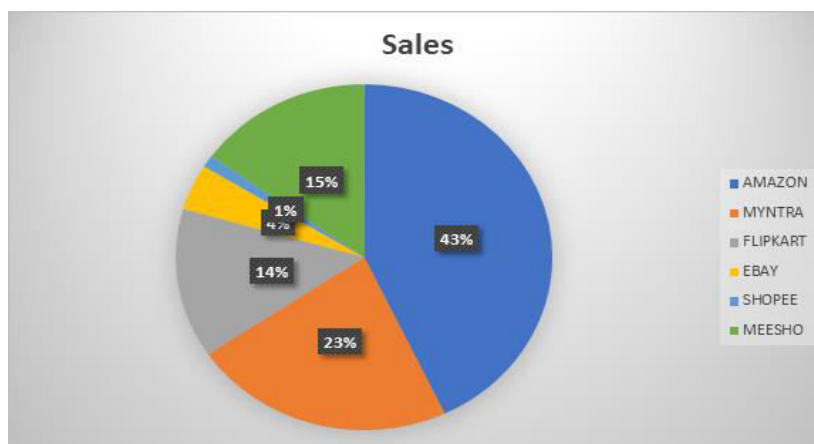
The above data and chart represent few last viewed advertisements where 43% people saw amazon's ad, 23% saw Myntra's ad, and 14% people saw flip kart's ad and 4%, 1% and 15% people viewed eBay, Shopee and meesho ad.

5. Product showcased on digital advertisement

Sr.No	Particular	Frequency	Percentage
1	Yes	41.9	43
2	No	58.1	57

The above data and chart represent advertisement decision made by people where around 57% people control the advertisement on their social media handles while 43%do not do the same.

6. Purchase from Repetitive Ads

Sr.No	Particular	Frequency	Percentage
1	Very Often	6.7	7
2	Often	18.9	19
3	Frequently	26.7	27
4	Rarely	33.3	33
5	Not At All	14.4	14
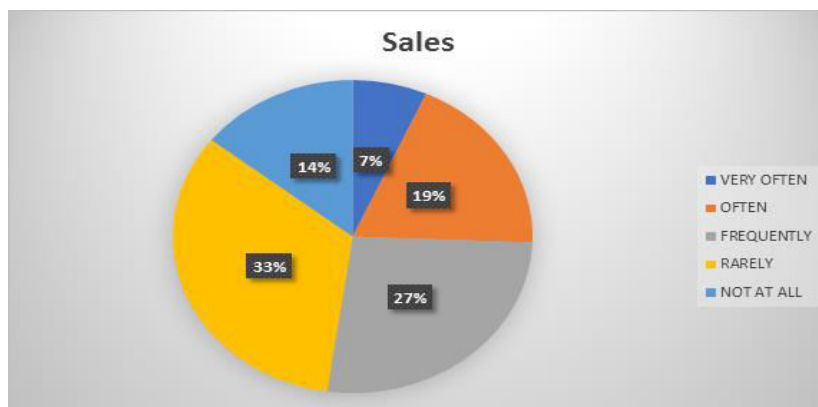
The above data and chart represent what is the occasion of them buying the product where around 7% people buy products very often,19% buys it often,27% buys it frequently,33% buys rarely and 14% do not buy it at all.

7. Emerging Innovation
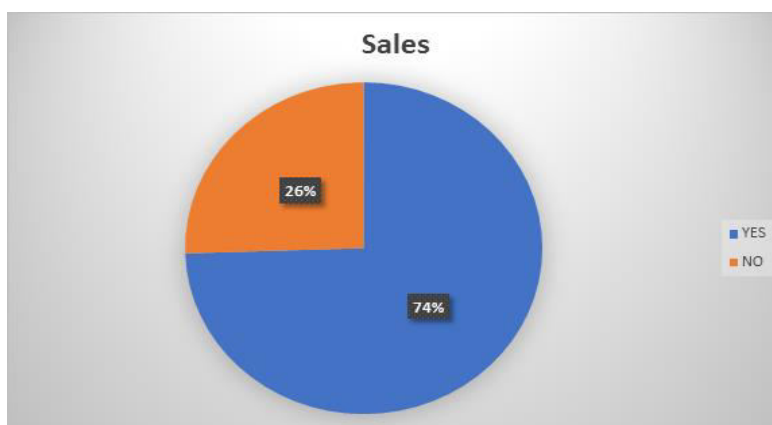
The above data and chart represent consumer's buying behavior on bases of emerging innovation where around 74% do believe and buys the emerging innovation where 26% do not.

8. Products by Influencers
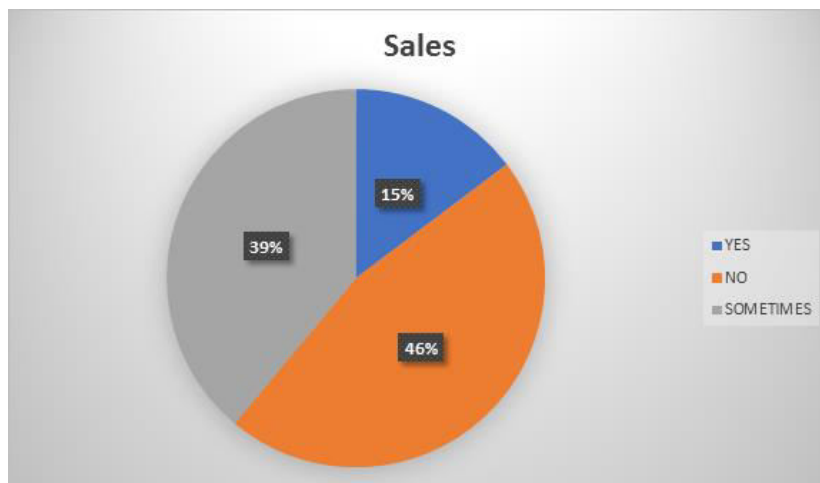
The above data represents the effect of influential marketing where around 15% people buys the product, 46% do not and 39% buys the product at times.

9. Influential Marketing
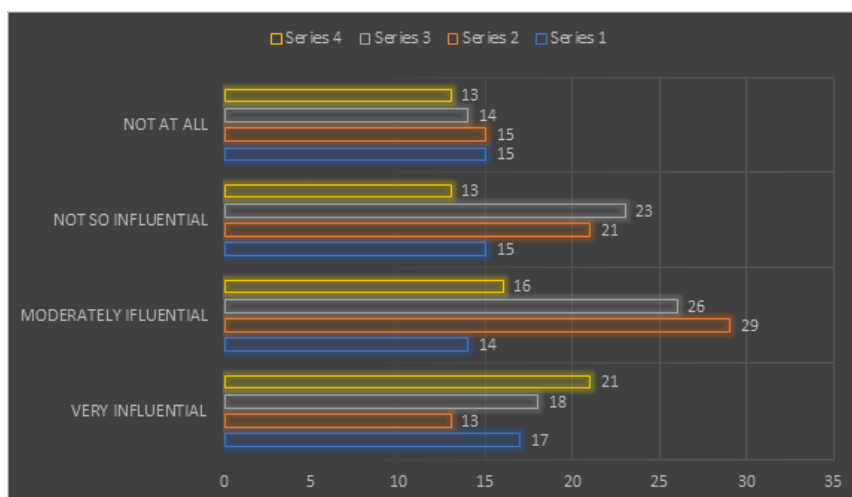
The above data and chart represent how influential is influential marketing for people where it was found around 24% people found influential marketing very effective ,29% while people found it moderately influential, while 28% found it not so influential and 19% found it not at all influential.
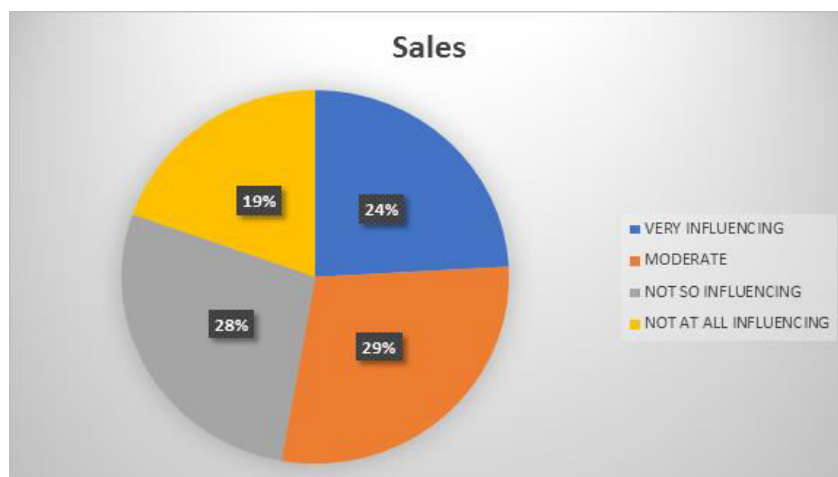
10. Attributes of a Brand
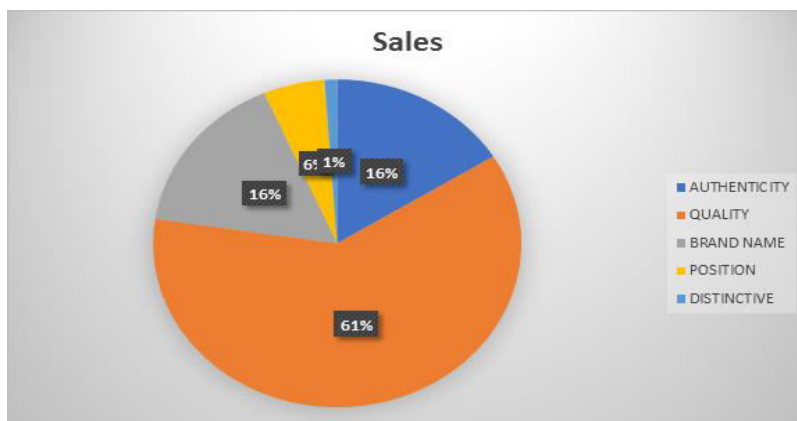
The above data and chart represent various attribute of brand where around 61% feel quality is a major attribute while 16% find brand name as an attribute and 16%, 5% and 1% feel position, authenticity and distinctive as a major attribute respectfully.

11. Referral Code /Coupons
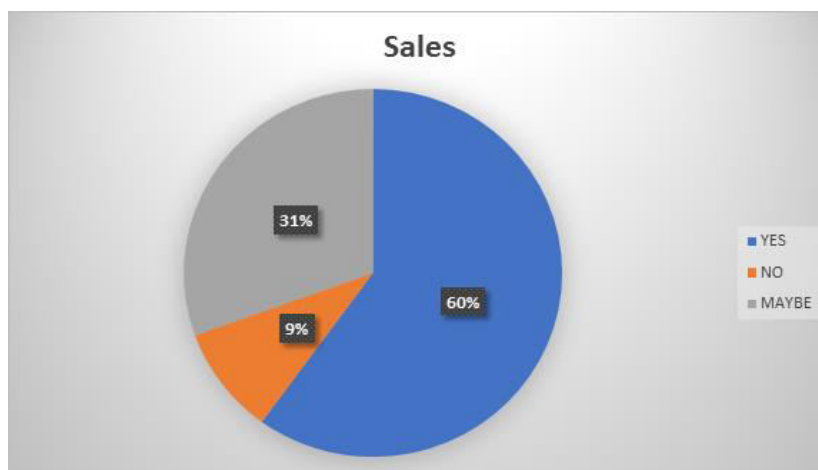
The above data and chart represent use of referral coupons and discount on online sites where around 60% people use this coupon, 9% do not use it and 31% may use it at times.

12. Factors Affecting Buying Decision
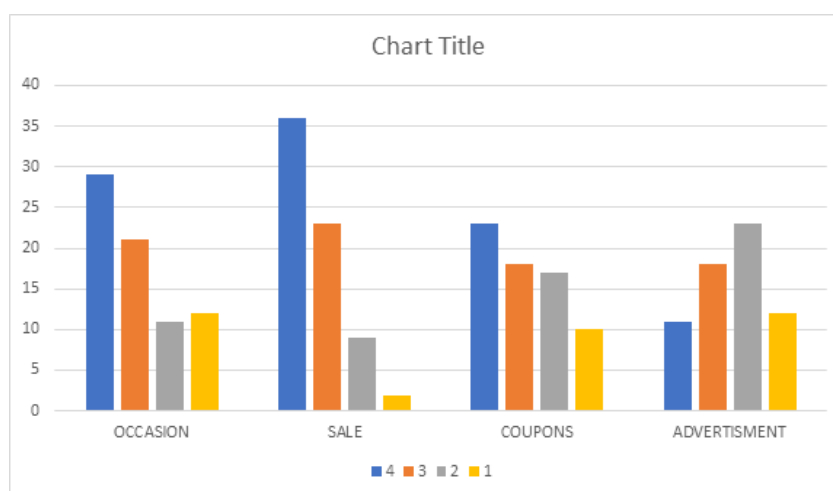
The above data and chart represent various factors affecting consumer's buying behavior

Where occasion influences 35% people, sale influences 33% people, coupons affect 31% people and advertisement affects 1% people
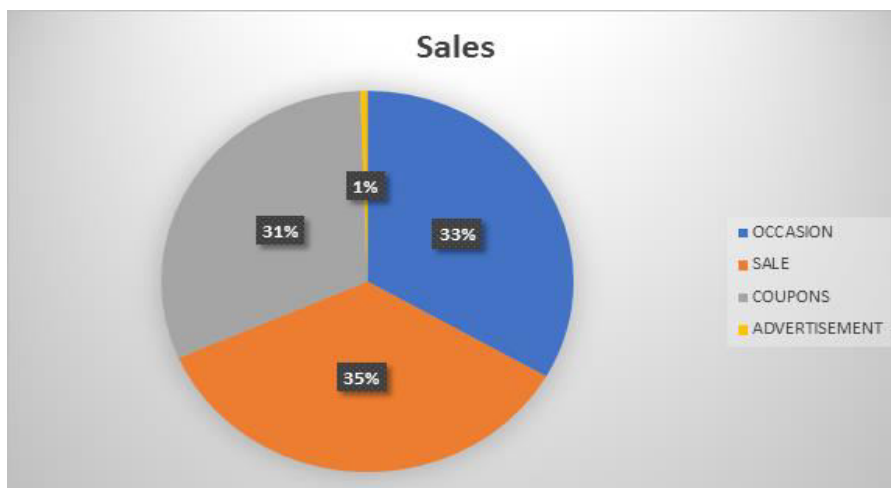
13. Rating of Websites
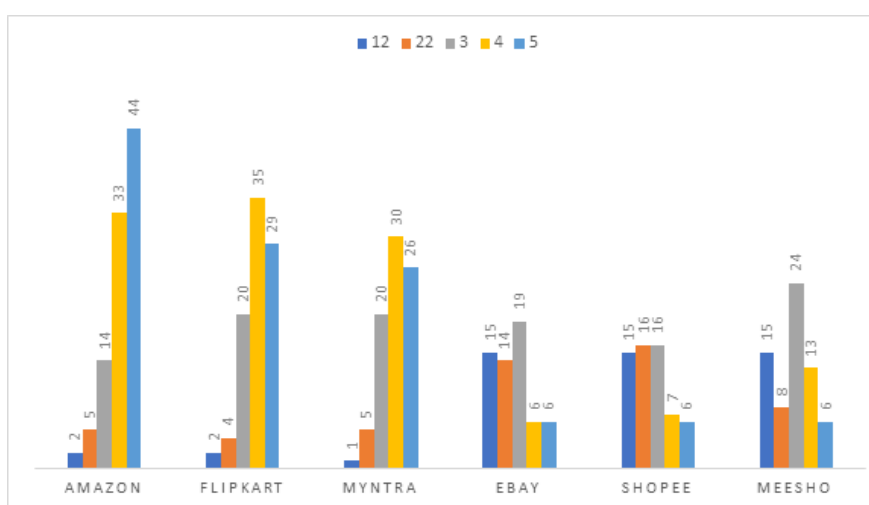
The above data and chart represent what do people feel or how was their experience on online shopping sites where 30% people found Amazon better, while30%people feel flip kart effective, while Myntra liked by 30% number of people, while eBay, Shopee and meesho were loved by 4%,2%,4%.

6: SUGGESTION

o Online shopping websites are indeed a boon for our society and is utilized on its maximum quantity

o Technology has paved the path for betterment of our society bringing new innovations in online shopping and innovative product formation as well

o This technology along with right strategy leads to a new brand formation and also innovation of existing brands creating wonderful opportunities for consumers and entrepreneur as well

o Online shopping websites have a complete understanding of various factors affecting consumers buying behavior delivering correct product at correct time and correct place.

o A proper analysis of consumers buying habit can be benefitted to both consumer and business person creating a wonderful opportunity for marketing of a product

7: CONCLUSION

As in the current scenario technology is booming all round the world ,noting down the current scenario of the global pandemic where it would have been next to impossible to survive without technology and online shopping site have paved the path for betterment of worldwide .Currently online shopping sites have millions of user and with the help of same we can find any goods from any random place at any time for a comparatively lower cost and numerous varieties sand also superior quality luxury products at our comfort zone or just by clicking few websites at the comfort of your home. Be it Louie Philippine or a local apparel brand we find it listed all together sharing the same platform, also online shopping has created marvellous opportunity for locals or small-scale business solving problem of inflation. Online shopping and technology go hands in hands and

created a great buzz amongst consumers and entrepreneurs creating an amazing platform benefiting both ends. Online shopping is one of the best solutions in today's hectic world, and maximum number of consumers are shifting online as not only is it quite convenient but also consumer gets the overall benefits and leverages, while studying consumer behaviour we observe that various factors affecting consumer buying needs to be studied and its future scope should be explored.

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ANNEXURE

1. Amongst the websites listed below which are the most familiar online shopping websites?

- Amazon
- Myntra
- Flipkart
- E-bay
- Shopee
- Meesho

2. How much do you trust the authenticity of the product purchase online?

- Trust completely
- Had to trust
- Do not trust completely
- Do not trust at all

3. Which point attracts you the most?

- Home Delivery
- Discount and Coupons
- Referral code
- Convenience of return

4. Among the brand mentioned below, which was the last viewed advertisement?

- Amazon
- Myntra
- Flipkart
- E-bay

- Shopee
- Meesho

5. How do you find the quality of product ordered online?

- Superior
- Optimum
- Low
- Vet low

6. Do you decide product showcased in digital advertisement?

- Yes
- No

7. If yes, how often do you buy from repetitive ads?

- Very often
- Often
- Frequently
- Rarely
- Not at all

8. Do you trust emerging innovation in online shopping?

- Yes
- No

9. Do you buy products advertised by influencers?

- Yes
- No
- Sometimes

10. How influential is social media marketing for you?

- Very influential
- Moderately influential
- Not so influential
- Not at all influential

11. How often do you visit the website?

- Once or twice
- More than twice a week
- Thrice a week
- More than twice a month

12. What attributes makes you choose a brand?

- Authenticity
- Quality
- Brand name

- Position

- Distinctive

13. How much money do you spend per month on online shopping?

- Below 500

- 500-1000

- 1000-3000

- Above 3000

14. Rate the website? ?[On scale of 5 to 1 , where 5 being highest and 1 being lowest]

- Amazon

- Flipkart

- Myntra

- E-bay

- Shopee

- Meesho

15. Do you use coupons/referral codes during online purchase?

- Yes

- No

- Maybe

16. Rate the factors affecting buying decisions?[On scale of 5 to 1 , where 5 being highest and 1 being lowest]

- Occasion

- Sale

- Coupons

- Advertisement

Study of Customer Satisfaction Related To Bancassurance in Public Sector Banks and Private Sector Banks in Mumbai City

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ABSTRACT

In India, banks are playing main role in the insurance market. Bancassurance is a French word which is defined as the distribution of insurance products through banks. This term is called "allfinaz" which can fulfill both Insurance and Banking needs of the customers under one roof. In view of the customers, bancassurance is an extravaganza in terms of high quality products, reduced price and door steps delivery. Firstly, on one side day by day customers preferences are changing as they have the lot of choices to choose insurance policy from any distribution channel. However, providing banking and insurance services to enhance satisfaction level.

Purpose: The purpose of this study aims at looking at the level of Customer satisfaction on bancassurance services towards public and private banks. Customer satisfaction in terms of service quality provided by banks while purchasing insurance policies and to find out the reasons for taking insurance policies from the same banks where they are having their bank accounts.

Methodology: Primary and secondary are collected. Data has been collected from 110 Customers. Those Customers are having Bank Accounts in Private and Public Sector Banks in Mumbai City.

Contribution: Paper is focusing on measuring the overall Customer satisfactions from customers towards insurance policies offered by the bank (public and private). There has been high expectation of customers when it comes to service quality provided by the banks. As introduction of bancassurance has happened so there is the change in level of satisfactions and overall service expectations of these customers.

Keywords: Customer Satisfaction, Service Quality, Bancassurance, Public and Private Sector Banks.

1. INTRODUCTION

The factors which indicates customer satisfaction level regarding bancassurance of private and public sector customers, it was noticed that "cost to quality worthiness"; "word of mouth publicity"; and "post purchase action" are the vital factors.

A customer's choice is to earn returns, to know more about the products charges, lesser premiums and other benefits of insurance policies to choose from (Devasenathipathi et al 2007). With an intention to provide a comprehensive financial service under one roof, bancassurance benefits customers by providing advices on financial planning, better service quality ease of renewals, electronic banking, credibility, transparency in dealings as mentioned by Kumaraswamy, 2012.

Earlier, insurance policies were sold by only insurance agent. But after the entry of bancassurance business poses a different channel for customers in availing insurance service. However, in bancassurance, banks face rigid competition not only within banking industry but also in insurance industry.

By selling the products and services of an insurance provider, banks try to increase their revenue. Insurance Companies by doing the tie-ups, will lead to increase its customer base with range of banks which ultimately ends up in increasing the customers.

2. LITERATURE REVIEW

The key objective of the literature review is to examine over existing research, like case studies, empirical papers, and proceedings, to see what factors influence customers' encounters with bancassurance. In strategies to succeed, banks, as discussed by Muthumari et al. (2017), must constantly follow the trend and explore the prospect of having customised services. Furthermore, per the report, bank loyal customers are satisfied with the services provided by the bank. Customers, in other words, want banks to always fix their problems and keeping their financial services up to date.

According to Chari & Jaylakshmi (2014) et al., the fundamental reasons for clients' strong demand for insurance products through banks are convenience, long-term relationships with banks, financial services under one roof, trust, and the overall image of the banks. Per the Meera et al. (2011), clients frequent bank branches and have little or no influence over cross-selling of insurance products.

3. OBJECTIVES

1. To study the influencing factors for the purchase of Bancassurance.

2. To study the Customer Satisfaction level for purchasing the bancassurance across public and private sector banks.

3. To study associations between the types of insurance policy purchased by public and private sector banks.

4. To study comparison between type of various reasons to purchase bancassurance by the customers of the bank.

4. HYPOTHESES

Therefore, current hypothesis is discussed and accordingly research questions have been framed below. Customer satisfaction means the perception that customers have towards the bank when their expectations have been exceeded or met. Customer satisfaction helps the banks to identify and grab the opportunities for product or services innovation.

H_{01}: *There is no significant difference in the influencing factors for purchase of Bancassurance.*

H_{11}: *There is a significant difference in the influencing factors for purchase of Bancassurance.*

H_{02}: *There is no significant difference in the Satisfaction level for purchasing Bancassurance across the type of Bank.*

H_{12}: *There is a significant difference in the Satisfaction level for purchasing Bancassurance across the type of Bank.*

H_{03}: *There is no significant association between type of Insurance plan purchased and type of Bank.*

H_{13}: *There is no significant association between type of Insurance plan purchased and type of Bank.*

H_{04}: *There is no significant difference between type of reasons to purchase Bancassurance by the respondents.*

H_{14}: *There is no significant difference between type of reasons to purchase Bancassurance by the respondents.*

5. RESEARCH METHODOLOGY

Data was collected in the month of January 2022. Total 110 Customers of the banks, having insurance, has been selected to participate in the study. Banks consists of private and public sector banks. Customers were from Mumbai City. Cronbach's alpha test was conducted to test the reliability of the data. There are two types of statistics used in data analysis. Descriptive statistics consists of Arithmetic mean and standard deviations are calculated. Inferential statistics is used for testing of hypothesis. Statistical tools such Anova F test, Chi-square test, Freidman's test was conducted to test the Hypotheses, by using SPSS software.

5.1 SAMPLE DESIGN

Information was collected through a Structured Questionnaire from 110 respondents. Out of 110 customers, 40 had their accounts in public sector banks and 70 had their accounts in private sector banks. Variables considered were Customer Satisfaction of Service Quality.

5.2 QUESTIONNAIRE DESIGN

The test of Cronbach Alpha is used for the purpose of validation of likert scale. Questionnaire was framed as per the variables. Likert scale was ranging as Not Satisfied, Partly Satisfied, Mostly Satisfied, Completely Satisfied. To test the satisfaction level of customers of insurance through banks. Banking Information and other Demographic Information was also collected. Test is applied for all 110 respondents and parameters were measured of Customer Satisfaction of Service Quality.

6. RESULTS

Data related to the Demographics is rated, classified in the following table:

Table 1

Demographics		Frequency	Percentage
Gender	Male	48	43.6
	Female	62	56.4
Age group	21 to 30 years	59	53.6
	31 to 40 years	24	21.8
	41 to 50 years	10	9.1

	Above 50 years	17	15.5
Qualification	HSC	22	20.0
	Graduate	34	30.9
	Postgraduate	40	36.4
	Professional	14	12.7
Monthly Income	Up to Rs 25000	47	42.7
	Rs 25000 to Rs 50000	28	25.5
	Rs 50000 to Rs 75000	13	11.8
	More than Rs 75000	22	20.0

The above table indicates that out of 110 respondents, there are 48 male and 62 female respondents. Among these, 59 respondents are aged between 21 to 30 years, 24 are aged between 31 to 40 years, 10 are aged between 41 to 50 years and 17 respondents are aged above 50 years. Of these 110 respondents, 22 are HSC passed, 34 are graduates, 40 are postgraduates and 14 respondents are professionally qualified. Also, 47 respondents have a monthly income up to Rs 25000, 28 respondents have a monthly income between Rs 25000 to Rs 50000, 13 respondents have a monthly income between Rs 50000 to Rs 75000 and 22 respondents have monthly income of more than Rs 75000.

Satisfaction for Bancassurance:
Responses related to Satisfaction level of factors influencing purchase of Bancassurance are rated suitably. Mean Scores for the same are calculated using appropriate formula and presented in the table:

Table 2

Descriptive					
	N	Minimum	Maximum	Mean	Std. Deviation
Satisfaction	110	40.0	100.0	71.727	14.8646
Valid N (listwise)	110				

The above table indicates that the Mean score for Satisfaction level for purchasing Bancassurance is 71.72 percent. Corresponding standard deviation is 14.86, suggesting that there is a moderate variation in the responses.

CRONBACH'S ALPHA TEST:
This test is used for validation of Likert scale which is present in the questionnaire. To validate the scale, Cronbach Alpha test is applied for all 110 respondents. The Cronbach Alpha value for the variable Satisfaction for Purchasing Bancassurance is 0.914. As it is more than required value of 0.700, therefor the test is accepted and **scale is reliable and accepted**

HYPOTHESIS TESTING:
H_{01}**:** There is no significant difference in the influencing factors for purchase of Bancassurance.

H_{11}**:** There is a significant difference in the influencing factors for purchase of Bancassurance.

To test the above Null Hypothesis, Friedman's test is applied and p-value is calculated. Results are shown in the table below:

Table 3

Test Statistics[a]	
N	110
Chi-Square	49.579
Df	9
p-value	.000
a. Friedman Test	

INTERPRETATION
The above results indicate that calculated p-value is 0.000. It is less than 0.05. Therefore, Friedman's test is rejected. Hence Null hypothesis is rejected and Alternate hypothesis is rejected.

CONCLUSION
There is a significant difference in the influencing factors for purchase of Bancassurance.

FINDING

Is that the ranking of influencing factors for purchase of Bancassurance is significantly different. It is observed that there is a significant difference in the mean rank of the most important and the least important factors. This can be observed in the following table:

Table 4

Ranks	
	Mean Rank
Q14.1 Low Premium	5.11
Q14.2 Ease of Documentation	5.21
Q14.3 Ease of Processing	5.38
Q14.4 Trustworthy and Secured	**6.29**
Q14.5 Single point contact	5.70
Q14.6 Recommendation by bank staff	5.07
Q14.7 Quick and Efficient Service	5.50
Q14.8 Convenient mode of payment	**6.46**
Q14.9 Proper guidance for selection of plan	5.00
Q14.10 Expert Advice from Relationship Officer	5.28

The above table indicates that the two most influencing factor for purchasing Bancassurance by the respondents are "Convenient mode of payment" followed by "Trustworthy and secure way" as it has the highest rank of 6.46 and 6.29 respectively. Similarly, the two least important influencing factor for purchasing Bancassurance by the respondents are "Proper guidance for selection of plan" and "Recommendation by bank staff", as it has the lowest rank of 5.00 and 5.07 respectively.

H_{02}: There is no significant difference in the Satisfaction level for purchasing Bancassurance across the type of Bank.

H_{12}: There is a significant difference in the Satisfaction level for purchasing Bancassurance across the type of Bank.

To test the above Null Hypothesis ANOVA is obtained and F-test is applied. Results are shown in the table below:

Table 5

ANOVA					
Satisfaction					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1800.657	1	1800.657	8.727	.004
Within Groups	22283.661	108	206.330		
Total	24084.318	109			

INTERPRETATION

The above results indicate that calculated p-value for Satisfaction is 0.000. It is less than 0.05. Therefore F-test is rejected. Hence Null hypothesis is rejected and Alternate hypothesis is accepted.

CONCLUSION

There is a significant difference in the Satisfaction level for purchasing Bancassurance across the type of Bank.

FINDING

Is that the Mean Score for Satisfaction level for purchasing Bancassurance is significantly different across the Type of Bank of the respondents. It is higher for the respondents with account in Private Banks as compared to the Public sector banks. This can be observed in the following table:

Table 6

Report			
Satisfaction			
Type of Bank	Mean	N	Std. Deviation
Private Sector Bank	74.786	70	15.2262
Public Sector Bank	66.375	40	12.6965
Total	71.727	110	14.8646

The above table indicates that the Mean Score for Satisfaction level for purchasing Bancassurance is higher at 74.78 percent for respondents with account in Private Banks, while it is lower at 66.37 percent for respondents with account in Public sector Banks. This validates our findings.

H_{03}: There is no significant association between type of Insurance plan purchased and type of Bank.

H_{13}: There is no significant association between type of Insurance plan purchased and type of Bank.

To test the association, Pearson Chi-square test and p-value is calculated. The results are as follows:

Table 7

Type of Bank * Type of Insurance purchased		
Type of Insurance	p-value	Result
Life Insurance	0.509	Not Significant
Health Insurance	0.828	Not Significant
Investment Insurance	0.966	Not Significant
General Insurance	0.205	Not Significant

INTERPRETATION

The calculated p-value for all four types of Insurance is 0.509, 0.828, 0.966 and 0.205 respectively. This are more than 0.05. Hence, the Chi-square test is accepted. Hence Null Hypothesis is accepted and Alternate Hypothesis is rejected.

CONCLUSION

There is no significant association between type of Insurance plan purchased and type of Bank.

FINDING

Is that there is a similar proportion of respondents purchasing various types of Insurance from both Private and Public sector banks.

Table 8

	Life Insurance		Health Insurance		Investment Insurance		General Insurance		Total
	Freq	Percent	Freq	Percent	Freq	Percent	Freq	Percent	
Private Bank	43	61.4%	33	47.1%	16	22.9%	35	50.0%	70
Public Bank	22	55.0%	18	45.0%	9	22.5%	15	37.5%	40

The above table indicates that 43 respondents (61.4%) purchase Life Insurance from Private Banks, while 22 respondents (55.0%) purchase it from Public sector banks. 33 (47.1%) respondents purchase Health Insurance from Private Banks, while 18 (45.0%) respondents purchase it from Public sector banks. 16 respondents (22.9%) purchase Investment Insurance plan from Private Banks, while 9 respondents (22.5%) purchase it from Public sector banks. 35 respondents (50.0%) purchase General Insurance from Private Banks, while 15 respondents (37.5%) purchase it from Public sector banks.

This suggests that there is particular choice of type of banks to purchase various Insurance plans. The respondents purchase it from both the banks in a similar pattern.

H_{04}: There is no significant difference between type of reasons to purchase Bancassurance by the respondents.

H_{14}: There is no significant difference between type of reasons to purchase Bancassurance by the respondents.

To test the association, Chi-square test is applied and the p-value is calculated. The results are as follows:

Table 9

Test Statistics	
	most important reason to take insurance policy
Chi-Square	42.891[a]
df	2
p-value	.000
a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 36.7.	

INTERPRETATION

The calculated p-value is 0.000. This is less than 0.05. Hence, the Chi-square test is rejected. Hence Null Hypothesis is rejected and Alternate Hypothesis is accepted.

CONCLUSION

There is no significant difference between type of reasons to purchase Bancassurance by the respondents.

FINDING

Is that the observed number of respondents purchasing Bancassurance for Financial security for Family is significantly different to the expected responses for the same. Also, there are significantly less responses for 'Compulsion from bank while taking loan' as the reason for purchasing Bancassurance.

Table 10

What is most important reason to take insurance policy?			
	Observed N	Expected N	Residual
Financial Security for Family	61	36.7	24.3
Savings and Investments	43	36.7	6.3
Compulsion from bank while taking loan	6	36.7	-30.7
Total	110		

The above table indicates that there are 61 responses for 'Financial security for family' as the reason for purchasing Bancassurance as compared to the expected responses at 36.7 for the same. This suggests that a significantly higher number of respondents purchase Bancassurance for this reason. Also, only 6 respondents purchase it for the reason of 'Compulsion from bank while taking loan' as compared to the expected number of responses at 36.7. This verifies our findings.

7. DISCUSSION

During the purchase of bancassurance by customers its rank range of most less and most high factors. As highest is convenient mode of Payment and least is less recommend by staff. Further Customer satisfaction level with respect to purchasing the bancassurance in private is more compare to public sector. However there is similar proportion of respondents various types of insurance plans purchased from both private and public sector banks. Therefore, when it comes to reason of purchase of insurance policy, it indicates customer priority is more for financial security for family compare to other reasons.

8. LIMITATION

This study is limited to respondent's opinion staying in Mumbai City only. However, in future there is a scope to conduct research in similar field by targeting other states. It is also recommended that further studies should expand the sample size. This could be done by involving customers from other countries and can be compared among different cultures.

9. CONCLUSION AND SUGGESTIONS

To conclude, it is observed that banks need to upgrade on innovative and customized insurance packages. Public sector banks need to use strategies to improve the Satisfaction level of customers as comparison to Private banks. Bank's employees should also be motivated to give suggestions to its customers with respect to insurance policies. Insurance is also important from point of view of saving and investment also that banks should create awareness in the minds of customers. However, customers are finding banks as a secured and trustworthy platform for purchase of bancassurance products so that in near future banks may provide appropriate information to its customers in association with their insurance partners and help customers to choose customized policies.

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Workplace Technologies Driving the Future Hybrid Workplaces

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ABSTRACT

In modern times, an individual aspired for a work profile with flexibility of work from anywhere anytime. Pandemic played a vital role in expediting this process which otherwise was considered messier and far-fetched model which could be rarely implemented on ground.

Technology played a tremendous role in making this happen in last couple of years at an unprecedented pace and we have reached a stage where majority of the office going population can deliver the expected outcomes well within time with better productivity and efficiency.

It has played a great role in reducing the attrition rate, reducing expenses for organizations, less physical stress on infrastructure of all forms and also personally, greater bonding with the family members and many more. Overall, the hybrid model seems to provide benefits of both worlds with technology interventions wherever required.

The technology blended workforce will be more productive from their preferred work location and also help organisation in recruiting workforce from tier 2 and tier 3 cities reducing the overall cost for organization and also reducing crowding of the metros.

Keywords: Hybrid Organization, Workplace technologies, Future of work, Collaboration tools, Communication platform

1. Hybrid workplace model

This model will enable the organizations to have a blend of workforce which operates from their home with workforce available on ground connected by right and relevant communication tools for better productivity and execution.

All office related job profiles have moves to work from home model in manufacturing setups also who were facing the challenge from years to operate out of plant sites. This has ensured that better talent at senior level can be recruited who would like to operate from big cities and visit the sites as required. The reverse is also true, where young individuals will prefer taking courses which require postings at site locations as this gives them opportunity to stay with their family while working. This model also helps in developing the overall economy rather than getting the wealth concentration in some places.

2. Empowering Technology Tools

As work from home/ hybrid models become the new normal of operations, organizations need to empower employees with right technological tools which would be relevant to make this a success in the long run and create value for all the stakeholders operating in this model in either quantitative or qualitative form.

3.1 Tracking Systems

End to end integrated system where offline or online workers are connected with the managers at any point in time and their whereabouts are known. This will instil a sense of physical monitoring by organization.

3.2 Tools for Collaboration

Microsoft teams and zoom has evolved in last two years creating a digital twin of office work premises over cloud whereas all can connect. Also, these software's enabled users to be part of any project from anywhere and on any device giving them complete flexibility of multitasking.

3.4 Document Management System

Authentic cloud platforms have enabled organizations to secure data in common drives which can be easily accessed by any individual. This has also helped in reduced dependence on infrastructure provided by office which are tightly controlled and shifting the governance mechanism over cloud for monitoring which is easy and efficient.

3.5 Human Capital Management

End to end integrated HCM systems should be put in place to modernise the activities and process of talent recruitment, retention. A platform for hire to retire should be created as one stop solution for all HR related

activities which should be available over cloud for hybrid model implementation and success. This will ensure interaction between HR and employee by way of pre-defined system workflows for each need resulting in smooth process and reduction of workload for HR operations eventually.

3.6 OFFICE TOOLS

In case of offline premises, proper entry exits mechanisms integrated with HCM systems and medical HMS systems should be put in place to implement covid protocols or any such guidelines in futures which are integrated with security systems / access cards of employees for seamless integration and employee experience. This should be part of HCM system itself for monitoring entire employee journey from testing to access management to entry in premises. Same should also help in monitoring the social distancing by having smart access cards which can intimate the user in case of violation of social distancing by sending app notification.

3.7 AUTOMATION

Office cleaning should be automated based on smart housekeeping tools rather than relying on punch sheets filled by supervisors on an hourly basis. Sensors should be implemented which should trigger housekeeping for maintaining cleanliness at particular areas. More automation in terms of cleaning robots, UV cleaning technology to disinfect office spaces should be implemented to avoid human interaction and maintain social distancing.

3.8 Learning and Development platforms

Learning management tools have evolved in last few years and online training platforms are playing a significant role in providing customised and personalised learning for individuals depending on their job roles. Supporting internal employees and providing them right training will help employers retain employees and also provide satisfaction to employee since company will take care of his learning needs. All these platforms should be integrated with HCM platform and available in anytime, anywhere any device mode. This will also help in removal of offline training requirements to some extent and provide opportunity for HR to utilise the communication tools to deliver the trainings to individual working in online mode in hybrid model. Most of the online trainings needs will be taken care by learning platforms giving ample time for HRs to develop modules for offline trainings which are more focused and practical oriented for people working on ground.

3.9 Mobile application

Mobile application has grown exponentially and with right tools available all jobs related to co-ordination have moved to mobile calls and have grown tremendously. They also have people connect with each other within seconds pivoting the new normal where employees are sitting remotely from same team. The work doesn't stop, and long meetings are curtailed to focused call for better outcomes. Mobile software's will play tremendous role in implements HCMs and communication tools practically giving power in hands of users to work from single device on majority of the occasions.

3.10 PMS (Performance Management systems)

Performance management systems will clearly help in defining the annual operating plans for individuals along with KPI monitoring mechanism which will eliminate the need of manual excel trackers. This will also ensure that there is no ambiguity between what is expected from the employee and what employee delivers as its recorded in system post discussion with the line mangers. The tools should be interactive and there should be enough opportunities of multiple discussions between employee and employer eliminating the fear of out of sight out of mind from employee thought process. A continuous feedback mechanism will help in adoption of hybrid model and its success.

3.11 Security Software's

Moving on private cloud is the new thing and along with VPN access management companies can keep the data secured which is of utmost importance in hybrid model since people tend to operate on personal laptops/ desktops, personal internet which may be secure/ unsecure. Organizations are also moving towards zero-trust network access. Slowly block chains technology will also be implemented which may play an instrumental role in hybrid workplace implementation.

3.12 Teleconferencing tools (Video/ Audio)

Teleconferencing has changed the entire way of communication and has completely eliminated the need of physical interaction in majority of the occasions. Lot of conferencing tools have come up in last two years with the onset of pandemic and are playing an instrumental role in enabling work from remote locations while connecting offline employees. Concept of hybrid meetings have evolved. Lot of service providers are specifically developing tools targeting hybrid workplaces.

3. Reports and research supporting hybrid model concept
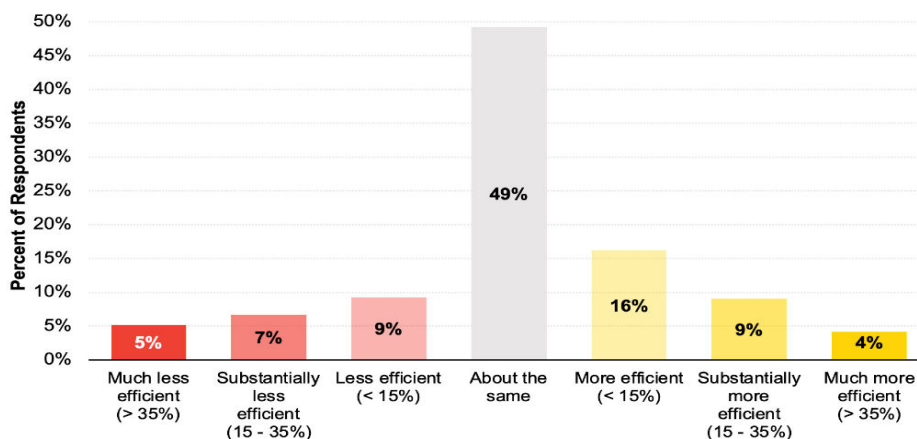
Source: https://voxeu.org/article/working-home-revolutionising-uk-labour-market
Fig. 1: Productivity Response
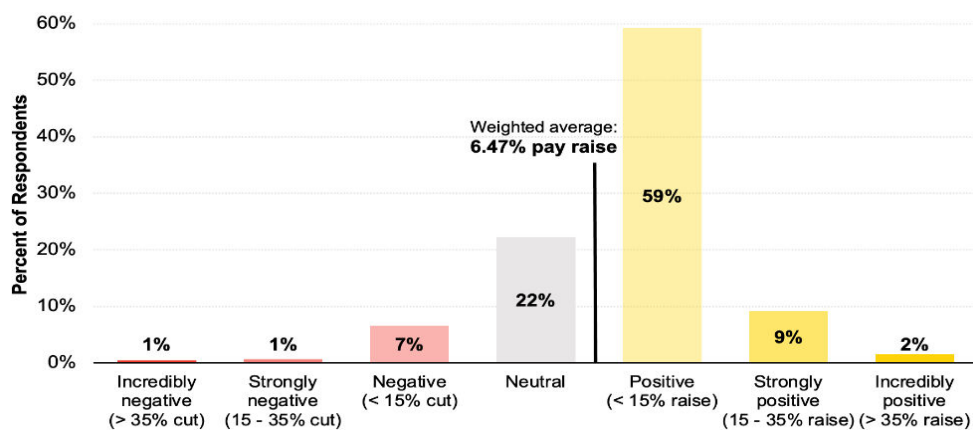
Source: https://voxeu.org/article/working-home-revolutionising-uk-labour-market
Fig. 1: Respondents preferring work from home
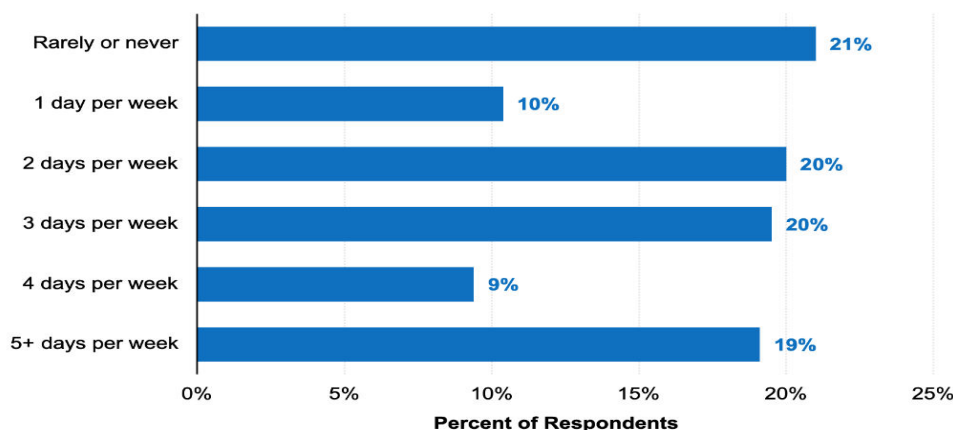
Source: https://voxeu.org/article/working-home-revolutionising-uk-labour-market
Fig. 1: Days preference for work from home

"Notes: Data are from two surveys of 4,809 UK residents, that Prolific carried out in January and February 2021 on behalf of the University of Nottingham and Stanford University."

4. CONCLUSION

The research paper focuses on highlighting the right workplace tools which has the potential to disrupt the typical traditional office setup and also brings out the various aspects related to sustainability, societal benefit at large and overall economy developed of national at whole in a decentralised manner rather than concentration in specific pockets.

1. What are the overall benefits?

Pandemic gave an opportunity to test the hybrid model way ahead of time and with right technological tools available and developed quickly over the span of last two years have played a significant role in evolution of the hybrid workplaces concepts in even the most difficult setups for implementation like the manufacturing organizations which require physical presence of employees to run machinery. The overall benefits include job role satisfaction, emotional satisfaction of living with the family, better work life balance, improved health, less stress and reduced absenteeism resulting in increased manhours. This also provides opportunity to all without any discrimination of gender and especially is a boon for new mothers.

2. Cost benefit analysis of remote working vis a vis traditional workplace setup.

Research report by Global Workplace Analytic have arrived at an approximate number of USD 11,000 per year per employee if they operate remotely for half of the time and it also benefits employees between the range of $2,000 to $7,000 depending on the salary ranges and job profiles. This suggests that hybrid model has the potential to increase the overall benefits for both the employer and the employee.

Report from 2019 prepared by Owl Labs State has found that employees working from remote locations of their choice have a productivity enhancement of 79% along with better focus. More than 50 % are less likely to take leaves as found by CoSo research. According to Airtasker research 2020, remote employees work more.

5. RECOMMENDATIONS

To move to complete work from anywhere model, the organization should identify teams and job roles which could have easy transition based on experience of pandemic for almost two years. Teams as whole should be moved and then departments if possible. Continuous evaluations to be done and modifications to be done as and when needed depending on change in nature of work for an individual. Individuals should be supported with proper training which can be delivered online. Sufficient IT support should be provided to individuals with work from home setup, IT infrastructure to be provided by company replicating the standard office experience for all users in the comfort of their home. The KPIs should be more of outcome focused rather than work hour punched in by the employees. The performance measurement should be based on efficiency and productivity rather than physical presence. Quantification of other benefits should be done for employee, employer and society as whole in the hybrid model of operations. Example can be reduction in carbon footprint by eliminating travel for substantial individuals in an IT service industry country like India. In order to make the hybrid model successful, organizations need to have right tools with a strong HR interface to create an overall distributed workplace environment which can collectively deliver results.

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Mudra Yojana- A Ray of Hope for Homemakers Turned Entrepreneurs Post Covid-19

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ABSTRACT

The Covid-19 pandemic has severely impacted many Indian households since its inception in early 2020. In such face of adversity the women in the households have taken up the responsibility to be Atmanirbhar by setting up their ventures thereby supporting their families. Finance is a key element for any venture to sustain as well as succeed. The objective of this paper is to understand the experiences of Indian women homemakers who turned entrepreneurs post Covid-19 pandemic through personal interviews. It also tries to analyse the importance of Mudra Yojana in helping such ventures cater to their financial activities. The comparison of the experiences of these women revealed that Mudra Yojana can play a significant role in motivating the women homemakers to start their own ventures or in the expansion of their business activities. Thus, it is extremely imperative to create awareness regarding schemes like Mudra Yojana in order to reach out to a large number of women entrepreneurs.

Keywords: Covid-19 pandemic, Women Entrepreneurs, MUDRA Yojana, Atmanirbhar, financial activities

INTRODUCTION

"Entrepreneurship is about being able to face failure, manage failure and succeed after failing"- Kiran Majumdar Shaw, Founder, CMD Biocon Ltd.

The above quote by one of India's most successful female icons aptly captures the essence of entrepreneurship and inspires millions. The recent success of the Nykaa IPO (a start up by Ms Falguni Nayar) re-iterates the fact women are no less when it comes to sailing through the rough waters of the entrepreneurial voyage. Women constitute approximately 49% of the total population of India. They need to be self-dependent in order to achieve the objectives of '*Atmanirbhar Bharat*'. Moreover, encouraging women to become entrepreneurs ultimately leads to fulfilment of two Sustainable Development Goals *(SDGs)* viz. 1) Gender Equality 2) Decent work and economic growth. The Budget 2022 aims to provide impetus to the growth of MSMEs and start-ups by linking portal such as Udyam, e-Shram, National Career Service (NCS) and Atmanirbhar Skilled Employee-Employer mapping (ASEEM) that provide services related to credit facilitation, skilling and recruitment. As per the recent data provided by the Ministry of Commerce and Industries, out of the total start-ups registered with DPIIT, around 46% are the ones either started by women or have at least one woman cofounder.

The current Covid-19 pandemic had a huge effect on the economic well-being of Indian households. In these tough times many homemaker women have taken up the mighty challenge of sustaining the finances of the family by starting their own entrepreneurial ventures. A homemaker especially an Indian woman juggles multiple responsibilities on the home front. If we draw some parallels between the qualities of an entrepreneur and an Indian woman homemaker we find some striking similarities regarding their management acumen such as Time management, Creative thinking, Networking, Communication to cite a few.

The crucial requirement of any business venture is easy availability of funds. In order to provide an impetus to entrepreneurship and lending funds to all those who find it relatively difficult to raise funds through the traditional lending avenues, the *Pradhan Mantri Mudra Yojana*(PMMY) was launched by the Government of India on 8th April, 2015 alongside MUDRA Bank, with the objective of *'funding the unfunded'*. It aims at providing loans up to Rs.10 lacs to the non-corporate, non-farm small/micro sector. Under the PMMY, Mudra has created the following three products as per the amount disbursed.

a) *Shishu Loans:* Covering loans up to Rs. 50000

b) *Kishore Loans:* Covering loans above Rs. 50000 and up to Rs.500000

c) *Tarun Loans:* Covering loans above Rs.500000 and up to Rs.1000000

Mudra loan is provided for various purposes which lead to income generation and employment creation.

The Annual report of MUDRA 2020-21 suggests that post the Covid-19 pandemic the proportion of women beneficiaries in the total number of Mudra Yojana accounts has increased to 66% compared to 63% in the year 2019-20 thereby indicating an increase of 3% year on year.

Category	Shishu		Kishore		Tarun		Total	
	No of Accounts	Sanction Amt (₹ in crores)	No of Accounts	Sanction Amt (₹ in crores)	No of Accounts	Sanction Amt (₹ in crores)	No of Accounts	Sanction Amt (₹ in crores)
Total	40180115	109953	9486160	132516	1068771	79290	50735046	321759
Women Beneficiaries	27753288	74490	5468211	50371	82105	6082	33303604	131303
							66%	**41%**

This paper is a case study and tries to compare and contrast the experiences of two such homemakers who established their own ventures battling the heavy economic impact of the Covid-19 pandemic ,wherein one of them availed the MUDRA loan facility and the other who would like to avail the same in future for expansion.

OBJECTIVES

1) To understand the experiences of Indian women homemakers who turned entrepreneurs post Covid-19 pandemic.

2) To highlight the importance of MUDRA Yojana as a critical source for financial activities in motivating women homemakers to take up entrepreneurial ventures.

CONCEPTUAL FRAMEWORK:

The Covid-19 pandemic had a three dimensional impact on the MSME (Micro, Small and Medium Enterprises) sector affecting particularly the supply chain ecosystem, demand patterns and labour supply in India.(Singh Anukarsh, 2020). The various incentives and schemes announced by the Government need to reach out to maximum MSMEs to bounce back from the huge losses in their financial activities. (Sahoo Pravakar et al, 2020). The Mudra Yojana can provide the much needed boost to encourage women entrepreneurship post the covid-19 pandemic (Mitra Sona et al, 2021).The economic development of any nation is holistic only when all the sections of the society are the contributors to the same. Women entrepreneurs have a mammoth role to play in the economic development of India (Parmeshwar, 2020). A huge business is the culmination of all the tiny steps undertaken at the inception. The idea of 'Start small but think big' is truly endorsed by the objectives of MUDRA Yojana (Dr Kannakatti Jayanna& Harish Tigari, 2019). The aim of MUDRA Yojana is to promote entrepreneurial culture thereby leading to self-dependence (Bhayana G, et al, 2020). As per the annual reports of MUDRA it can be fairly understood that women entrepreneurs are availing the benefits of the scheme in huge numbers. Thus it is indeed playing the role of a catalyst to encourage women entrepreneurship in India (Srinivas R, 2021). However the road to success is full of challenges and obstacles and it is the very presence of several micro-finance schemes that encourages women homemakers to dive into the ocean of business opportunities awaiting them. (Chaturvedi Nidhi et al, 2019).

METHODOLOGY

Primary data was collected with the help of a questionnaire and personal interviews supplemented by secondary data from research papers, news articles and official websites of MUDRA Yojana, DPIIT , MSME etc.

OBSERVATIONS

This paper uses the case study approach to highlight the experiences and challenges of only two women entrepreneurs from the study specifically related to the food industry. The details of the two entrepreneurs are as follows:

1) Mrs Swati Bhide is the proprietor and manager of Bhide Foods, specialising in traditional Maharashtrian sweets and savouries. The business which was started in July, 2020 is located in Pune City.

2) Mrs Anita S Khamkar, is the owner of a vegetables and fruits shop in Kothrud area of Pune City. She started the business in May 2020 with the help of Mudra loan (Shishu category).

Case 1- Mrs Swati Bhide.

a) **Reasons for starting the venture**: Mrs Bhide always wanted to exhibit her excellent culinary skills in traditional Maharashtrian cuisine. During the lockdown due to Covid-19 pandemic, the workers in her husband's business were rendered jobless due to no customer footfall. However, she took up the opportunity to set up her catering business offering laddoos, Diwali snacks and other savouries by using the services of these workers.

b) **Initial Support and Obstacles**: Her initial struggles included training the workers, advertising and marketing their product so as to reach the target customers. However, she received a formidable support from her family members in all these aspects.

c) **USP**: Her strengths include her expertise in preparation of traditional Maharashtrian food items with utmost thrust on quality and good people management skills. Within a very short span of one year, Bhide Foods has managed to go from local to global, reaching out to international customers based at Singapore, USA, UAE etc based primarily on the word of mouth publicity by their Pune based customers. Her team workers are constantly motivated by her drive to adhere to deadlines and successfully execute the orders and deliveries even during tight schedules.

d) **Thoughts on importance of funding :** According to Mrs Bhide, continuous and timely availability of funds is a very important aspect of any business. Currently, the business is able to manage its funding needs from the operating revenues generated and ploughing back of accumulated profits. However, to cope up with the requirements of expansion in future, bank borrowings will have to be considered.

e) **Awareness regarding MUDRA Yojana:** Mrs Bhide is aware of MUDRA Yojana, but much unaware of the eligibility norms. With gradual expansion of her business ,she is contemplating availing the benefits under the MUDRA Yojana under the Kishore category (INR 50000-500000)

f) **Challenges ahead:** The biggest challenge ahead is the scaling up of operations, expansion of the existing customer base through appropriate marketing strategies to compete with established local brands. As the business operates in a cutthroat competitive environment ensuring consistency in quality is also highly imperative.

Case 2-Mrs Anita S Khamkar.

a) **Reasons for starting the venture:** Mrs Anita Khamkar hailing from a very humble household was a typical homemaker efficiently managing her home front. However after facing financial problems during the lockdown due Covid-19 in March 2020 she felt the constant need to help augment the income of the household by starting something on her own. There was a hesitation on her part due to paucity of necessary funds to start any venture. Through her friends she came to know about the Mudra Yojana. A detailed analysis of the same motivated her to finally start her own venture of dealing in fresh and exotic vegetables and fruits.

b) **Initial Support and Obstacles:** As Mrs Khamkar had no idea of setting up any venture she initially faced a lot of challenges in the form of procurement of raw materials, marketing and selling, competition from peers etc. In spite of not having any formal training, she sailed through the difficulties successfully with her determination and grit.

c) **USP:** The USP of this business is consistent customer demand as it is an essential commodity. Her adoption of a totally customer centric approach for her business helped her to adapt to the challenging times of the pandemic situation. Mrs Khamkar navigated through all the hardships of the pandemic by devising a unique strategy of delivering her vegetables and fruits in customised packages on a door to door basis. With the increasing demand coupled with lockdown obstacles, she hired an auto rickshaw which she and her son would use for delivering and selling vegetables by the day and ferrying passengers by the evening.

d) **Thoughts on importance of funding:** According to Mrs Khamkar as well, timely availability of funds is a very important aspect of any business. Currently the business is running with the help of Shishu loan (up to INR 50000) under the MUDRA Yojana; however she is looking forward to availing loans under the Kishore category (i.e. from INR 50000- INR 500000) for expansion purposes.

e) **Awareness regarding MUDRA Yojana:** The government scheme specifically the MUDRA Yojana instilled the much needed confidence in Mrs Khamkar to be truly *Atmanirbhar* (self-dependent) and put her entrepreneurial skills to best possible use.

f) **Challenges ahead:** The vegetables and fruits dealership venture is a very competitive business with many supply chain bottlenecks. With expansion proposed the requirement of additional funds is a huge issue.

CONCLUSION

The pandemic has disrupted the financial activities of many organizations. The MSME sector was probably the worst hit in this situation. However, on the other hand it has also boosted entrepreneurship acumen in homemakers. The aspiring women entrepreneurs need to believe in themselves and channelize their potential in

the right direction in order to be financially independent. Based on the above two cases studies, one can easily understand the significance of the following observations.

1) Awareness of one's own inherent skills and strong determination.

2) Belief in ones capabilities.

3) Strong sense of intrinsic motivation.

4) Knowledge of the market conditions.

5) Easy availability of funds.

6) Awareness of the Government schemes.

7) Entrepreneurial Ecosystem.

8) Need for prudent financial discipline.

One can conclude that with growing awareness of MUDRA Yojana many such capable as well as talented women homemakers, who aspire to be *Atmanirbhar*, can be encouraged to contribute to the economic development of India. However in order to encourage more women the other two categories (Kishore and Tarun) also need to be promoted through rigorous awareness campaigns. The supportive environment provided by both the family members and the ecosystem coupled with new government initiatives like the Government E- marketplace (GEM), provide the impetus for the homemakers to spread their horizon.

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Impact of Covid-19 on the Perception and Behavior of Investors towards Mutual Funds

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ABSTRACT

During COVID 19, majority of the sector have been severely affected which leads to loss of jobs and reduction in source of income. At that particular time, many of the retail investors were in panic due to negative sentiments of the stock market. Mutual fund is nothing but it's an indirect way of investing in equity market through diversify the risk. Thus, in this current scenario it is important to know the overall behavior and perception of the retail investors. The study attempts to find out the impact of COVID 19 on the perception and behavior of the retail investors. A well-structured questionnaire has been framed to analyze the investors' perception and behavior. The findings of the study reveals that investors having positive attitude towards mutual funds which reflects on their perception and behavior during the pandemic. The study examines investors looking for long – term investing in mutual funds and through Paired T – test, it has been analyzed investors have increased their risk-taking capability even during COVID 19.

Keywords: Mutual funds, COVID 19, pandemic, Paired T – test, perception, behavior, retail investors.

INTRODUCTION

This outbreak of COVID-19 pandemic has severely impact physically, mentally and financially as well. This pandemic has changed the perception and behavioral aspects of the investors. All individuals have been fighting from all issues that risen during the hard time of the COVID-19. Many investors have realized the importance of savings that these are the income of the future. As future is unpredictable, the returns on the investment are also unpredictable in a similar manner. Investors need to think about their savings like how to diversify the portfolio with respect to risk and return and the liquidity as well. This pandemic also realized the importance of liquidity, the more money in the form of liquid assets fruitful in hard time. So, they have to keep balance their portfolio in an efficient manner to meet the demand in the future. It depends on the nature of the investors, some of them are more inclined to safer side and pool their money at low-risk avenue specially during COVID whereas some of them have taken advantage of the downfall of the market and invested in the high-risk avenue like shares and mutual funds.

Mutual fund is one of the crucial financial intermediaries in the capital markets that creates wealth of the retail and corporate investors and also diversify their portfolio. Due to its many advantages, the mutual funds' demand going significantly over a period of time. COVID-19 pandemic has severely impact on financial market as well. The awareness towards mutual funds has been risen over the last many years, so many investors registered with multiple folios. (*Mutual Funds Add More than 81 Lakh Investor Accounts in 2020-21*, 2021). The AUM of the mutual funds at all time high of Rs 30 lakh crore in 2020 by November-end itself, from Rs 26.54 lakh crore at the end of December 2019 and these unexpected figures have been registered specially came after the pandemic hit worldwide. (*Mutual Funds Attract New Investors, Add to Their Wealth in Pandemic-Ravaged 2020*, 2020). Due to negative sentiments in the market, it has been observed that NFO declined from 11 in January 2020 to just zero in April 2020. (Das & Das, 2020). This disruption in the market will bring challenges and opportunities as well for all types of investors and for fund managers as well. (PricewaterhouseCoopers, 2021).

AUM of various mutual funds build-up the scope and quality of digital reach (for investors and distributors) and adapt robust research on data analytics to provide best services to investors and create more opportunities for the investors, as a result some NFO launched in the market during August 2020 and many more new investors joined in the mutual fund industry. (*The Impact of Covid on Mutual Funds | Value Research*, n.d.). This disruption in the market has changed the overall perception and behavior of the investors with an objective to earn substantial return in the mutual funds which leads to drop in the SIPs dropped 4%. (*SIP Collections Drop to ₹96,000 Cr in FY21 amid Pandemic-Led Disruptions*, 2021) and during the second wave of COVID, new SIPs registration has severely hit down to 16% as compared to the previous year as it is very difficult for the industry to reach in the rural areas to new clients. (Sharma, 2021) every investor seeking for safety first instead of returns as a result huge redemption have been recorded from both equity and debt securities as well. The credit risk schemes failed to face these pressure leads to Franklin Templeton has shut down 6 debt funds due to which investors was panicking but later on SEBI introduce regulations to ease the pain of the investors

(Matharu, 2020). After all these circumstances faced by the investors, this paper focus on analysis of perception and behavior of investors towards mutual funds before and during COVID-19. (Alber, 2020) investigates that there is a negative correlation between stock market returns and the number of coronavirus cases in most of the countries.

The economy of developing countries highly affected such as in Asian countries because their people heavily dependent on futuristic savings and diversify their investment portfolio as per their future demands and current needs. Due to this outbreak the whole economy was stopped and this forced investors to redeem all possible investments in this urgency. (Agarwal, Jamwal, & Gupta, 2020).

LITERATURE REVIEW

The COVID-19 pandemic has impacted on financial decisions of the investors in small towns as well. (Gurbaxani & Gupte, 2021) reported many respondents from Madhya Pradesh have dropped their SIPs by 43% during the pandemic. This study revealed that change in investment decisions associated with COVID-19 pandemic. During this pandemic, individuals witnessed many issues like salary cut, job loss caused changed in financial decisions because now investors seek for safety and wealth preservation which leads to reallocation of investors' portfolio (Verma, 2021).

(Himanshu et al., 2021) examines how investors changed their portfolio allocation during the pandemic with an objective of wealth creation. Risk-free avenues become more preferable during the pandemic such as Bank deposits, Public Provident Fund (PPF), Gold. However, before the COVID-19 pandemic investors were seeking for risky assets such as Stocks, Mutual Funds, Bonds, Real estate to grow their wealth with maximum expected returns. Similarly, investors changed portfolio in Mutual Funds itself, they are more inclined to risk-free funds such as debt funds, money market funds.

Investors' financial decision depend on many factors but the most prominent factor is economic situation. As the economic situation was too dynamic during the pandemic leads to mutual funds industry responding in a similar way. As a result, investors' perception and behavior changed towards mutual funds. (Walia & Kiran, 2009) study analyzed investors always look for risk-return trade-off for mutual fund services and take decisions as per the market situations.

(Schmidt, 2010) identified key determinants such as subjective norm, attitude and perceived behavioral control of the willingness and intention to invest in mutual funds using Theory of Planned Behavior (TPB) and these determinants have shown positive significant correlation.

(Chawla, 2014) empirically stated that most of the respondents invest in the mutual funds with the objective of capital appreciation followed by saving tax and the investors behave as per the fund performance which shows there is a positive relation between mutual fund performance and the behavior of the investors. Moreover, mutual fund professional management also most prominent factor affect in the adoption of mutual funds (Alhorani, 2019).

IMPORTANCE OF THIS STUDY

COVID-19 pandemic has disrupted everything, everything was shutdown. They have no option to reside home safely with family and forced them to take risk free decisions. This pandemic affected on individuals' health and disturbed mentally and financially as well. Most of the Indians households have lost income which led to sharp increase in the unemployment rate. Moreover, middle income people have highly affected by COVID-19 (*How Are Indian Households Coping Under the COVID-19 Lockdown?*, 2020), therefore, its essential to evaluate the perception and behavior of investors during pandemic.

PERCEPTION

Investors are highly active during these days to achieve their financial goals by earing expected return. Performance of mutual funds highly dependent on fund manager ability. Investors would prefer those funds which perform better in positive sentiments and would not worse in negative sentiments, thereby fund manager keep diversifying their funds by balancing equity and debt. (Ganapathi, 2015). Due to inability of fund manager, mutual funds trended negatively and investors move out from such type of funds.

(Rehan, Naz, Umer, & Ahmed, 2018) find out investors do lot of research work while choosing right funds for them as there are many funds available in the market to fulfil the objectives of the investors and nowadays, investors invest in new and more innovative funds and give them expected returns.

During COVID 19, the perception of retail investors have been changed in respect of risk, return, comfort level and financial goals while investing in mutual funds. In the outbreak of pandemic due of fear of human lives, the

stock market sentiments was absolutely negative and the psychology of the investors also became negative and they ceases to invest in stock market (Naseem et al., 2021) which ultimately negative impact of mutual funds industry also as it is an indirect way of investing in equity market. This paper evaluates the behavior of investors in China, Japan and US and hence, examines the relationship between the sudden trend in stock markets in these countries due to COVID and the behavior of retail investors and found the investors behaves in the same manner in these countries as market behaves.

(Frenay & Bonnet, 2020) as per this report stated that during March 2020, when COVID 19 first time witnessed in India, it's been high volume of trading recorded. In March 2020, new 1,50,000 investors bought SBF 120 shares. Existing investors invested more than average and also number of long positions taken during the crisis of six weeks.

(Himanshu, Ritika, Mushir, & Suryavanshi, 2021) evaluated how investors moving to conservative investment options during crisis by reallocating the portfolio. Their preferable investment avenues before COVID 19 were risky like stocks followed by mutual funds, real estate whereas during COVID 19 investors shifted to less risky investments options and their preferable options are Insurance, bank deposits, Gold and so on.

Now the investors moving back to pre – COVID scenario as market bounced back within a short period of span and with these investors are also moving ahead with positive mindset. (Naresh & Alamelu, 2020).

Pertaining to the impact of COVID 19, it is important to know the perception of Indian investors investing in mutual funds.

(K., 2021) examined that there is a positive impact of COVID 19 on the investment and entering into equity market considering the factors such as knowledge, confidence, safety, liquidity, tax benefits, return, growth and riskiness of shares and mutual funds. The investors take all decisions rationally and put money in the market accordingly. Through regression model, the author concludes that investor behavioral aspects, investors personal character, nature of the investor, awareness of the mutual funds, and shares are the important factors of investors preference. (Parashar, n.d.) investigated the factors affecting on the perception of investors and found monetary factor is the most prominent followed by capital appreciation, better customer service and risk and return.

During the pandemic, the investors' risk tolerance level have also been affected due to uncertainty in the market. (Wang, Zhang, Ahmed, & Muhammad Shah, 2021) analyses that due to the moderation effect of COVID 19, financial risk tolerance is the valuable input to take financial decisions. The COVID 19 impact is the best way to measure of measure risk tolerance level of investors and it has been found that there is a positive relation among satisfaction of investors and financial risk tolerance due to the pandemic.

(Saleem et al., 2021) empirically investigated determinants of behavior of investors towards mutual funds and established awareness is the key factor investors invest in the mutual funds. Means there is a positive relation between investors investing in mutual funds and mutual funds awareness and vice versa. Financial Literacy also affects positively on the behavior of the investors. (Himanshu, Ritika, Mushir, & Suryavanshi, 2021) examines the perception of the investors using AHP model. The AHP results show that investors preferred high risky investment before the pandemic and low risky investment during the pandemic. Investors changed their portfolio and moved to less risky investment, they prefer life insurance, followed by gold, bank deposits and public provident fund (PPF).

OBJECTIVES OF THE PRESENT STUDY
1. To study the perception of retail investors investing in mutual funds during COVID-19.

2. To analyze the behavior of individual investors during COVID investing in mutual funds during the pandemic.

3. To find out the impact of crisis on risk tolerate level of individual investors.

RESEARCH METHODOLOGY
The study uses primary data collected through the questionnaire using sampling method. The questionnaire divided into two segments. First segment focuses on demographic and socio-economic profile of respondents. This section gathered information about the respondents' age, income, gender and occupation also collected data about how many respondents still not investing in Mutual Funds. The second segment focused on those respondents who are investing in mutual funds to analyze their perception and behavior towards mutual funds before and post COVID-19 on a five-point Likert scale (1 Strongly Disagree to 5 Strongly Agree).

On the basis of the objectives and variables, the hypothesis have been framed:

Association between perception towards investing in mutual funds during COVID and demographic factors

H_1: There is no relationship between gender and reasons behind for not investing in mutual funds

H_2: There is no relationship between income group and reasons behind for not investing in mutual funds

H_3: There is no association between perception towards mutual fund during COVID and income of the individual investors

H_4: There is no association between perception towards mutual fund during COVID and Gender

H_5: There is no association between perception towards mutual fund during COVID and number of children

H_6: There is no association between behavior towards mutual fund during COVID and gender

H_7: There is no association between behavior towards mutual fund during COVID and income group

H_8: There is no association between behavior towards mutual fund during COVID and number of children

H_9: There is no significant difference between risk tolerance level of the investors investing in mutual funds before and during the pandemic.

DATA ANALYSIS

Table – 1 Demographic profile of the respondents

Demographic Characteristics N = 296	Response	Valid Percentage
Gender		
Male	127	42.9
Female	169	57.1
Age		
18-30	224	75.7
31-45	56	18.9
Above 45	16	5.6
Marital Status		
Married	92	31.1
Unmarried	204	68.9
Occupation		
Student	130	43.9
Employee in Government/Private Sector	135	45.6
Business Profession	28	9.5
Retired	3	1.0
Annual Family Income		
Less than 5,00,000	179	60.9
5,00,001 - 7,50,000	30	10.1
7,50,001 - 10,00,000	40	13.5
Above 10,00,000	47	15.9
Number of family members		
1	2	0.7
2	17	5.7
3	42	14.2
4	121	40.9
More than 4	114	38.5
Number of Children		
None	78	26.4
1	172	58.1
2	39	13.2
More than 2	7	2.4

Table No. 1 shows demographic profile of the respondents. There are 127 (42.9%) male and 169 (57.1%) female respondents. In the age classification 224 (75.7%) respondents belongs to 18-30 age group, 56 (18.9%) are in 31-45 age group and 16 (5.6%) respondents belongs to above 45 age group. Regarding the marital status of the respondents, 92 (32.1%) of the respondents are married and 204 (68.9%) of them are unmarried. In occupation wise classification, 130 (43.9%) of the respondents are students, 135 (45.6%) are employed in government or private sector, 28 (9.5%) having business profession and 3 (1%) are retired. In income wise classification 179 (60.9%) respondents having less than Rs 5,00,000 annual income, 30 (10.1%) of the respondents belongs to the annual income group of Rs (5,00,000 - 7,50,000), 40 (13.5%) in Rs (7,50,001 – 10,00,000) income group and 47 (15.9%) are in the income group of above Rs 10,00,000. In relation to number of family members of the respondents only 2 respondents having 1 family member, 17 respondents having 2 family members, 42 of them having 3 family members, 121 of them having 4 family members and 114 of them having more than 4 family members. Regarding the number of children, 78 (26.4%) respondents not having children, 172 (58.1%) respondents having one child, 39 (13.2%) of the respondents having 2 children and 7 (2.4%) of the respondents having more than 2 children.

Figure – 1: To analyze how many respondents interested in investing in mutual funds.
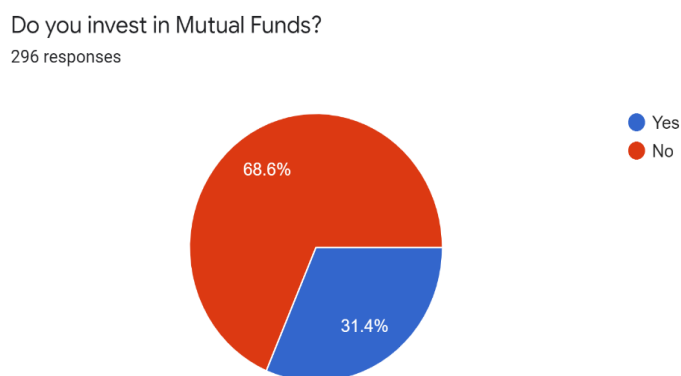
Out of 296 respondents, 203 of the respondents do not invest in mutual funds whereas only 93 of them park their savings towards mutual funds.

Figure – 2: To find out the reason behind not investing in mutual funds
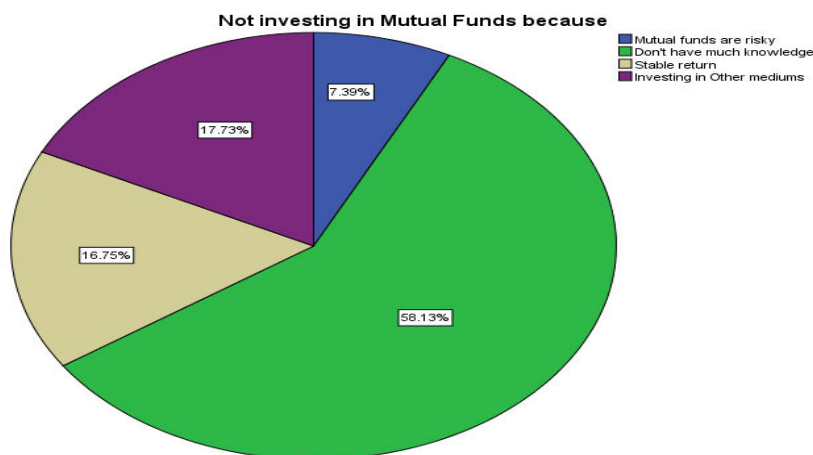
The reason behind not investing stated by the respondents that 7.39% of respondents think mutual funds are risky, 58.13% of them don't have enough knowledge about mutual funds, 16.75% of them don't have stable income and rest 17.73% of respondents investing in other investment avenues.

<table>
<tr><td colspan="9" align="center">Table – 2
Gender * not investing in Mutual Funds because Crosstabulation</td></tr>
<tr><td colspan="3"></td><td colspan="4" align="center">not investing in Mutual Funds because</td><td>Total</td></tr>
<tr><td colspan="3"></td><td>Mutual funds are risky</td><td>Don't have much knowledge</td><td>Stable return</td><td>Investing in Other medium</td><td></td></tr>
<tr><td rowspan="2">Gender</td><td rowspan="2">Male</td><td>Count</td><td>4</td><td>40</td><td>13</td><td>21</td><td>78</td></tr>
<tr><td>Expected Count</td><td>5.8</td><td>45.3</td><td>13.1</td><td>13.8</td><td>78.0</td></tr>
</table>

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		% within Gender	5.1%	51.3%	16.7%	26.9%	100.0%
	Female	Count	11	78	21	15	125
		Expected Count	9.2	72.7	20.9	22.2	125.0
		% within Gender	8.8%	62.4%	16.8%	12.0%	100.0%
Total		Count	15	118	34	36	203
		Expected Count	15.0	118.0	34.0	36.0	203.0
		% within Gender	7.4%	58.1%	16.7%	17.7%	100.0%
Chi-square = 7.930	**df=3**	**P = 0.047**					

Table 2 exhibits the relation between retail investors not investing in mutual funds among gender. The Pearson's chi-square statistics has been done to find the association between male and female with regard to giving reasons not investing in mutual funds. The result shows the P-value of 0.047 which is less than the accepted level of 0.05. Thus, there is significant relationship between male and female with regard to not investing in mutual funds to be found (Chi-square = 7.930, df=3; P<0.05).

Table – 3
Income * for not investing in Mutual Funds because Crosstabulation

			not investing in Mutual Funds because				Total
			Mutual funds are risky	Don't have much knowledge	Stable return	Others	
Income	Below 5,00,000	Count	10	84	19	25	138
		Expected Count	10.2	80.2	23.1	24.5	138.0
		% within Income	7.2%	60.9%	13.8%	18.1%	100.0%
	5,00,001-7,50,000	Count	2	12	5	2	21
		Expected Count	1.6	12.2	3.5	3.7	21.0
		% within Income	9.5%	57.1%	23.8%	9.5%	100.0%
	7,50,001-10,00,000	Count	1	11	6	2	20
		Expected Count	1.5	11.6	3.3	3.5	20.0
		% within Income	5.0%	55.0%	30.0%	10.0%	100.0%
	Above 10,00,000	Count	2	11	4	7	24
		Expected Count	1.8	14.0	4.0	4.3	24.0
		% within Income	8.3%	45.8%	16.7%	29.2%	100.0%
Total		Count	15	118	34	36	203
		Expected Count	15.0	118.0	34.0	36.0	203.0
		% within Income	7.4%	58.1%	16.7%	17.7%	100.0%
Chi-square = 7.864	**df = 9**	**P = 0.548**					

Table 3 exhibits the relation between retail investors not investing in mutual funds income wise. The Pearson's chi-square statistics has been done to association between income groups with regard to giving reasons not investing in mutual funds. The result shows the P-value of 0.561 which is more than the accepted level of 0.05. Thus, there is not a significant relationship between income group with regard for not investing in mutual funds to be found (Chi-square = 7.864, df=9; P>0.548).

Investor's Perception towards Mutual Funds during COVID 19
To find out the perception of respondents towards investing in mutual funds during COVID 19, asked different question on Likert scale ranging from 1 to 5 (Strongly disagree =1 to Strongly Agree = 5). The researcher has taken mean of all these statements to analyse the perception of respondents towards investing in mutual funds. In below Table 4, variables are stated in relation positive perception of investors towards mutual funds.

Table – 4

Variable (Positive perception)	Mean	Variance
Mutual fund is best avenue than any other investment	3.52	0.948
Still feel comfortable to continue my investment towards Mutual funds during the pandemic	3.88	1.062
Willing to withstand some fluctuations in Mutual funds even during COVID 19	3.57	1.117
Mutual funds still provide me a diversified investment	3.85	0.825

COVID 19 doesn't impact on achieving long term goals while investing in Mutual funds	3.94	1.039

Table – 5
Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Perception	Male	49	3.6857	.97639	.13948
	Female	44	3.8227	.70244	.10590

Table 5 shows, both male and female have shown positive perception towards mutual funds during the pandemic. The average mean score of male respondents is 3.68 whereas mean score of female respondents is 3.82.

Table – 5
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Perception	Equal variances assumed	3.285	.073	-.769	91	.444	-.13701	.17818	-.49095	.21692
	Equal variances not assumed			-.782	87.012	.436	-.13701	.17513	-.48510	.21107

Table 5 reveals the positive perception of retails investors investing in mutual funds among male and female. Among gender, 49 (52.68%) of the males and 41 (47.32%) of the females having positive perception towards investing in mutual funds after the pandemic COVID 19. The t-test result (with equal variance assumed) shows t-statistic of 0.769 with 91 degrees of freedom and the corresponding p-value is 0.444 which is more than 0.05. Therefore, null hypothesis can't be rejected at 5% significance level. This means that mean score of positive perception investing in mutual funds during the pandemic between male and female is not significant different.

Investor's Behaviour towards Mutual Funds during COVID 19
To find out the behaviour of respondents towards investing in mutual funds during COVID 19, asked different question on Likert scale ranging from 1 to 5 (Strongly disagree =1 to Strongly Agree = 5). The researcher has taken mean of all these statements to analyse the behaviour of respondents towards investing in mutual funds.

Table – 6

Variable	Mean	Variance
Redeem amount from Mutual funds due to fear of loss during pandemic	2.33	1.029
Shifted to less risky funds during COVID	3.02	0.956
Decreased weightage of savings in Mutual funds during COVID	2.60	1.025

Table – 7
Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Behaviour	Male	49	2.5238	.69054	.09865
	Female	44	2.7955	.86630	.13060

Table – 8
Independent Samples Test

	Levene's Test for Equality of Variances	t-test for Equality of Means

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Behaviour	Equal variances assumed	1.294	.258	-1.680	91	.096	-.27165	.16170	-.59284	.04955
	Equal variances not assumed			-1.660	82.119	.101	-.27165	.16367	-.59723	.05394

Table – 9

One way ANOVA	Homogeneity	df	P	Results supports
Perception*Income group	0.270	3	0.295	Null hypothesis (Income group doesn't have a significant relation with Perception
Perception*Number of children	0.138	3	0.820	Null hypothesis (Number of children doesn't have a significant relation with Perception
Behaviour*Income group	0.483	3	0.813	Null hypothesis (Income group doesn't have a significant relation with Behaviour
Behaviour*Number of children	0.182	3	0.137	Null hypothesis (Number of children doesn't have a significant relation with Behaviour

In Table 9, One Way ANOVA is used to find the income wise differences with regard to perception towards investing in mutual funds during COVID 19 and the behaviour of investors towards mutual funds during the pandemic. Since, the P value is more than significant level of 5%, hence the difference in perception and behaviour towards mutual and among income group is statistically not significance.

One Way ANOVA also used to find out the association between number of children and the perception and behaviour towards mutual funds during COVID 19. Since, the P value is more than significant level of 5%, hence the relationship is statistically not significant.

Table – 10 Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	What was your risk tolerance level before COVID?	1.92	93	.576	.060
	What is your risk tolerance level during COVID?	2.15	93	.642	.067

Table 10 exhibits the mean score of risk tolerance level before COVID 19 and during the COVID 19. The average risk tolerance level before pandemic is 1.92 whereas the mean score is 2.15 during COVID 19. It shows retail investors having positive mindset towards investing in mutual funds during the pandemic.

Table – 11 Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	What was your risk tolerance level before COVID? & What is your risk tolerance level during COVID?	93	.266	.010

Table 11 exhibits the relation between risk tolerance level before and during COVID 19. The correlation showing positive value which is 0.266 having significant P value (<0.05).

Table – 12
Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	What was your risk tolerance level before COVID? - What is your risk tolerance level during COVID?	-.226	.739	.077	-.378	-.074	-2.946	92	.004

Table 12, Paired T- test is used to find out the differences in risk tolerance level among the retail investors before the pandemic and during pandemic. The average tolerance level before pandemic was 1.92 and 2.18 during the pandemic. This difference in risk tolerance level is statistically significant. (t=-2.946, df=92, P=0.004). P value is less than the accepting value at 5% significant level. This clearly shows that the investors with positive perception taking more risk towards investing in mutual funds even during the pandemic.

SUMMARY AND CONCLUSION

From the analysis, which was based on the responses from survey can be concluded that most of the investors still not investing in mutual funds as they don't have enough knowledge to invest due to which they invest in other investment avenues available in the market. The study confirms that those who are investing in mutual funds, they feel comfortable and having positive mindset towards investing in mutual funds even in during pandemic. From the T-test and One Way ANOVA can be conclude that demographic variables such as gender, income number of children doesn't impact on perception and behaviour of investors investing in mutual funds during COVID 19.

The present study analysis that during the pandemic, investors have taken decisions positively in relation to investing in mutual funds without any fear of loss. From the paired T-Test, it was found the investors' risk tolerance level of investing in mutual funds has increased significantly.

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Impact of Covid-19 Pandemic on Ready Made Garments (RMG) Industry of India

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ABSTRACT
The Covid-19 pandemic had wrostly affected the readymade garment (RMG) industry in India. This study is based mainly on secondary data from various sources which are descriptive in nature. It is the effort to find out the impacts on this informal sector which provides large scale employment to weaker section of the society. It aims to study the overall impact on this decentralised industry and the measures undertaken by the small entrepreneurs as well as government of India. The export trends for readymade garments were on the decline in early 1920 and after spread of this pandemic worldwide, the manufacturing activities were greatly affected. Orders started cancelling, the RMG factory owners forced to cut down their employees and all other means to mitigate the impact. There were large scale shut down of small, micro units, continuous lay offs. Initially, workers faced salary cuts, later resulted into job loss. These migrant employees in RMG industry had no option, but to go back to their native places with no money in their packets. After first wave in 1920, little efforts were made to re-start the industry, but the second wave gave a big blow to revival the manufacturing activities. The RMG industry received support from Indian government in different packages which help them to recover from depressive conditions. After deteriorating graph of pandemic showed some signs of recovery in July 2021 onwards. The central and State governments had undertaken many monetary and non-monetary measures for RMG industry.

Keywords: Readymade Garment industry, Covid -19 pandemic, Omni measures, Supply chain management, Apparel industry.

1. INTRODUCTION

The COVID-19 pandemic led to nationwide lockdowns and for over a year now, many people are working from home. Public gatherings and family functions, too, have been limited. Which means far lesser need to shop for new clothes? All these have had an impact on the readymade garment industry. Just when things had begun recovering post September 2020 and looked to getting back to pre-COVID levels, the second wave of COVID-19 struck, forcing various states to announce fresh lockdowns. It is going to delay the recovery in the sector.

Domestic demand accounts for almost three quarters of overall demand and the second wave coupled with the fresh curbs in various states may have pushed the recovery to pre-pandemic levels by at least a year, feels ratings agency CRISIL.

The Indian economy is likely to encounter economic slowdown due to the lockdown caused by ongoing coronavirus (COVID-19) pandemic throughout the country and the central government along with country's central bank has initiated many measures to tackle the financial and economic recession, Dev & Sengupta (2020). Because of the continuous COVID-19 pandemic the readymade garments industry is experiencing production postponement, cancellation of orders and these are resulting losing jobs, pay cut, employees health related complexities and many more problems. Government has showed priority importance to save the industry, Shimanta, at el. (2020). They further mentioned that COVID-19 has affected the supply chain system of the garments industry worldwide. The ongoing coronavirus pandemic due to COVID-19 is creating influential impacts for the worldwide value chain for apparels.

There are many segments of global readymade market like type of fabric, type of applications, type of products, region wise, age group wise etc. Nowadays sports wear, casual wear, formal wear, woven, non-woven, knit, kids wear etc. are in great demand as the standard of leaving in developing countries like India, Pakistan is improving gradually. During pandemic the online shopping & e-commerce activities rose new heights due to preference of customers in urban areas. The ever increasing logistics support helped to boost the trade in RMG and Apparel industry.

The whole world including US and EU stirred the readymade garments markets on the advent of corona pandemic. The consistent demand for apparels and RMG declined for temporary period. The production in MSME factories is disrupted the supply chain totally. All types of fabrics woven, knitwear, non-woven got disturbed because of social distancing policy measures adopted by government to stop spread of pandemic.

The consumers has influence of fashion trends stimulating demand for readymade garments. They want uniquely designed fashion wears like celebrities. Growth in sports, ultimately derived demand for new age garments from toddlers to old age group. The e-commerce players like Amazon, myntra, flipkart, has triggered the demand for readymade garments through aggressive digital marketing. This inspired the medium and large scale manufacturers to reap benefits of social media & digital marketing by opening their online fashion shops which keep the consumers with recent & emerging fashion trends even in pandemic situation.

The use of internet increased significantly due to movement restrictions by government and easy comparisons of prices on shopping websites got added advantage for the shoppers. The business community offered them variety of apps declaring great discounts and variety of products for all the categories of customers all over the world. The manufacturers saved lot of expenditures on physical outlets or showroom, cost of electricity, employees etc. In total, all these elements backed the growth of RMG industry with gradual decrease in the spread of corona pandemic.

2. LITERATURE REVIEW:

The garments industry faces several obstacles in its way of activities including lack of efficient workers, safety & security, shortage of power and energy supply, difficulties in financing, social and buyer compliances etc. Proper management and collaborative initiatives may resolve these barriers, Islam, at el. (2016). The fashion sector of the RMG industry's future has faced uncertainty due to COVID-19 pandemic. With the increase of lockdown this sector is likely to face firing from job, bankruptcy and financial insolvency, Brydges & Hanlon (2020).

Sultan, at el. (2020) studied that a great number of garments workers is likely to get affected due to coronavirus pandemic ranging from pay cut to job loss. These issues will impact the socioeconomic condition of the country and to tackle the crisis of the RMG industry the trade leaders along with the government support should formulate proper policies.

Governmental guidelines of maintaining social distancing has resulted to the downsizing and even shut down of many supplying entities especially in the developing countries like India. Subsequently many international buyer brands have cancelled or postponed some of their orders, Pasquali & Godfrey (2020). Due to the coronavirus pandemic many RMG factories have lost their affordability to disburse salary and wages of their employees and workers and have sent back the workforce to home without wages, Sen at el. (2020).

3. OBJECTIVES:

1. To investigate the impact of Covid-19 on labour force & employment in Readymade Garments (RMG) industry of India.

2. To understand the recent trend in RMG & Apparel Industry.

3. To assess the Key Shifts in Apparel industry post Covid.

4. To study the rise in demand for athleisure & opportunities in the Apparel industry.

5. To explore the challenges & problems in the RMG industry.

6. To find out solutions to overcome the pandemic crisis in RMG industry.

4. METHODOLOGY

This is a descriptive research based on secondary data from different published sources. Relevant national and international literatures have also been reviewed in conducting the study that has increased the validity of the research. Secondary data were collected from newspapers, research magazines, government reports, data from textile ministry. Different statistical tables have been used to present the data and result of the research.

5. Impact of COVID-19 on Labour Force and Employment

The announcement of lockdown in the whole India since March 2020 resulted in complete standstill transport facilities like trains, national and international flights that tremendously hurts the business activities in India. The covid -19 has not only scared the global community by engulfing most of the countries in the world but deterred growth rate of Indian economy.

5.1 The Impact of Pandemic on various sectors of Indian Economy:

5.1.1 Employment level in India:

Textile & Apparel industry is one of the largest provider of employment to skilled & unskilled labour in India about 5 crore people. The miracles observed for the daily wage workers in the RMG industry. The owners

initially tried to provide all types help in different ways to retain their employees, but extension of lockdown forced them short term closure of their factories and lay-offs. This has destroyed the marginal workers in this informal sector forcing them to go back to their native places in villages where they could at least survive with governments' measures to safeguard the weaker sections.

5.1.2 Supply of raw material, Exports worldwide:
The rapid spread of corona pandemic in Europe & US proved dangerous for Indian garment exporters on large scale, as it constituted 60% of the total export from India. Subsequently, domestic demand fell rapidly as lockdown restricted the movement of people nationwide. The order cancellations & postponement of export receivables rose working capital requirement and no support from banking industry on loan repayment etc. Indian government declared the recovery package for RMG industry little late as compared to our competitors such as Bangladesh, Vietnam, and Srilanka.

In addition to this, All India level closure of all types of economic activities halted every new business expectations of RMG industry. Exporters had no option but to sell their inventories in the domestic markets with bare margin or even cost to cost or at a loss. Every industrialist were under pressure as there were no guarantee of pandemic situation will continue until what time.

5.1.3 Money flow restraints:
With the pandemic crisis, the cash flow in the RMG industry stopped largely. Decline in yarn & fabric export, competition from cheaper import made their life miserable.

5.1.4 Source chain commotion:
Disruption in Import and export complied the garment owners to source locally for the raw materials, unskilled local labourers to sustain their activities with little improvement in the market conditions.

5.1.5 Customer mawkishness:
The strict rules of social distancing for safety of masses demoralised the customer sentiment on large scale. Unpredicted lockdown condition with no guarantee of reopening of markets, loss of jobs, and depression like condition completely dampen the spirit of consumers.

The industry organisations appealed the government to cater the relief package the earliest to save this labour intensive industry, which provides large-scale employment to common people. Otherwise, the survival of RMG & Apparel industry was impossible.

6. The new trend in RMG Industry:
In 2019, the valuation of global readymade garments was $ 984 billion with projection of CAGR of 8.8% to reach $ 1268 billion by 2027. The China, US & EU played the dominant role in global RMG & Apparel market in 2019.

The coronavirus pandemic turned into an opportunity, for many e-commerce entities in the RMG market. The McKinsy & Company's Fashion 2021 report states that industries necessity to lessen complication and find diverse ways to heighten full-price sell-through to cut inventory levels by taking a demand-focused method to their collection approach.

As per the ET Retail report, the ecommerce industry too became the victim of second wave of pandemic. The sales dipped by 22%, but overall picture is promising due to growth of online shoppers in 2022 assuring long run rise in the demand by customers on gradual disappearance of corona pandemic.

The work from home culture has changed the dressing sense of working class people, which increased the demand for T-shirts and other non-formal, wear greatly.

5.1 Key Shifts in Apparel industry post COVID-19.
5.1.1 Social Media is a Dominant source of influence:

5.1.2 Increasing E-commerce but brick & Mortar to stay relevant:

5.1.3 Casualization of Wardrobe, focus on athleisure

The customer's choice towards their wardrobe moves for comfort wears especially athleisure. The Retail resurgence report of BCG clears that the buoyant growth in demand for different segments of athleisure will touch Rs.5781 billion by 2024.

Source: Unicommerce report 2021

6. Ecological and Decent Style:

With Coronavirus pandemic, people become aware to use high quality recyclable material in the fashion world too. Fashion industry is often targeted for creating environmental pollution. The people has understood their responsibility towards climate change , environment protection due to pandemics. They preferred for eco friendly clothing materials. Well-known fashion brands has changed their concept of conscious fashion in India.

6.1 Underclothing:

Due to Corona pandemics people became more cautious about personal hygiene and body care. There is a gradual   increase in the demand for innerwear for both men & women category. Leading brands adopted advanced technologies to raise their market share.

6.2 Ready-to-wear clothes:

Even during pandemics the demand for major fashion brands such as Indya, Taavi etc. sustained for last few years. Customers enjoyed shopping these ready-to wear online on various platforms regularly. The study reveals that this trend will continue in the current year too.

6.3 Children wear:

Children were considered as the most vulnerable for the covid -19 infection. Parents disallowed their children to go out for the threat of infection. As a result, a huge rise is seen in demands for children wear in 2021 by about 200%.

6.4 Growth in demand for Athleisure:

Work-from-Home approach has saved lot of office overhead expenses of the corporate world. It has raised demand for athleisure significantly.

6.5 Expanding healthiness & wellness Awareness in Covid-19:

One of the great advantage of the fear of spread of corona virus inculcated the habit of use of masks. Mask use has resulted in prevention of public from many airborne diseases. This has created demand different types of masks and fabrics among women for scarf.

7. Prospects in the RMG Industry

The gradual phasing out of Corona pandemic have opened up many avenues for fashion industry in the form of online & digital shopping. It is compulsion for everyone to become tech savvy. Being clothes are one of the basic needs, and essential commodity of social need, its demand slowly started inching high in recent period of corona relaxation. At present, there is drastic fall in corona patients the municipal corporation too have reduced their rescue camps on large scale. This is going to be a great boost for growth of RMG industry.

The government efforts to provide continuous support to the textile & RMG industry have resulted in another dose of investments for textiles & RMG sector. Textile parks under the Scheme for Integrated Textile Parks:-

- Completed:- 22
- Operational:- 17
- Under Construction:- 20

In every budget, government is keen to improve the helping hand to this industry in view of bright prospects in international market. In 2021 budget, the Indian government has planned to set up 7 mega parks in the next three years. Government has reduced the custom duties on yarn, nylon fiber, and nylon chips to 5%. These positive steps taken government has painted ray of hope on the horizon for textiles & apparel industry.

9. Present Difficulties in the RMG Industry:

The novel tendencies, shifting buyer behaviors, and marketplace moves have outbuilding a light on the new difficulties in the e-Commerce RMG industry is experiencing in the aftermath of the pandemic:-

1. Strain in handling tailored order distribution

2. Incapable to line up warehouse operations manually within such tough period

3. Problems in selling pandemic essentials such as face masks in combo packs

4. Incapability to achieve timely distributions, leading to higher percentage of Customer Initiated Returns (CIR)

5. Tough to bring into line multiple sales channels

6. Back-breaking for e-Commerce stands to achieve multiple sellers

7. Late and ineffective distribution of products

8. No stock turning leads to out-of-date stock

9. The enlarged cost of Converse Logistics

10. inefficient management of returns and withdrawals

Solutions to the problems in RMG industry:

Annexure
Chart 1: Sharp recovery in RMG exports
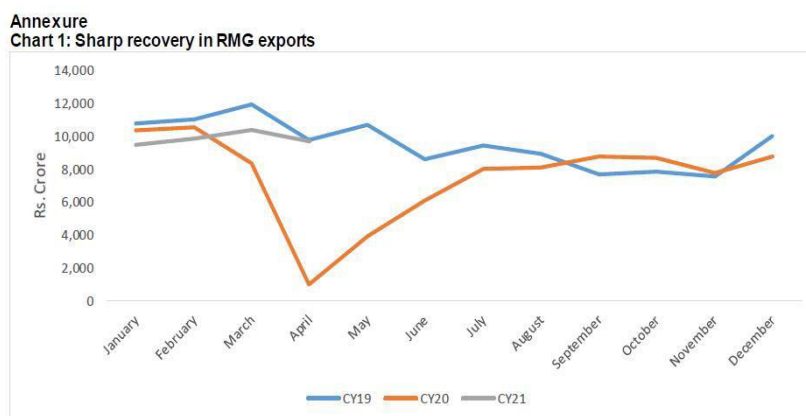
Source: Apparel Export Promotion Council

1. Delivering Omni channel Experiences

It has become rather imperative to provide a seamless experience to the customers on all the touchpoints. Integrating and aligning offline and online channels together helps both the businesses and the customers develop a better relationship. Omnichannel retail not only offers unhindered shopping experiences to customers but also helps in keeping the inventory and stock levels uniform.

2. Serving directly with D2C business model

D2C is quite a recent approach wherein brands deal with the customers directly, eliminating the intermediaries. While many new brands are adopting this strategy, some established brands are switching from traditional business models to D2C models. The biggest advantage for a D2C brand is that they can shorten the time to sell the products, giving their customers a better price while earning a higher margin. Direct to Consumer (D2C) e-commerce allows the original brand voice to come in front, letting brands have a better engagement with their customers.

3. Advanced Warehouse Management

This system help to track the count of inventory, manage dispatched and allocate orders, making the flow of operations simpler and efficient. Moreover, you get the real-time update of the entire warehouse operations across multiple locations.

4. ERP and Bundle management – Every types of ERP systems like Tally, Oracle, SAP etc. has combined into omni channel software product to increase efficiency across many sales channels.

5. Logistics Assimilation – This assists in decreasing orders cancellations and returns because it automatically run s the process to ensure right product delivery to the customers.

6. **Integrated Merchant Boards** – With this system in action, e-commerce retailers can faultlessly manage suppliers via centralized login.

7. **Integrated Inventory Administration** – To empower greater cost savings, the well-organized Inventory Management system limit bad stock and reduces the danger of overselling.

8. **Precise Report Scrutiny** - This permits the firm to investigate and examine its daily operations with Dashboard segment. The Firm can track the number of orders fulfilled, Sales achieved, Returns progressed, etc.

9. **E-commerce Returns Administration** –It compromises a inclusive returns management solution through a integrated panel to manage returns across all sales channels intensifying the firm's overall sales profits.

CONCLUSION

In post corona pandemic scenario, the RMG industry is going to benefit infinitely, as there is increasing demand for new brands and changes in fashion. The government is too keen to provide packages to the development of RMG industry in India. A systematic and integrated approach will certainly overcome the various difficulties in post pandemic period and Russia-Ukraine war aftermath. The novel business model is the need of an hour for brands to stabilise their share in global market. For this digital marketing, online advertising, social media marketing will increase the competitiveness of RMG industry.

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Impact of Covid-19 Pandemic on Cost to Company (CTC)

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ABSTRACT

According to the data published by the Centre for Monitoring Indian Economy, Corona Virus pandemic's immediate effect resulted in nearly 23 million job losses. Nearly 230 million Indians affected and become relatively poor in these initial months of the pandemic mainly due to lockdown and other pandemic related reasons.

Over the past one year, due to Covid-19 pandemic and slowdown, many Indian companies cut down their costs, as a result nearly two third of employee were not given any variable pay or were given reduced variable pay as part of their cost-to-company (CTC). Many employees wanted restructuring of salary with a higher fixed pay even if that means the overall CTC is a little less. Moreover, due to the lockdowns in different parts of the world, many employees were forced to work from home. As working from home became the new normal, these are now demanding a work-from-home allowance. As a result, work from home, life/medical insurance, home office set-up allowance, work from anywhere and flexible hours are being sought as high-priority benefits. Younger employees are also expecting, employee stock options and retention bonus as long-term incentives from organizations. The impact on remuneration, such as reduction in total pay was prominent in most of the small companies with less than 1,000 employees, mostly in the real estate, infrastructure and hospitality sectors.

This research will focus on the larger companies in sectors such as consumer, retail, e-commerce, pharma, healthcare and life sciences as well as education sector for their impact on remuneration and cost to company. This research paper attempts to find out the expectations of the employees regarding the restructuring of their salary after the Covid-19 pandemic, through the secondary data collection and the data analysis was done using Excel.

Keywords: Cost to Company (CTC), no variable pay, reduced variable pay, restructuring of the salary, a work-from-home allowance.

1. INTRODUCTION

Role of compensation especially maintaining Cost-To-Company (CTC) in retaining top performers, who are more valuable than ever in this turbulent environment of COVID-19. Due to COVID-19 lockdowns, it was economically challenging for organizations to retain their employees. Organizations started to part away with those employees that were redundant or not adding any value to the organization's output. Organizations expected that employees can work from home, which means that the numbers of offices and workstations employees were reduced. The immediate effect of the COVID-19 was that many industries were started working remotely. Employees and organization had adopted virtual meetings software's and applications and there was enough proof available which can prove Indian employees can effectively function from home that is outside the traditional office environment. In many industries, physical presence of employees at the office was not mandatory. Many organizations start saving rent for their office premises as now they require smaller office space for their offices or they can give extra space on rent. As organization could save the occupancy costs, they could add it to their profit.

Work-from-home policy have resulted in many logistical and even behavioral challenges for the organization, but at the same time this work from home resulted in to the overhead cost saving. Impact of not meeting your customers, stakeholders may be there and it need to pay attention for survival of the organization.

As the organizations could manage business meeting remotely, they could save on the travel expenses for the business meetings. The need to meet face to face to grab any business opportunity may require in the near future also.

In the near future, the organizations are required to pay attention the economical and psychological impacts of Covid-19 pandemic. On one hand organizations are saving in the operating cost due to work from home environment but on other hand these saving can be neutralized by the IT and infrastructure related expenses. The change in human behavior like less travel, health issues, less group/team activities results in the shutdown of the certain business or industry as a whole.

COVID-19 time is a challenging time in which organizations can slash traditional expenses from their prospective operating budget. COVID-19 had giver some unique opportunities of cost savings but that may responsible for organization's long-term prospects.

2. REVIEW OF LITERATURE

When the review of literature done on this topic different research gives the following insights: During the initial months of pandemic i.e., March 2020 to May 2020, due to lock down many companies became bankrupt and millions of employees lost their job over nearly 40 countries in the world.

Retaining Skilled Workers: A Challenge to Companies during Pandemic

To retain their skilled employees, organizations gave temporary wage subsidies. To prevent mass layoffs, and to recover production after lockdown ended, companies ensured that workers continued to receive at least part of their usual wages, even if some workers had to take wage cut.

In other countries, where unemployment did not increase as much – possibly owing to the use of

Impact of Covid-19 Pandemic: Shift in the Work Environment

Another impact of Covid-19 pandemic was that due to lockdowns in different parts of the world, and restrictions on travelling, work from anywhere was the policy adopted by many companies. As a result, this pandemic impacted the work environment. Service industries, mostly the information technology industries adopted the work-from-home policy. According to one research, nearly 60 % of the employees had upskilled themselves during the lockdown and these employees were mostly with the work experience of 10-14 years. On the other hand, the employees in the age group of 26-35 years, believed working from home were a better option.

Impact of Covid-19 Pandemic : Compelled Companies to cut costs and lay off their staff

The pandemic had compelled many companies to cut their costs for their survival. Many companies have resorted to reducing the employees' salaries. Some companies had even asked their employees to go on leave without pay. Such employees were ready to face salary cuts and continue with their current jobs, and they were not looking for new jobs. Fresh hirings were put on hold by many companies. Most of the companies in the wholesale and retail industry had frozen the salaries of their employees and/or reduced salaries.

Impact on the Salary Structure : Additional Pay for Employees Physically Present in Organizations

It was also observed that, there was a change in the salary structure of many employees who were physically present in the organizations during the pandemic. Many companies gave such employees additional pay which were typically 10% above the baseline compensation. The industries with the largest percentage of companies providing additional pay were from few sectors like, the financial services, wholesale and retail and manufacturing. However, according to their corporate requirements, the companies were implementing such policies. Moreover, to retain their crucial talent, companies were considering to offer allowances and spot bonuses.

3. RESEARCH METHODOLOGY

This research focuses on the larger companies in sectors such as fast-moving consumer goods (FMCGs), retail, e-commerce, pharmaceuticals, healthcare and life sciences, information technology as well as education sector for the impact of Covid-19 pandemic on their remuneration and cost to company. This research paper attempts to find out the expectations of the employees regarding the restructuring of their salary after the Covid-19 pandemic, through the secondary data collection and the data analysis and data representation using Excel.

4. Data Representation and Data Analysis

Data Analysis was done using Excel and data representation was done using Pie-charts.

4.1 Impact of COVID-19 on Employees' Total pay (fixed + variable)
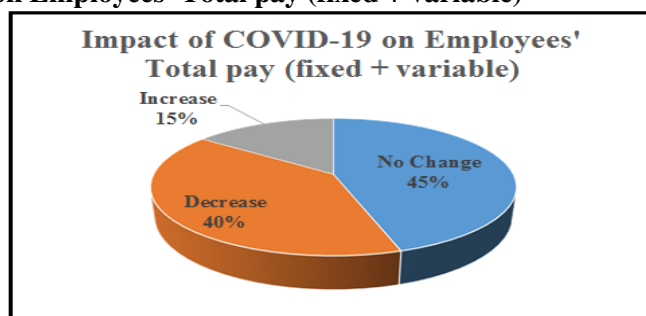
Figure 1: Impact of COVID-19 on Employees' Total pay (fixed + variable)

45 % of the respondents experienced no change in their total pay due to the Covid-19 impact. Out of them, younger respondents, that is employees having work experience of less than five years and those having work experience between 5-10 years, did not experience major changes in their total pay. Moreover, considering the organization size, employees of large organizations, that is, organizations with 1,000-5,000 employees and 5,000+ employees, also did not experienced any change in their total pay during the pandemic. Sector-wise, it was observed that employees working in the fast-moving consumer goods (FMCGs), retail and e-commerce, pharma, healthcareand life sciences, information technology, media and telecom sectors did not experience any change in their total pay.

4.2 Decrease in the Total Pay (Fixed + Variable)
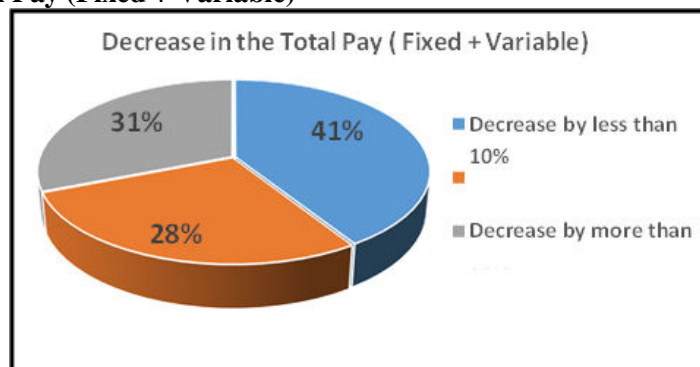
Figure 2: Decrease in the Total Pay (Fixed + Variable)

Out of the 40 % respondents, who experienced decreased in their total pay, it was observed that, 59% of employees experienced more than 10% of decrease in their total pay. Most of the employees of the real estate and infrastructure sector experienced decrease in total pay of more than 10 %, whereas the education sector experienced a decrease in total pay of less than 10%.

4.3 Impact of Covid-19 on the Employees' Fixed Pay
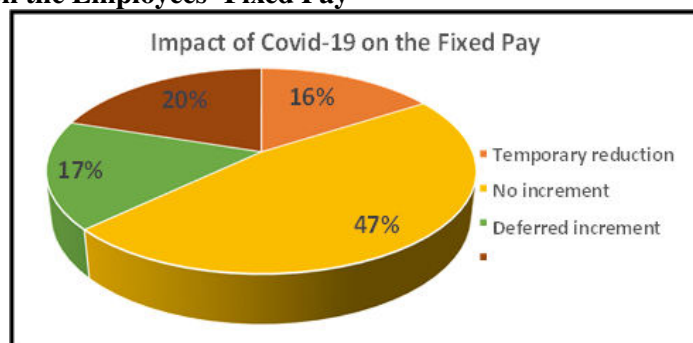
Figure 3: Impact of Covid-19 on the Employees' Fixed Pay

63 % of respondents experienced temporary reduction and/or no increment in their fixed pay due to Covid-19. Most of these employees were from real estate and infrastructure sector, where as 37

% of employees surveyed experienced increment as usual, which were mostly from financial services as well as pharma, healthcare and life sciences sectors.

4.4 Impact of Covid-19 on the Variable Pay
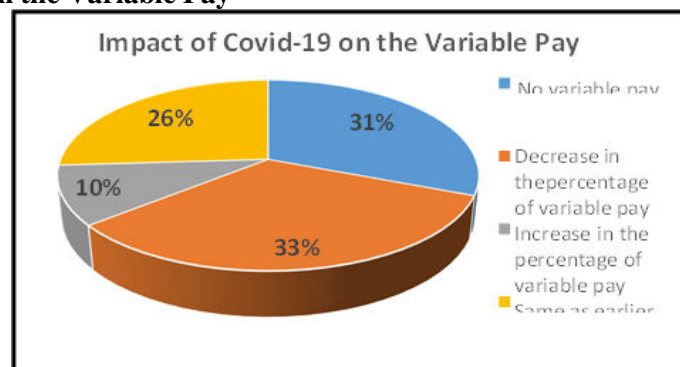
Figure 4: Impact of Covid-19 on the Variable Pay

31% of employees experienced no variable pay and 33 % experienced decrease in the percentage of variable pay due to the pandemic. Most of the small organizations (with less than 100 employees) and the real estate and infrastructure sector and hospitality sectors were observed to have negative impact of Covid-19 on their variable pay.

4.5 Additional Employee Benefit Expected from Organizations in the light of Covid-19 Pandemic
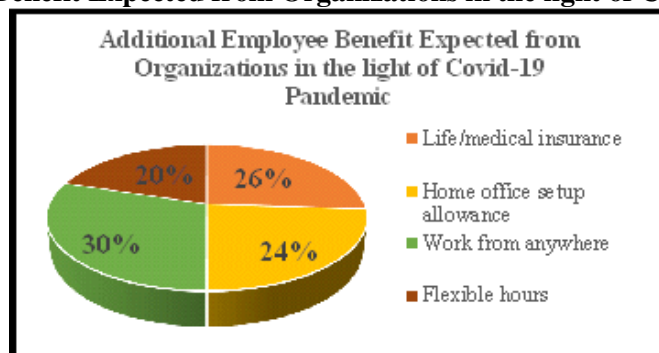
Figure 5: Additional Employee Benefit Expected from Organizations in the light of Covid-19 Pandemic

26 % of the employees expect life / medical insurance as benefits from their organization. Most of the employees of more than 20 years would like their organizations to offer life / medical insurance. 24 % of the employees surveyed would like to have home office setup allowance as additional benefit. It was observed that most of these employees were from organization with 1,000

– 5,000 employees and mostly from the information technology sector. 30 % employees were expecting their organizations to allow them to work from anywhere. Employees in consumer, retail and e-commerce, pharma, healthcare and life sciences and public sector would like the provision to work from anywhere.

5. RESULTS AND DISCUSSIONS

Impact of Covid-19 pandemic on the remuneration and CTC was different across different groups. The younger respondents, that is employees having work experience of less than five years and those having work experience between 5-10 years, did not experience major changes in their total pay. Large organizations with more than 1,000 employees also experience no change in their total pay. Impact of Covid-19 pandemic was different for different sectors as well. The employees working in the fast-moving consumer goods (FMCGs), retail and e-commerce, pharma, healthcare and life sciences, information technology, media and telecom sectors experienced no major change in their total pay.

However, decrease in the total pay was observed more in the real estate and infrastructure sector, the decrease being more than 10 %. The decrease in the total pay was also observed in the education sector, but the decrease was less than 10%.

Considering the impact of Covid-19 on the Employees' Fixed Pay, it was observed that majority of respondents experienced temporary reduction and/or no increment in their fixed pay due to Covid-19. Most of these employees were from real estate and infrastructure sector, where as some employees, mostly from financial services as well as pharma, healthcare and life sciences sectors experienced increment as usual. The impact of Covid-19 on the Employees' Variable Pay, it was observed that most of the small organizations (with less than 100 employees) and the employees of real estate and infrastructure sector and hospitality sectors were affected observed to have negative impact of Covid-19 on their variable pay.

Considering the expectations of employee regarding additional benefits from their organizations, the employees with more than 20 years of experience, would like their organizations to offer life / medical insurance. Employees were from organization with 1,000 – 5,000 employees and mostly from the information technology sector, would like to have home office setup allowance as additional benefit. However, employees in consumer, retail and e-commerce, pharma, healthcare and life sciences and public sector would like the provision to work from anywhere.

6. CONCLUSION

In the turbulent environment of COVID-19 pandemic, maintaining Cost-To-Company (CTC) in retaining their top performers, was economically challenging for organizations across the world. Impact of Covid-19 pandemic on the remuneration and CTC was different across different groups as well as across different sectors. Small organizations with less than 100 employees faced this challenge more than large organizations, as a result

employees of small organizations experiencedtemporary reduction and/or no increment in their fixed pay due to Covid-19. Most of these employees were from real estate and infrastructure sector and hospitality industry, however, someemployees, mostly from financial services as well as pharma, healthcare and life sciences sectors experienced increment as usual.

Higher negative impact of Covid-19 was observed in the real estate and infrastructure sector, wherethe employees experienced more than 10 % decrease in their total pay.

The immediate effect of the COVID-19 was that many organizations started working remotely. Employees and organization had adopted virtual meeting software and applications and there wasenough proof available which can prove Indian employees can effectively function from home thatis outside the traditional office environment. For many employees from the service sector, physical presence at office was not mandatory. As a result, employees from organization with 1,000 – 5,000employees and mostly from the information technology sector, expected their organization to provide them home office setup allowance as additional benefit. However, in the light of Covid-

19 pandemic, the employees with more than 20 years of experience, were expecting theirorganizations to offer life / medical insurance as additional benefits.

There is an increasing need by the organization to pay attention towards the negative business impacts of COVID-19, both economically and psychologically in the near future. On one hand, organizations are saving in the operating cost due to work from home environment but on other hand these saving can be neutralized by the IT and infrastructure related expenses. Moreover, to retain their top performers, employers need to provide their employees with life/medical insuranceas additional benefits.

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Impact of Covid-19 on Indian Banking Sector: An Analytical Study

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ABSTRACT

The COVID-19 has challenged Indian Banking sector adversely. The deadly disease is impacting the Banking segment in numerous ways - from business progression issues and Banking functional contemplations to the in general monetary viewpoint. In Indian Banks reported an Increase in NPAs, demand of credit and in turn impacted profitability. Because of the shutdown, there were no source of Revenue and expenses were increasing. So, Public were demanding advances and on the other hand they were not in a Position to repay the same loan. So, liquidity crisis arose. To overcome this situation, Hold bank of India and focal Government has gone to numerous lengths to give alleviation to the general population. In this Research Paper an attempt is made to analyse the relationship between NPAs, Advances and Profitability due to COVID-19 and also highlighted of measures taken by Reserve bank of India and government in Indian Banking sector. For the purpose, we have analysed four Indian Banks i.e. SBI, Bank of Baroda, HDFC Bank, Axis Bank in this 5 Years period from 2014-15 to 2019-20. The data was analysed with statistical tools like correlation coefficient to determine the impact of NPAs and Advances on profitability. A few specialists accept that financial area chiefly in India invests in some opportunity to recuperate from the effect of this pandemic.

Keywords: Banking, NPA, Covid-19, Net Profit, Economy

INTRODUCTION

In January 2020, Covid arose in India and hit huge number of lives with great many passings across the world. To battle with COVID-19, Indian Government reported total lockdown in the nation beginning on March 24, 2020 and the equivalent was reached out to third May, 2020. A comparative move has been made by numerous states all over the planet. Notwithstanding, this sort of measures taken by Indian Government to control the spread of Coronavirus pandemic affected the GDP of the country in problematic manner. One of the main areas of Indian economy is banking area which is answerable for every one of the monetary exercises happening in the nation and filling in as a supporting hand to each of the enterprises in term of financing, credit, exchanges, assortment and installment, etc. Coronavirus has caused such a lot of repercussions in the presentation of the Indian financial area as far as NPAs, Profitability, progresses and so forth Indian banks have confronted a trouble during the pandemic time frame and it has changed the productivity of the Indian banks. They have confronted many difficulties and the progressions they made, have affected on their budget reports. One of the center effects was a direct result of the increment in NPAs, no reimbursements of advance and request of credit. Furthermore, these might be the purposes behind the banks to decrease their benefit from the year 2019 onwards. To decrease the effect of COVID-19 on Indian Banks, different arrangement measures were taken by Reserve Bank of India and focal Government at focus level and state government at level. a few specialists accept that Banking area fundamentally in India might invest in some opportunity to recuperate from the effect of this pandemic.

Introduction of Indian Banking distribution

Prior to talking the main problem, let us first know a foundation of the Indian Banking area. A bank is an establishment which acknowledges stores and loan cash to needful people, finance managers and legislatures. Banks are viewed as dependable all over the planet.

The singular realizes that the cash will be protected in the bank when contrasted with elsewhere. Other than this, banks offer different types of assistance, for example, fixed store, advance offices plans, charge and Visa offices, and so on In India, right now there are 33 banks, out of which 12 are public area banks and rest 21 are private area banks. The banks have predominant situation in India's economy and it is significant donor towards different region in India. Tragically, a large number of the exhibition marks of India's banks have confronted negative circumstance since most recent five years. The present circumstance holds precise if there should arise an occurrence of PSBs as they appear to be more wasteful contrasted with their friend gatherings. To improve consequence of effect of Coronavirus on Indian banks, one should be had some significant awareness of the elements that influence the benefit of bank.

LITERATURE REVIEW

Vikas Kumar and Sanjeev Kumar (Jan, 2021) had carried out researchon "Effect of Covid19 on Indian Economy with Special Reference to Banking Sector: An Indian Perspective" demonstratesoverview of the effect of COVID-19 circumstance on Indian economy and its financial area and furthermore examinations the different approach measures taken by Reserve Bank of India and Indian Government at focus level and state level to work on the current monetary circumstance of the country. Ambrish Kumar Mishra, Archana Patel and Sarika Jain (Feb, 2021) completed an examination study named "Effect of Covid-19 Outbreak on Performance of Indian Banking Sector" shows repercussions of the Covid-19 in the presentation of the Indian financial area by making and assessing the biggest far reaching information base called cosmology (Covid19-IBO) to get semantic data, in continuation of similar they address not many significant exploration inquiries regarding Indian economy. Jitender Singh and Dr. B. S. Bodla (2020) completed an examination study named "Coronavirus Pandemic and Lockdown Impact on India's Banking Sector: A Systemic Literature Review" shows the effect of this pandemic on Banks and NBFCs because of lockdown which has come about into conclusion of every single business association, instructive organizations, public and private Towards Excellence: An Indexed, Refereed and Peer Reviewed Journal of Higher Education/Dr. Nilam Panchal/Page 446-459 June, 2021. VOL.13. ISSUE NO. 2 https://hrdc.gujaratuniversity.ac.in/Publication Page | 448 workplaces, suspension of method for transportation, and so forth by considering sees communicated by a few gatherings including market analysts, monetary organizations like IMF, World Bank and counseling firms. Ashly Lynn Joseph and Dr. M. Prakash (Jul, 2014) did an examination study named "A Study on Analyzing the Trend of NPA Level in Private Sector Banks and Public Sector Banks" exhibits patterns of NPA in financial industry, the variables that basically add to NPA bringing up in the financial business and furthermore gives a few ideas how to beat this weight of NPAon banking industry.

OBJECTIVES OF THE STUDY

- To study the impact of the covid-19 pandemic on the profitability levels on the bank.

- To recognize the relationship among the NPAs, advances and Net profit.

- To study steps taken by Reserve bank of India to overcome the NPAs in Indian banks and what will be the effects.

RESEARCH DESIGN

It is a descriptive study which tries to establish the relationship between the NPAs, advances and Net profit. The research undertaken was quantitative research as it was concerned with numerical, applied statistics, and use of graphs and tables.

DATA COLLECTION

The present study is planned to be carried out with the help of secondary data.

LIMITATIONS OF THE STUDY

- For this study, we have taken only four banks (2 public banks and 2 private banks).

- For the study I have taken only five years' period for the research including 2019-20.

DATA INTERPRETATION & ANALYSIS

I. Axis Bank

Year	NPAs (CR)	Net Profit (CR)	Total Advances (CR)
2014-15	1316.71	7357.82	281083.03
2015-16	2522.14	8223.66	338774.00
2016-17	8626.55	3679.28	373069.00
2017-18	16591.71	275.68	439650.00
2018-19	11275.60	4676.61	494798.00
2019-20	9360.41	1627.22	571424.00

INTERPRETATION

In the above diagram it shows that NPAs for the year 2014-15 is Rs. 1316.71corer and Net Profit for this year is Rs 7357.82 crore. In the subsequent year, the net profit and NPAs of this bank, both rises i.e., Rs 7357.82 CR and Rs 1316.71 crore respectively. The reason behind this is the net profit of the bank is higher than the NPAs of the bank. Thus, there is noeffect ofNPAs is seen on the bank profit in the year 2014-15 and2015-16.

For the year 2016-17, the net profit of the bank has decreased to Rs 3679.28 crore and NPAs of the bank has surpassed the net profit of the bank. The NPAs has increased to Rs 8626.55 corer. Thus, it has seen that the sudden increase of the NPAs of the bank has majorly impacted the profitability of the bank in the year 2016-17. The reason of sudden increase in the NPAs in the year 2016-17 is that there was higher liquidity and very less corporate credit demand. Still the company managed to increase the loan advances in the year 2016-17 butall the benefits were eaten up by the increase in theNPAs.

In the year 2017-18, the NPAs of the bank doubled compared to 2016-17. This is majorly impacted the profitability of the bank for the year. The profit of the bank is reduced to Rs 275.68 crore. In the year 2018-19, the NPAs got reduced and net profit increased. Thus, it is clearly seen thatthereisaninverselyproportionalrelationshipbetweenNPAsandnetprofitofthebank.

- **Pandemic effect:**

In the year 2019-20, Net profit and NPAs, both are decreasing.

1. NPAs aredecreasing

2 Disbursement of loan is also increasing Above points the parameters shows that the net profit should increase. But actually, it is not. The reason behind these are,

1. NPAs are identified higher than the Netprofit

2. There is a huge impact on the Indianeconomy

3. The bank increased the provisions for the NPAs for the year on account of pandemic. Theabovethreereasonsledtoreducetheprofitabiliofthebankforthe year 2019-20

II. ate Bank of India

Year	NPAs (CR)	Net Profit(CR)	Total Advances (CR)
2014-15	27590.58	13101.90	1300026.39
2015-16	42365.78St	9950.65	1463700.42
2016-17	54065.61	10484.10	1571078.38
2017-18	110854.70	6547.45	1934880.19
2018-19	65894.74	862.23	2185876.92
2019-20	51871.30	14488.11	2325289.56

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INTERPRETATION

From the above, diagrams it is clearly seen that from the year 2014-15 to 2019-20 NPAs are higher than the Profit inSBI. Reason behind this can be theincrease in total advances year after year

In the year 2018-19, NPAs of the bank are decreasing compared to the previous year and also Profit is increased to 862.23 crores from -6547.45 crores. Reason behind growth was:

1. Government Investments

2. Demand from Personal loan segment

3. Better Risk management

From the above data of NPAs and Advances it is clearly seen that in year 2017-18, NPA ratio was 5.72% on the other hand in the year 2018-19, it decreased to 3.01% which led to greater Profitability.

- **Pandemic effect:**

After 2018-19, similar position was found out in the year 2019-20 in spite of facing Covid-19 Pandemic. Reasons are:

1. Digital Payments

2. Increased Interest Income due to rise in Advances

3. Corporate credit demand

BANK OFBARODA

III. The advances were high in the year 2019-20 due to financial crisis of covid-19 pandemic which led to source of income for SBI in terms of Interest on loans and also because of decrease in NPAs and profitability was increased.

Year	NPAs (CR)		Net Profit (CR)	Total Advances (CR)
2014-15	8069.49		3398.44	428065.14
2015-16	19406.46	-	5395.54	383770.18
2016-17	18080.18		1383.14	383259.22
2017-18	23482.65	-	2431.81	427431.83
2018-19	48232.76		433.52	468818.74
2019-20	69381.43		546.19	690120.73

CORRELATION ANLAYSIS

Correlation of	AxisBank	SBI	BOB	HDFC Bank
Net profit & NPAs	0.90	-0.90	0.04	0.97
Netprofit & Totaladvances	0.70	-0.30	0.23	1.00

NOTE:

Ifthecorrelationis**lessthan1**thenthereisreciprocalrelationbetweenthetwovariables.

If the correlation is **near 0**, then there is no relation between the twovariables.

If the correlation lies between **0.1 to 0.5**, then there is moderate impact of one variable on the other.

Ifthecorrelationis**morethan0.5**,thenthereishighimpactofonevariableontheother.

AXIS BANK:

The correlation between Net profit and NPAs comes to -0.90.

The correlation between the total advances and the Net profit comes to -0.7.

This shows that both the variables have reciprocal relation. The reciprocal relation is justified because the profit is very less compared to the NPAs of the bank. Thus, NPAs have greater and negative impact on profitability of the business. Though the advances are increasing, the profitability is hampered because ofNPAs.

SBI:

The correlation between Net profit and NPAs comes to -0.90.

The correlation between the total advances and the Net profit comes to -0.3.

The reason is justifiable for the above correlations. There is reciprocal relationship between NPAs and Net profit. The reason is that SBI have higher NPAs than their Net profit. Their loan advances have increased in

2019-20. During the pandemic period, people were in need of credit demand. Also the moratorium given to the customers have led to decrease in NPAs. Thus, their profitability for the year 2019-20 has increased. But the profitability will hamper in the coming years as they willneedtomakehigherprovisionsfortheNPAsandthiswillreducetheprofitabilityofthebank.

BOB:

The correlation between Net profit and NPAs comes to 0.04.

The correlation between the total advances and the Net profit comes to 0.23.

The correlation 0.04 shows that there is no relation between net profit and NPAs of the bank. The reason behind the same can be the high fluctuation in the Net profits. Net profits for the five years are fluctuating because there is unevenness in the loan advance. The loan advances have increased in the year 2019-20. For liquidity purpose, BOB has invoked the Covid-19 restructuring schemes of the RBI for loans worth Rs 7800 CR in the year2020.

HDFC BANK:

The correlation between Net profit and NPAs comes to 0.97.

The correlation between the total advances and the Net profit comes to 1.

The correlation of Net profit and NPAs shows that there is positive relation between the two. This is because HDFC bank has much higher profitability than its NPAs are. Thus, the increasing NPAs does not have impact or negligible impact on the profitability of the bank. Their advances have increased 3 times from 2015 to 2020, the same as the Netprofit.

MEASURES & RELIEF BY RBI IN RESPONSE TOCOVID-19:

The measures announced by the RBI were primarily aimed boosting liquidity, expanding credit flow and easing the stress in the banking and financial servicessector.

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MEASURES & RELIEF BY RBI IN RESPONSE TOCOVID-19:
The measures announced by the RBI were primarily aimed boosting liquidity, expanding credit flow and easing the stress in the banking and financial servicessector.

Repo Rate – RBI announced that it was cutting the repo rate by 75 bps, or 0.75% to 4.4. The Repo Rate was earlier 5.15; last being cut in October2019.

Reverse Repo – The regulator also announced that it would cut the Reverse Repo rate by 90 bps, or 0.90%. On a daily average, banks had been parking Rs 3 lakh crore with the RBI. The current reverse repo rate was4%.

Loan Moratorium – In a massive relief for the middle class, the RBI Governor also announced that lenders could give a moratorium of 3 months on term loans, outstanding as on 1 March, 2020. This is applicable to All Commercial Banks including Regional, Rural, Small Finance, Co-Op Bank,AllIndiaFinancialInstitutionsandNBFCsincludingHousingFinanceandMicrofinance.

CRR – The RBI also announced that the Cash Reserve Ratio (CRR) would be reduced by 100 bps,or1%,to3%.ThiswouldbeapplicablefromMarch28,andwouldinjectRs.1,37,000crores.

LTRO – The RBI will also undertake Long Term Repo Operations (LTRO); allowing further liquidity with the banks. The banks however are specified that this liquidity will be deployed in in commercial papers, investment grade corporate

FINDINGS
Axis Bank has exhibited increase in advances and decrease in Profitability in the year 2019-20 compared to previous years due to the COVID-19 Pandemic.

- On the other hand, SBI has reported sudden increase in Profit and decrease in NPAs in the year 2019-20. Reasons can be strong well established digital platform (SBI YONO) of SBI, Interest income from increased advances, corporate credit demand and MSME lending.

- Bank of Baroda has reported increase in both NPAs and Profit in pandemic year. Reason behind profitability can be the rise in revenue from interest income due to the increase in advances.

- HDFC Bank has reported increase in Advances in 2019-20 due to the moratorium given by the banks to defaulters and NPAs and Profit have not been increased more than it would have been.

Correlation between Net Profit and NPAs

Reforms and measures taken by RBI during pandemic has created enough liquidity in the economy, availability of credit at lower rates, relief in Reporting requirements for banks due to reduction in daily CRR maintenance requirements, encouraged surplus fund into productive sectors of the economy in the form of investments and loans instead of RBI

CONCLUSION

COVID-19 outbreak has hampered the Indian Banking operations and overall Banking sector. Not only banking sector but it has severely affected every industry across the globe. As industries are attempting to recover, there is need of some solid measures and strategic initiatives. RBI must take all possible initiatives to maintain sufficient liquidity in the financial system and its constituents in the face of COVID-19. Government is required to take decisions and actions to lessen uncertainty and financial stress in the economy. Continuous measures should be taken to enable the smooth functioning of both money and capital markets. COVID-19 breakdown has caused severe damage in Banking sector. Actual NPAs will remain suppressed till the extended moratorium period gets over. According to S&P Global rating, Indian Banking sector will be slower to recover and it will happen only beyond 2023. The path to recovery will be more painful for emerging market such as India. There is an expectation of an economic rebound in 2021 because of the release of vaccines. After an economic rebound also, it may take a full 18 months or more to recover. There is much uncertainty on the recovery path. For now, we can only focus on systematic measures to revive the profitability and maintain liquidity in the market.

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A Study on Role of Ai/Ml Supported Bots on Marketing of Products on E-Commerce Sites – A Customers' Perspective

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ABSTRACT

AI and machine learning is increasingly being utilized by several e-commerce sites. Chatbots and recommendation systems are developed using AI and machine learning to improve the marketing of the products on these e-commerce sites. This quantitative study is conducted to examine buyers' perception about effectiveness of marketing of products on e-commerce websites that employ chatbots and recommendation systems. Research revealed that the people who knew about chatbots and preferred it over a human being perceived that the artificial intelligence and machine learning techniques were helping the marketing of e-commerce products. Similarly, buyers who bought products suggested by the recommendation system perceived that marketing of products has improved on e-commerce websites due to the use of AI and machine learning.

Keywords: Artificial Intelligence, Marketing, Machine Learning, E-commerce, Bot, Recommendation system, Chatbot, Customer.

1. INTRODUCTION

The term intelligence is the ability and potential of a being or system to apply knowledge and various unique skills to solve a given problem. Intelligence is concerned with the use of mental ability to solve and learn from various different situations and circumstances. (Sheikh, S.,2021)

The use of intelligence in the field of Marketing has evolved drastically. It is being used in almost every organisation to improve its efficacy, yield, revenue, customers etc.

In this paper we will find out the effectiveness of Machine Learning and Artificial Intelligence techniques used in Marketing of E-commerce products perceived by the customers who use it.

1.1 BACKGROUND
What is meant by the term Artificial Intelligence?
Artificial Intelligence is intelligence exhibited by machines, unlike the ability shown by the human beings. The word Artificial Intelligence (AI) refers to "machines (or computers) that try to copy "cognitive" functions that humans associate with the human mind." (Davenport, T et.al. 2019).

Now a days, AI is playing a vital role in every industry from manufacturing to selling. Every firm is using this leading-edge technology to increase efficiency.

What is meant by Machine Learning (ML)?
"The study of computer algorithms that updates and learns automatically through experience." is known as Machine Learning. It is a part of AI. Machine learning computer algorithms are built on a sample historic dataset which is also known as the training dataset. It involves computers discovering ways to solve difficult problems, to make predictions or make decisions that are not even coded in the algorithm. It is done by using the historical data provided. (Khrais, L. T., 2020).

Machine learning helps in creating models that can train themselves, identify patterns after analyzing the data and find solutions to novel problems by utilizing the past data. (Çelik, Ö.,2018)

WHAT IS MARKETING?
Marketing refers to various activities an organisation undertakes to promote the product or service to increase its revenue. In marketing advertising, selling, and delivering products is done through different ways.

Marketing includes everything a company undertakes to get its potential customers' attention and maintain relationships with them.

Product, Price, Place, and Promotion are the 4P's which is most important in marketing. These 4 P's together form the essential mix which a company wants for marketing their product or service. (Khrais, L. T., 2020).

What is the use of Artificial Intelligence in Marketing?
Marketing uses AI & ML techniques to make decisions based on the data collected from customers. AI in marketing is deployed to ensure swiftness and efficiency. AI gathers data of the customers through the profiles created by them on the e-commerce sites and tries to discern the taste of customers to interact with them in a better way.This helps in sending customized messages and ads at the right time. Artificial intelligence is used to replace marketing teams or to perform more complex tasks. (Grandinetti, R., 2020)

Artificial Intelligence Marketing is used in almost every firm where media buying, automated decision making, chatbots, real time personalization, recommendation systems, content generation is needed.

1.2 Benefits of Leveraging Artificial Intelligence in Marketing

There are numerous cases where artificial intelligence has been used in marketing. The benefits of using artificial intelligence and machine learning techniques are increased speed in doing tasks, higher customer satisfaction, increased profits, risk mitigation and more. (Grandinetti, R.,2020)

Two of the artificial intelligent techniques used in e-commerce websites are:

RECOMMENDATION SYSTEMS
Recommendation systems are a deep learning technique which aims to predict the user's interest, what will he/she purchase next. It uses user's past purchase history data and uses this data to recommend products which are interesting to them and most likely going to be purchased by them. In e-commerce, the recommendation system helps both the sellers and buyers. It helps the seller by finding customers who would like to buy their products and it helps the buyers by reducing their effort of searching for the right product from thousands of products by recommending them the product they would most likely buy based on the customers past purchase behavior. Content-based recommendation and collaborative recommendation systems are the methods which are most widely used. (M. Li, H. Wu and H. Zhang, 2019) Thus, recommendation systems create the shortest path to sales by showing the customers the right product from thousands of products and thus increase revenue.

CHATBOTS
With the growth of NLP (natural language processing) via artificial intelligence, chatbots are now being used in customer services. Customers with more simple queries (repetitive queries which are often asked) can use the chatbots which will give immediate and precise answers. Simple user queries (queries which are repetitive and are often asked by users) are answered quickly via chatbots which gives the customer support team more time to work on more complicated issues. Thus, the chatbot gives a good conversation experience by solving basic customer queries almost immediately.

2. LITERATURE REVIEW

2.1. History of AI
The idea of bringing lifeless intelligent objects has been in this world for a very long time, even Greeks who lived centuries ago talked about robots and Egyptians and Chinese about robots and automation (Lewis Tanya, 2014). Alun Turing (1950) was one of the first people who had explored the use of mathematics in artificial intelligence. He put forward that humans use data and information as well as reasoning to solve various issues and problems, so he argued that why machines cannot do the same thing. This framework of building intelligent systems using information and reasoning was discussed in his paper Computing Machine and Intelligence (Anyoha Rockwell, 2017).

First discussion on AI happened in the year 1956 at Dartmouth College conference (Pan, 2016), and though many people criticized the progress of AI, it flourished in the years 1957-1974. Artificial Intelligence is "the capability of machines to understand, think, and learn in the same procedure a human being thinks, indicating the possibility of using computers to simulate human intelligence." Funds for research in AI and Machine Learning were cut off in 1974-80, which is also known as the "AI Winter".

Advent of Deep learning & expert systems made AI flourish after 1993 which was mainly reactive in till 1980s. Deep Learning made it possible for the computers to learn by training data and expert systems allowed computers to develop decision making skills. IBM came up with computer named "Deep Blue" in 1997 which defeated the then chess champion and this marked the supremacy of AI over Human Intelligence A software that can recognize human voice was also developed in the year 1997.

Earlier in the 1980's turning did not function properly because the technology at that time was not good enough. Computers could only execute but could not store commands and computers were also very expensive at that time. Success of AI could not be attributed to the algorithms; these are the same as before. Success of AI is due

to the increase in computer's computational power. Now computers can store a lot of data and do heavy computations easily which was not possible in the 1980's. According to Moore's law, the speed and memory of computation gets doubled every year

Today, Artificial Intelligence stretches far outside the domain of human capabilities. In the current trend of big data when we have lot of information, Artificial Intelligence is proving fruitful in many sectors such as banking, marketing, education, entertainment etc.

2.2. AI in Marketing

AI & ML are now leading the advertising world. It is interesting to observe how these technologies are utilized to transform the data from the company/organisation into valuable marketing insights and to boost a company's ROI. Firms are making informed and appropriate decisions based on insights provided data analytics. AI and ML have become integral part of marketing these days some key techniques which are commonly used are:

·   AI uses large data to identify valuable patterns

·   ML helps to create more advanced customer interactions

·   A more personalised customer experience with AI

Implementing AI into their business is essential for companies that want to optimize their marketing now-a-days. These technologies can helpcompanies sort through large datasets. In addition to this, ML helps to make marketing experience more targeted and personalized (Jarek, K., & Mazurek, G.,2019). This increases customer traffic and boosts ROI in the long run.(Utermohlen Karl,2019)

Amazon's $1/3^{rd}$ income comes from the recommendation system it has employed which uses machine learning algorithm. Same is true for Netflix, it's $3/4^{th}$ income comes from its recommendation system. Artificial Intelligence will bring considerable changes in how things are done across the industries.(Conick Hal, 2017)

In marketing, Artificial Intelligence might change the way companies interact with customers, marketers would use advanced toolkits to do their analysis. Artificial Intelligence can perform various tasks such as optimizing pricing strategies , analyse customer data using numerical data etc. AI operated Bots can assist customers in locating and identifying the things they may be looking for in retail stores. (Davenport, T.et.al., 2019).

Artificial Intelligence is impacting digital advertising and marketing as well. Chatbot, Semantic search, Advertising targeting, voice search, Predictive advertising, and marketing etc. have impacted digital advertising and marketing drastically.

Implementation of AI in various sectors has changed company's process flow as well. AI has led higher degree of precision and has made the process fast. Companies are able to do data driven campaigns with the help of AI and that has led to better results.

3. RESEARCH METHODOLOGY

3.1. PROBLEM STATEMENT

Have artificial Intelligence and Machine Learning techniques like chatbot and Recommendation system led to effective marketing of products on e-commerce websites according to customers.

3.2. OBJECTIVE

Objectives of this study are:

• To know the level of awareness of customers about AI and ML techniques used for Marketing on E-Commerce websites.

• To know if users and non-users of chatbot and recommendation system differ in their views on AI & ML leading to effective marketing of products on e-commerce sites

This project will make use of quantitative approaches to determine the impact of AI & ML equipped bots on Marketing of goods on E-Commerce websites.

3.3. Research Framework
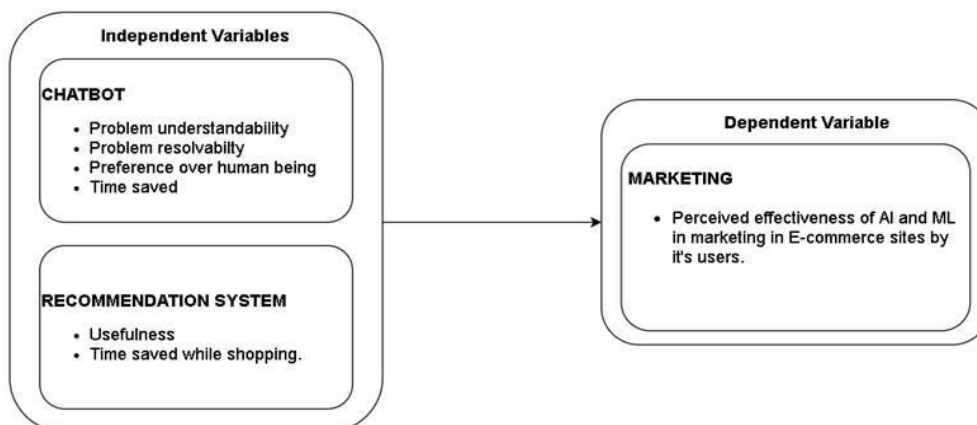
Figure 1: Research Framework

The independent variables for our research project are understandability and resolvability of chatbot (how well the chatbot is able to understand user's problem and how well it is able to resolve it). Other variable related to the recommendation system would be whether the users find out Recommendation system to be useful and whether the recommendations saved their time while shopping. By these variables we will be able to find out the effectiveness of AI and ML in marketing on Ecommerce sites as perceived by its users.(see fig.1)

3.4. RESEARCH DESIGN
The type of research design that we have undertaken in our project is descriptive research design.

3.5. SOURCES OF DATA
Primary data is collected through questionnaire. Questions were asked on linear scale of 1-7. External sources like blogs, article, websites, journal, magazines etc. to get relevant information for our project.

3.6. Sampling Design and Size:
Research was conducted using a survey and convenient sampling was used to collect the data for the research. The survey was sent to 250 users and 200 people responded to the survey. The data was analyzed using two-way ANOVA.

3.7. Research Limitations:
Due to time constraints and the COVID-19 pandemic situation data was collected through online mode only

4. ANALYSIS

4.1. OVERVIEW
The objective of this study is to know the impact of AI & ML technologies on Marketing of products on e-commerce sites. The two broad technologies reviewed for the study are Recommendation System and Chatbot. The research examined whether there is a significant difference in perception of customers about AI/ML technologies increasing the effectiveness of marketing on e-commerce sites. Difference in perception of groups who prefer and who don't prefer recommendation system and chatbot on e-commerce site about marketing effectiveness was measured through two-way ANOVA.

4.2. Null Hypotheses
Hypothesis 1
The difference between the perception of users and non-users of Recommendation System regarding marketing effectiveness on E-Commerce websites is not significant.

Hypothesis 2
The difference between the perception of customers who prefer Chatbot and customers who prefer human beings regarding effectiveness of marketing of products on E-Commerce websites is not significant.

Hypothesis 3
There is no interaction among users and non-users of chatbot and recommendation system on marketing of products.

4.3. DATA ANALYSIS

Hypothesis was tested using two-way ANOVA, with dependent variable as marketing effectiveness on e-commerce sites and independent variables are users of chat bot and recommendation system.

Between-Subjects Factors		
		N
RS	No	90
	Yes	90
ChatbotCat	No	84
	Yes	96

Table 1: Count Matrix of each group

The research began by conducting data screening and looking for outliers. Important assumptions of two-way ANOVA viz. Normality and Homogeneity of various were tested through Kurtosis and skewness test and Levene's test respectively.

DESCRIPTIVE STATISTICS

Data reveals that 90% of people were aware about the different AI & ML techniques used in the marketing of ecommerce products. 20 out of 200 who responded were not aware about the Artificial Intelligence and Machine Learning techniques.

In total, the final data analysis was run on 180 participants. In which the number of people who used Recommendation System are 90 and number of people who do not use Recommendation System are 90. The number of people who prefer and use Chatbot are 96 and the number of people who prefer human being over a chatbot are 84.(see table 1)

4.4. ASSUMPTIONS

ANOVA was conducted to test the null hypotheses and examine the differences between the effectiveness of AI/ML techniques used in Marketing among people who used Recommendation System and people who do not used Recommendation System and people who prefer using Chatbot and people who prefer human being interaction.

NORMALITY

Skewness and Kurtosis value for perception of effectiveness of people who have used Recommendation System are -0.234 and 0.117 respectively and Skewness and Kurtosis value for perception of effectiveness of people who do not use Recommendation System are -0.817and -1.136 respectively.

Skewness and Kurtosis value for perception of effectiveness of people prefer human being over chatbot are -0.462 and -0.474 respectively and skewness and Kurtosis value for perception of effectiveness of people who use Chatbot are -0.117 and -0.469 respectively.

Skewness values were between -2.0 and +2.0 and Kurtosis values were between -1.0 and +1.0 except for 1 kurtosis value which is slightly greater than 1. Researcher went ahead with study as two-way ANNOVA is robust to slight violations. [16][17] Glass, G. V., Peckham, P. D., & Sanders, J. R. (1972). Harwell, M. R., Rubinstein, E. N., Hayes, W. S., &Olds, C. C. (1992)

Homogeneity

Homogeneity of variance was determined through Levene's test, which resulted in *F*= 1.503, *p* = .215. It denotes that there was homogeneity in data. (See table 2)

Dependent Variable: FQ2			
F	df1	df2	Sig.
1.503	3	176	.215
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a.	Design: Intercept + RS + ChatbotCat RS * ChatbotCa		

Table 2: Levene's Test of Equality of Error Variances

5. RESULTS

5.1. Results for Null Hypothesis One

According to first hypothesis, the difference between the perception of users and non-users of Recommendation System regarding marketing effectiveness on E-Commerce websites is not significant. A two-way ANOVA was

performed to know if it's correct. Since $p < .05$, the null hypothesis is rejected. The analysis establishes that there is a significant difference in perception about marketing effectiveness on e-commerce between the users and non users where $p = .000$.

5.2. Results for Null Hypothesis Two

According to second hypothesis, the difference between the perception of customers who prefer Chatbot and customers who prefer human beings regarding effectiveness of marketing of products on E-Commerce websites is not significant. A two-way ANOVA was performed to know if it's correct. Since $p < .05$, the null hypothesis was rejected. Therefore, we can say that chatbot users and non-users perceive marketing effectiveness on e-commerce site differently.

5.3. Results for Null Hypothesis Three

ANOVA was performed to check interaction effect among customers perception, about increased marketing of products on E-Commerce website using Artificial Intelligence and Machine Learning techniques of those who prefer Chatbot to human being and the users or non-users of Recommendation System.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	97.534[a]	3	32.511	30.393	.000	.341
Intercept	3884.676	1	3884.676	3631.570	.000	.954
RS	81.972	1	81.972	76.631	.000	.303
ChatbotCat	14.965	1	14.965	13.990	.000	.074
RS * ChatbotCat	8.007	1	8.007	7.485	.007	.041
Error	188.266	176	1.070			
Total	4262.000	180				
Corrected Total	285.800	179				
a. R Squared = .341 (Adjusted R Squared = .330)						

Dependent Variable: FQ2

Table 3: Two-way ANOVA table

5.4. INTERACTION EFFECT

The plot of the perception of effectiveness of marketing of e-commerce products for each combination of groups of "users & non-users of recommendation system" and "people who prefer Chabot for solving their query & people who prefer human beings " are plotted in a line graph, as shown in fig.2
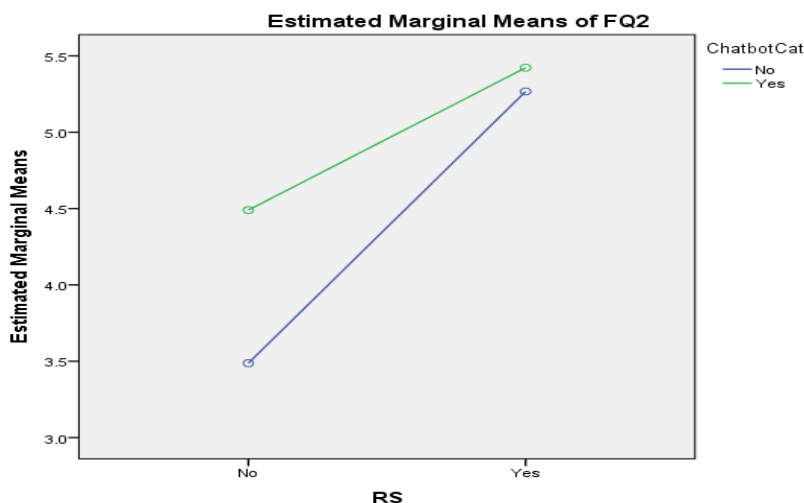
Figure 2: Interaction Effect

An interaction effect can be seen in the graph (see fig.2). Effectiveness of marketing on e-commerce platforms depends on how effective their chat bots and recommendation systems are according to the customers. The graph clearly depicts that more the customers use recommendation system higher the marketing effectiveness for both chat bots users and non-users.

Interaction effect was analyzed using the **Tukey test** as shown in table 4.

RS	ChatbotCat	Mean	Std. Error	95% Confidence Interval	
Dependent Variable: FQ2					
				Lower Bound	Upper Bound
No	No	3.487	.166	3.160	3.814
	Yes	4.490	.145	4.204	4.776
Yes	No	5.267	.154	4.962	5.571
	Yes	5.422	.154	5.118	5.726

Table 4: Tukey test Table

Tukey's test clearly depicts that chatbot usage and non-usage creates a lot of difference in means especially among non-users of recommendation system (1.003) as the customers use recommendation system they perceive marketing to be more effective.

Therefore, we can say that if e-commerce platforms can make chatbots more interactive and use it for making more personalized recommendations marketing will become more effective. There is a combined effect of the independent variables "users & non-users of recommendation system" and "users who prefer chatbot & users who prefer human being" on the dependent variable which is effectiveness of marketing of products on e-commerce websites.

6. CONCLUSION

Awareness of artificial intelligence techniques and machine learning techniques applied in the e-commerce sites help in the marketing of products on e-commerce sites. Therefore, customers should be made aware of the AI employed and the way it can help them.

Recommendation systems are techniques which create the shortest path to sales by showing customers the right products based on the customers previous purchase history thus leading to the customer buying the product. Data showed that the people who used chatbots and bought from the suggestions made by recommendation system perceived marketing on e-commerce platforms to be very effective.

Chatbots are self-help bots which are created using machine learning. These help in creating a better customer relationship with customers, resolving customer's queries faster and this in turn helps the site generate more sales.

Chatbots are mainly used for solving customer queries about a product. However, we recommend to use these bots to give more personalised experience to the customers by utilizing the information for product recommendations and purchase history.

Companies should focus on making their recommendation systems and chatbots more effective as customers perceive that AI especially chatbots increase marketing of products on e-commerce website and this results in improved sales. Human beings like to speak with human beings than a bot when they are panicked. Therefore, NLP and emotion recognition software should be deployed to know if the customer is panicky. Call should be diverted to the customer care executive if the level of frustration is high. Alternatively, an option can be given to the users if they want to use the chatbot for resolving queries or not rather than leading them to the chatbot directly. This will certainly increase customer satisfaction and improve marketing of products on e-commerce sites.

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A Study on Investment Options and Investors Attitude towards Investment

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ABSTRACT

This research paper titled mainly aims to understand the various options of investments available in India and the most preferred option by people by understanding their psychographic traits through identifying the factors those influence their Investments decisions. India as compared to other countries have always been the land where saving money is given a priority. People in India believe in spending less than their income and save maximum amount possible to secure themselves and their families' future. Thus along with huge amount of saving, Investment comes into the picture. With various categories of people in India there are numerous options of Investment available as per the requirement, on basis of varying needs and risk appetite. Thereby over the years it has given rise to the competition among the companies to provide better investment options with good returns and satisfy the needs of customers. But along with various features and returns the securities provide, it has been observed that there are various Psychographic, Cultural and Demographic factors that influence the attitude of people towards their Investment Decisions, thereby the project has tried to identify such varied factors and the degree to which it affects the decision of potential customer.

Keywords: Customer, Investments, Psychographics, Attitude, India.

INTRODUCTION

India being the developing nation, has emerged as fastest growing economies in the world and also being the nation with highest population in the world with majority of people consisting of young age group, it always had huge investment generating capability. Along with increasing GDP over the years per capita income has also increased and was estimated at Rs 1,45,680 crore in FY21.This increase has given huge opportunity for investment market to grow.

To cater the needs of huge population for Investments there are various financial sectors available in market to earn returns, secure your savings and plan your money management wisely.

Few popular Investment options available are studied in the projects which are as follows-

1. Bank deposits – This is the most common Investment option available for investment to every person. It is a flexible investment option with short term as well as long term investment facility. It is considered as easy and convenient investment option for all age Groups. Also it is Risk Free and most traditional way of investment which is preferred by all the strata of population.

2. PPF – PPF is saving cum tax saving Instrument in India which was introduced by National Saving Institute of Ministry of Finance. It is a Risk free option available. There is no specific Eligibility criterion or any Age limit for Investment. Thus it is considered as good long term option which provides fixed rate of return.

3. Mutual Funds - Mutual Fund is a type of Financial Vehicle that collects money from various Investors and allocate those fund in different Financial Assets to generate income. It creates a diversified Portfolio for Investor there by averting the Risk and compensating for losses in any one sector. It has slow risk as compared to Share Market. Also it provides decent degree of liquidity.

4. Post Office Schemes – Post office provides various investment schemes under Government Guidance including PPF, Sukanya Samruddhi yojana, NSC, Post Office Time Deposit etc. These schemes plays very important role to cover different categories and people from different location to come under umbrella of investments as post office has reach even in Interiors of India.

5. Stock Market – Stock market is designed for trading various kinds of stocks in controlled secured and managed environment. As we all know it works on the standard rule of Demand and Supply. It is a High Risk involved market which can provide very High Return in short period if executed wisely.

Share market works on two major indices and benchmarks which are

1. SENSEX i.e weighted stock market index of well-established and financially sound 30 listed companies

2. NIFTY i.e weighted stock market index of 50 larges Indian listed companies

6. Insurance cum Investment schemes – These are the options where companies provides compensation for specified loss, Damage, illness or death in return for payment of specified premium. Insurance market consist of Non-Life Insurance sector and Life Insurance Sector. Insurance Sector is governed by IRDA (Insurance regulatory and Development Authority).Few insurance cum Investment schemes now a days provide return as high as 8%pa along with various other features of Loan, less lock in period plus life cover. Thus Investment in this sector is showing Increasing trend.

7. Real Estate –This is again long Term Investment option available with Risk involved which can Earn High Returns. Real estate provides various options to people from Small to Large funds raisers like REIT, Real Estate Investment Groups, and Real Estate Limited Partnerships etc. Though Economic factors do affect the returns you get from Real Estate.

8. CRYPTO CURRENCY

A crypto currency is a new medium of exchange which uses computerized database for strong cryptography to secure transaction records and verify transfer of coin ownership. Thus this medium does not exist in physical form and also not issued by central authority. Crypto currency works through distributed ledger technology typically a blockchain. Currently it is not recognised by Indian Government as legal tender nor regulated by RBI, but there are no laws that prohibit trading in crypto and thus lot of people are taking interest in Investing in crypto currency. The numbers reflect a sharp increase in crypto investments in India as much as from $200million to $40billion in the year 2020. This number is a reflection of attitude that investors carry and the changing perceptions of investors towards new investment options available in market.

LITERATURE REVIEW

1. Sindhu K.P and Dr. S.Rajitha Kumar, (Sept 2013), the main objective of the paper was to understand and study specific Attitudes of Investors on Investment Decisions. The paper mainly focuses on Investment in Mutual Funds and various factors Influencing decision of Investors while investing in Mutual Fund. The researchers conclude by stating that increase in awareness about mutual funds will result in increase in its Investment and has also highlighted about the need of new and Innovative Mutual Fund Products to be brought in Market by Asset Management Companies.

2. Anuradha Samal and A.K. Das Mohapatra (Aug 2017), the study presents the factors Influencing Investment Decisions in Indian capital Market. The purpose of research is to study on retail Investors in the Odisha Province. The main objective of the study is to determine investment influencing factors and understand its relation with socio economic characteristics of investors in Odisha province. Reliability Test and Factor test are used as Research tools and the findings states that Investment decisions are influence by various factors like Organization efficacy, mediators Influence, ROI, fear of loss, Risk factors and Income level.

3. Deepak Sood and Dr. Navdeep Kaur (February 2015), the paper specifically presents findings with respect to Investment pattern of salaried Class People, research was conducted in in the city of Chandigarh. Sampling technique is used for Survey. Analysis was done on basis of Age, Gender, Marital status, Annual Income, Categorization of Job, and Types of Working sector. On the basis of survey they have concluded that salaried class has started realizing the importance of saving and Investment. Most people are preferring Normal standard of living over the luxurious one. Also the findings showcase the reasons for increase in savings which included saving money for children education, marriage and other goals of life.

4. Riyazahmed.K (April 2021) - The paper studies Investment Motives and preferences of people during Covid 19. Author used primary data collected through questionnaire. The study was conducted on the basis of Demographic, Socio economic factors and Various investment motives behind the Investment preferences and also which avenues of investments like Mutual funds, Life Insurance, and shares is more preferred by people. Factor analysis and Regression analysis tools are used to analyse the data. Through the findings they have disclosed that the Covid 19 has positive impact on Investments but the same is influenced by investment motives that drive investors towards different avenues. Various aspects like nature of Investments, Investors personal characteristics, behavioural aspects, awareness etc are the important determinants of Investor preferences.

5. Ms. Babita Yadav and Dr.Anshuja Tiwari (July 2012) – The main objective of the paper was to study and explore various factors influencing customer investment decision in life insurance, preferences of customers while taking life insurance and factors responsible for selecting life insurance option. They have conducted direct interview and questionnaire as an instrument for collecting data and through the research they have reached to the findings that life insurance penetration in India is very low as compared to developed nation.

Customers play very important role in life insurance business thus company needs to offer need based innovative products and demographic factors of people play pivotal role in purchase of life insurance policy. Numbers of statistical tools like chi-square, Correlation, weighted average have been used for testing hypothesis.

RESEARCH OBJECTIVES

- To understand which Investment Options are preferred by people.

- Investor's attitudes towards various Investment options available.

- Factors that Influence the decision of Investors while Investing.

- Impact of Demographic and Competitive factors those Influence the Investment Decisions.

RESEARCH METHODOLOGY

- **Primary Data** – A through Questionnaire was prepared for primary data collection and survey was filled by 70 respondents. Questions were multiple choice and Rating based which were constructed with the intention to understand the Investment Options preferred by people and the factors that influence their investment criterion.

- **Secondary Data** – Research Papers were referred for understanding different studies undertaken to analyse Investment options and Investors Attitude.

DATA ANALYSIS
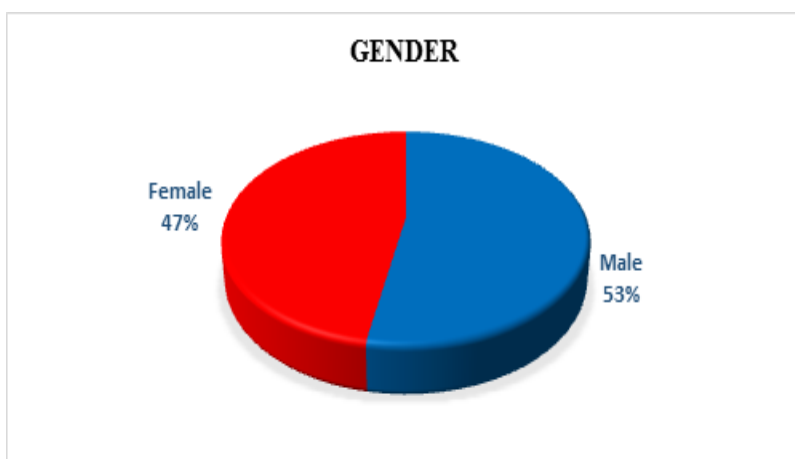
Fig 1.

As shown in the Figure 1 from the 70 respondents who responded to the survey 53% were Male and 47% were female.
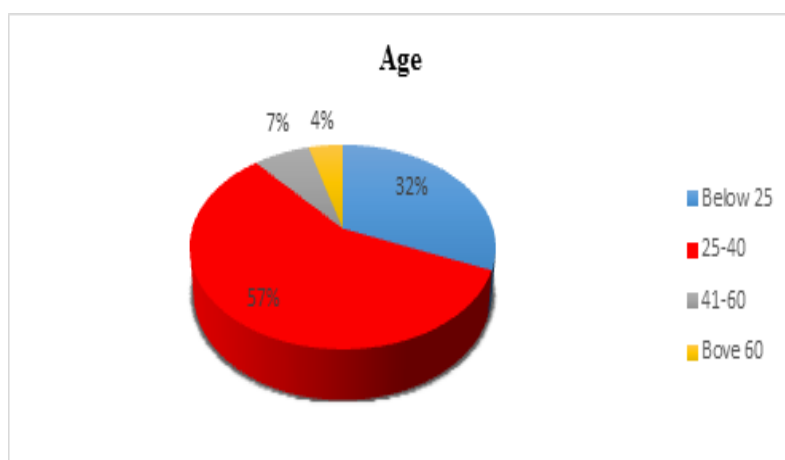
Fig 2.

As shown in the figure 2 analysis is done on one of the demographic Factor i.e Age where maximum respondents (57%) are from the age group of 25 to 40 and almost 32% respondents are from age group of below 25.
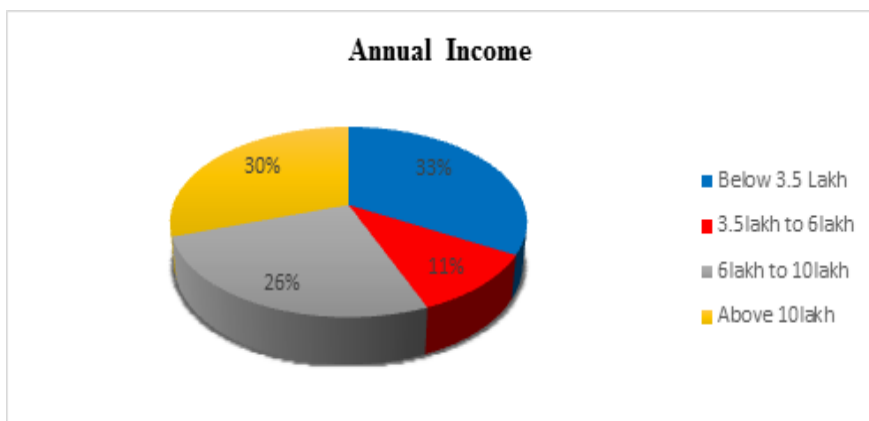
Fig 3

In Figure 3 we can see that range of Annual Income of respondents is reflected and maximum respondents are having Income less than 3.5lakhs and below that there is class of people with Income of above 10lakhs. This wide range has given the analysis regarding Investment Preference of people from both lowest and Highest Income category.

Where do you prefer to invest regularly?
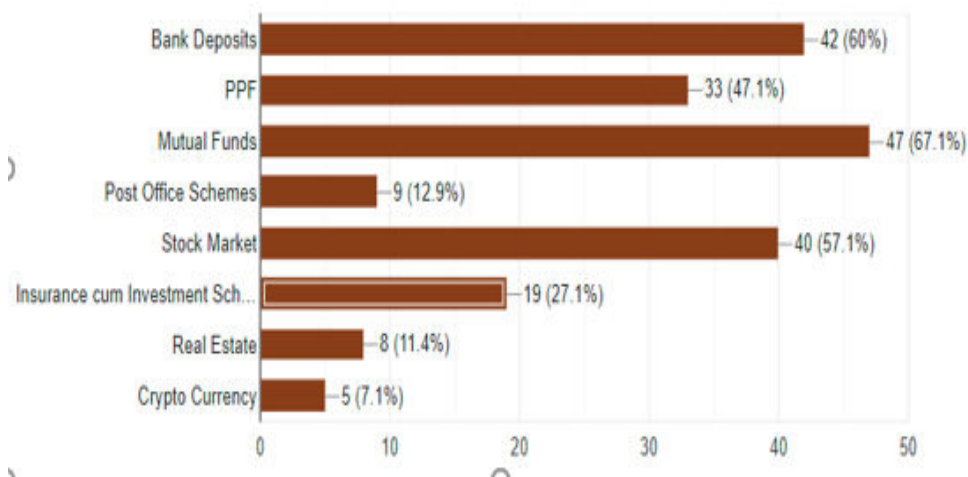
Fig 4

From the various Investment options available in the market I have tried to understand which investment is preferred most by people through primary data collection, and from the 70 responses received we can see

that most of the people (67%) have preferred investing in Mutual Funds which is followed by conventional Investment option of Bank Deposits (60%) and the next most preferred option is of stock market. Thus Mutual Funds, Bank Deposits and Stock Market are the top 3 preferred Investment options.
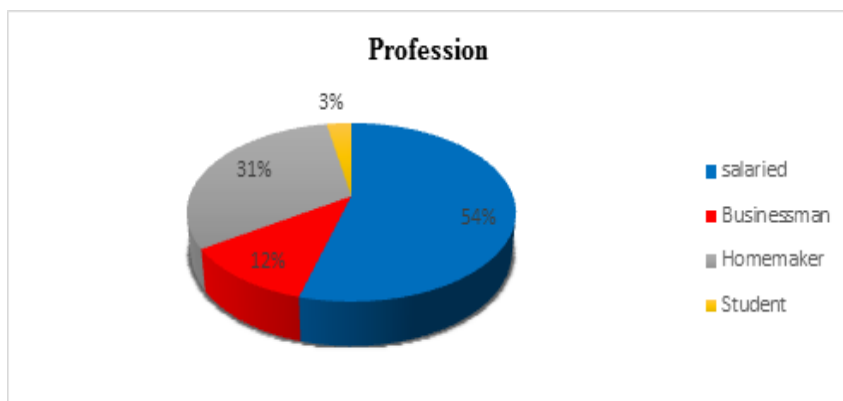
Fig 5.

From the above figure we can see that maximum people contributed to survey includes salaried class which is around 54%, followed by 31% homemakers' 12% business man and 3% of students.
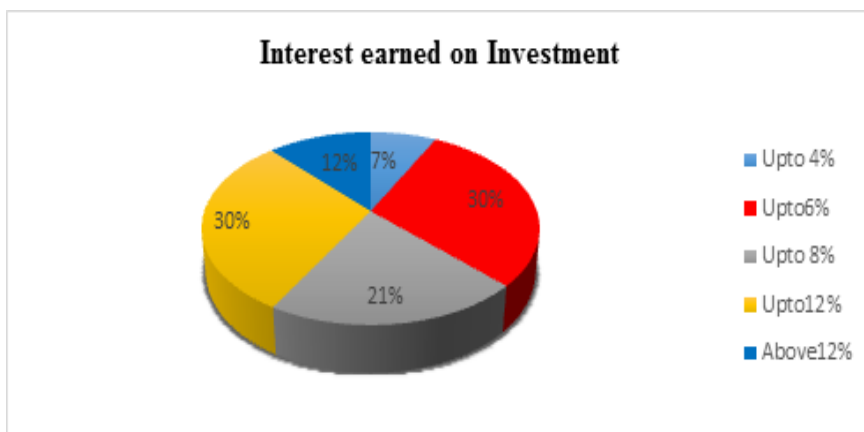
Fig 6.

To understand ROI from investing in various instruments people were asked about the overall interest they earn from all investments and from the above pie chart we can infer that almost 75% of the people are in the range of 6% to 12%.
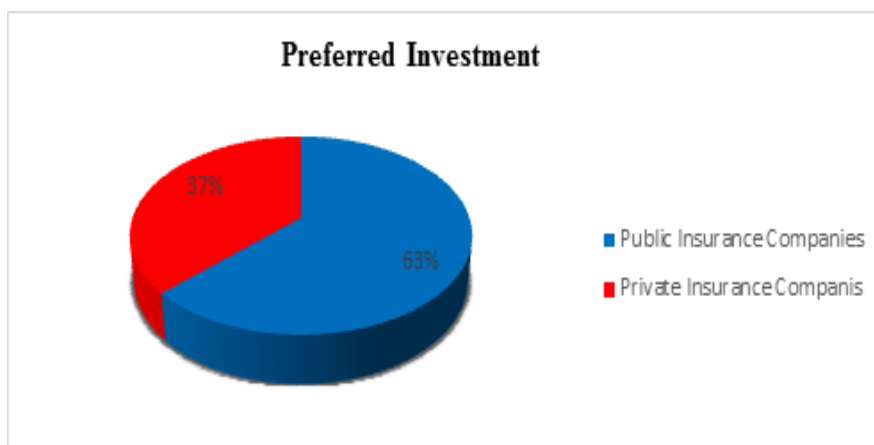
Fig 7

Since this project also aims to understand the attitude of people while investing, we have tried to find out the preference towards investing in Public Insurance companies and Private Insurance companies and from above pie chart we can clearly see that 63% percent have preferred Public insurance companies over Private Insurance companies.
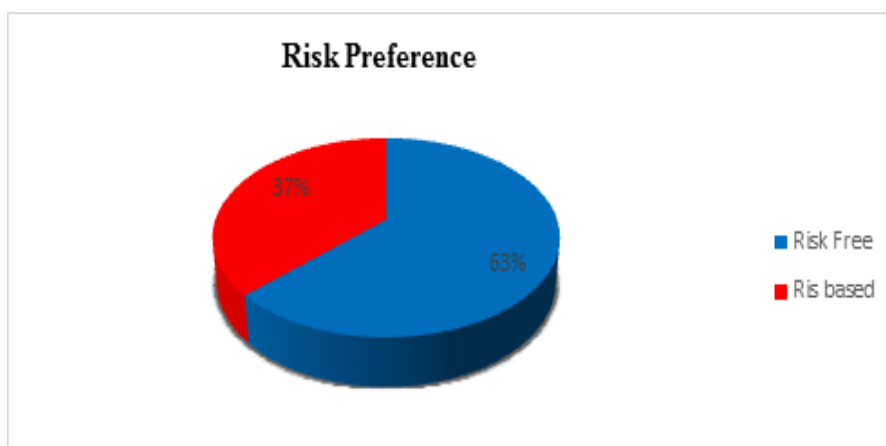
Fig 8

Every Investor in the market has different mind-set and perspective while investing. Few investors have good risk Appetite where as some of them are risk averse and always preferred secured investment with fixed income. This approach towards investment has huge impact on type of investment options preferred by people and attitude they have while investing. The above diagram reflects that 63% investors prefer risk free Investment over the risk based one.

Pointer Scale Analysis

Questions related to various factors those influence the Investment decisions were asked in the questionnaire and the respondents were expected to respond on linear scale pointer basis where 1 was the least important and 5 as most important.

Analysis of each question is stated further-

1.Influence of company's credibility.
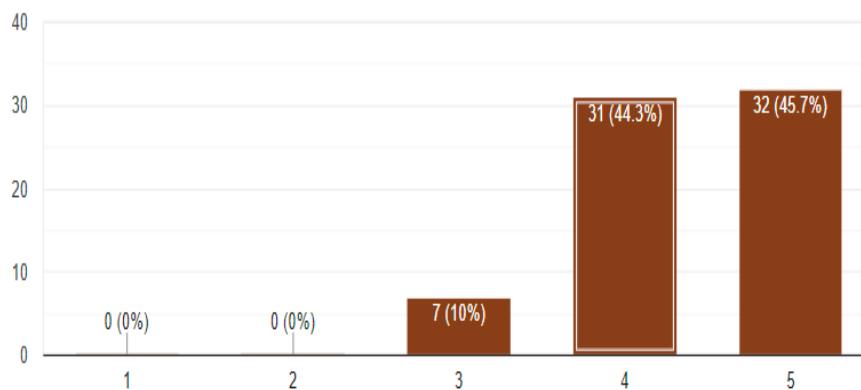
While investing in any company one of the important parameter considered by Investor is Company's Credibility. Which includes Company's Goodwill or Brand Image in the market depending on its performance. Thus this question is asked primarily in questionnaire to understand how important this factor can be, and we can see in the graph that maximum people have rated this factor at point 5 which maximum points are allotted.

2. Importance of expert's recommendation about investment
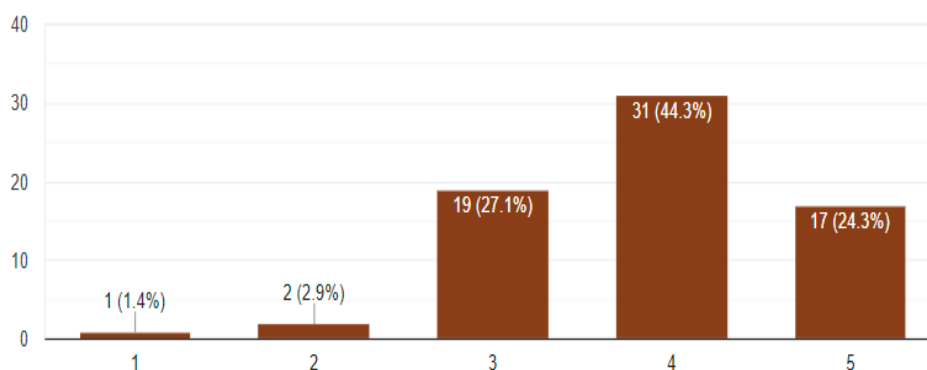
While Investing in any Instrument, most of the people prefer to take expert's opinion , though few of them do self – analysis, few consider it important to take suggestion from the one who has deep knowledge about subject. Thus the above factor is important for understanding investors thinking while investing.

3. Self-analysis and study about Investment
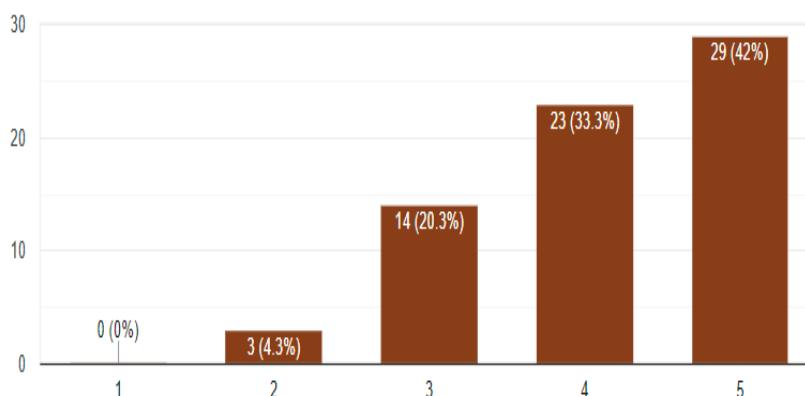
While investing in any instrument some people give lot of importance to self- analysis as it provides them assurance about investments and the returns they would get. Investment options which provide opportunity for self-analysis and easy user access it influence the decision of investor while investing.

4. Percentage of return on Investment
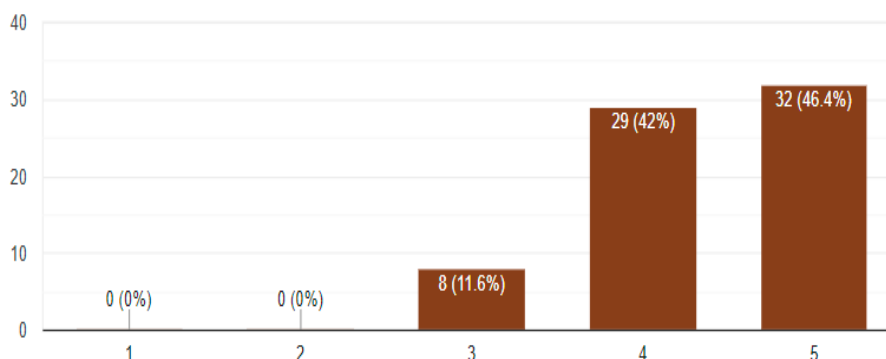
This is the most important factor which influence the decision of investment as every Investor expects good returns from the amount invested by him in any kind of instrument. Most of the times this is the only factor which people take into consideration while investing. We can also see in the graph that almost 42% have rated this factor at 4 pointers and 46% have rated this at 5pointers which reflects that this is considered as very important factor while investing.

5. Whether the instrument of Company you are investing in is Listed Company?
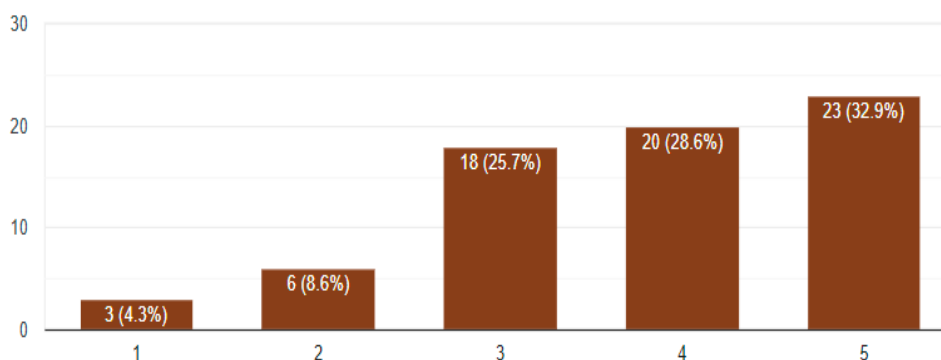
While investing in any instrument few people who have knowledge about financial aspects and stock market they try to check if the company is listed in the market or not, as for them it is an important factor to value the worth of company or its performance. And from the survey undertaken we can see that there are few people who think that this is not a factor which will influence the

investment decision but at the same time 32.9% people consider this point as important whereas 25.7% people are neutral about this.

6. Company's performance in Stock market?
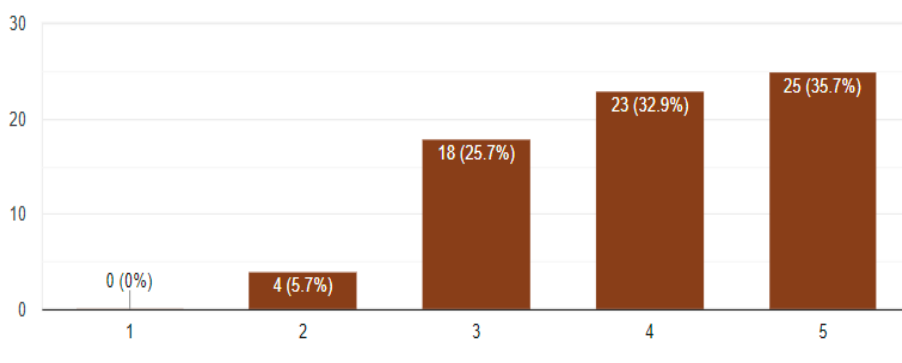
From the above graph we can observe that the response for the above question is distributed and there are people who are neutral about this factor as it does not affect their investment decision, whereas there are still 35.7% of people who feel that even the company's performance in stock market need to analysed and thus have considered this factor as very important while investing.

7. Does Flexibility of Lock in period Influence your Investment Decision?
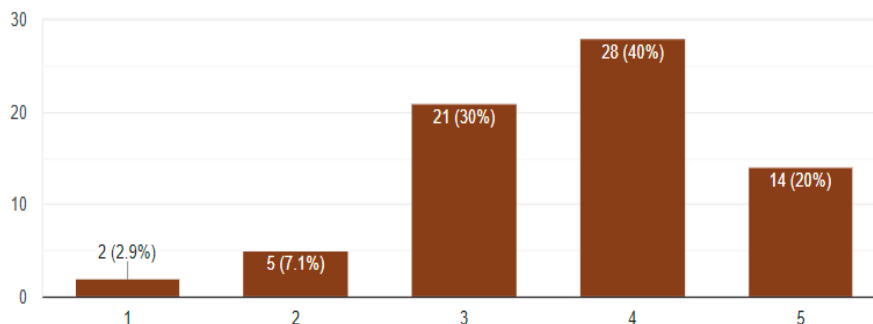
Different Investment option provide different lock in period options and people choose the scheme as per their requirements. Thus the flexibility in lock in period is important factor that people take into consideration while investing, as lock in period decides the years for which money will be locked in the investment and thus maximum people i.e about 40% (as represented in graph) thinks this is important factor

8. Liquidity Feature Offered by Investment
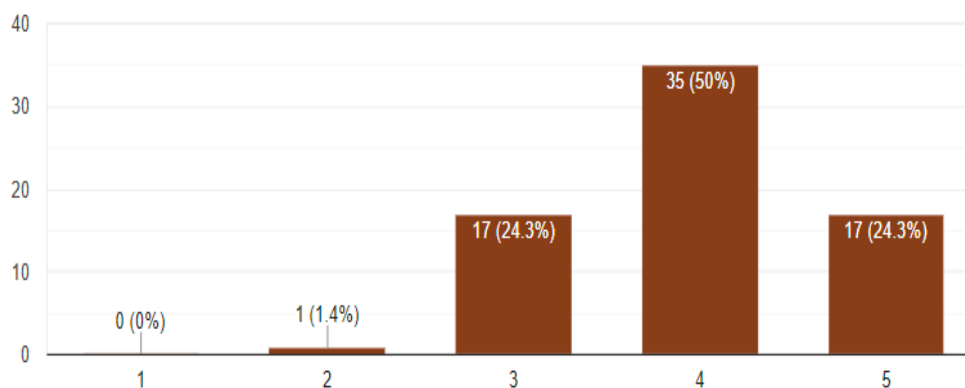
From the above graph we can conclude that almost 50% of people are of the opinion that liquidity offered by investment Instrument influence their decision while investing as it secure them in case of any emergency of funds.

9. Importance of Simplified Investment Procedure
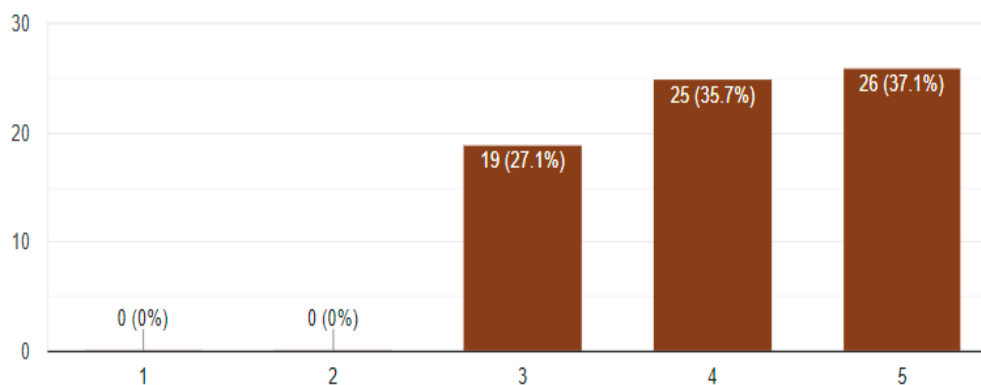
The above graph states that almost 37.1% people consider simplified process is very important factor while investing in any instrument, as it makes their work easy, while almost 35.7% people have responded with 4 points preference to this factor from which we can understand that with increase in digitalized process people also expecting it to be user friendly.

HYPOTHESIS
a) Relationship between Age and Risk Taking attitude of Investor while Investing.

Age Investment Preference	below 25	25-40	41-60	Above 60
Risk Free	15	24	4	1
Risk Based	8	15	1	2

Hypothesis considered for testing purpose:-

Null Hypothesis-

H0:- There is no relationship between Age and Risk taking Attitude of investor

Alternative Hypothesis

H1:- There is relationship present between Age and Risk taking Attitude of Investor.

To test the above mentioned Null Hypothesis, Karl Pearson's Coefficient of Correlation was calculated which is as follows

	Age	Which type of Investment is preferred
Age	1	-0.036510070693871
Which type of Investment is preferred	-0.036510070693871	1

As seen in the table "r" value is -0.036510070693871. That states there is negative correlation between Age and Type of Investment Preferred by Investor

However in order to understand level of significance, 'P' value is calculated.

	df	SS	MS	F	Significance F
Regression	1	10.56943	10.56943	0.090764	0.764127491
Residual	68	7918.573	116.4496		
Total	69	7929.143			

RESULT-
The "P" value was 0.764127491, which is much higher than 0.05, HO1 is accepted and H1 is rejected. Thus the result shows that relationship between Age and Risk Taking attitude of Investor is insignificant.

b) Relation between Self-analysis or study before Investing and Interest Earned annually-
It was tried to find out through survey, if people give importance on doing self- analysis before investing in any instrument, and they were asked to provide response on 5pointer scale wherein 1 was least preferred and 5 was highly preferred. The responses received are tabulated in the table below-

Self-analysis about Investment (Pointers)	1	2	3	4	5
Total Responses Received	0	3	14	12	30
Interest earned Annually					
up to 4%	0	0	5	0	0
Up to 6%	0	1	3	6	10
up to 8%	0	2	3	5	4
up to 12%	0	0	3	7	12
Above 12%	0	0	0	5	4

Hypothesis considered for testing purpose:

H0 – There is no relationship between Self-analysis of Investment and Interest earned annually

H1 – There is relationship between self-analysis of Investment and Interest earned annually.

	Self-analysis and Study about Investment	Interest earned
Self-analysis and Study about Investment	1	0.246711966
Interest earned	0.246711966	1

As seen in the table "r" value is 0.246711966. That states there is positive correlation between Self-analysis of Investment and Interest earned annually.

However in order to understand level of significance, 'P' value is calculated.

	df	SS	MS	F	Significance F
Regression	1	3.321588	3.321588	4.407194	0.039502
Residual	68	51.24984	0.753674		
Total	69	54.57143			

RESULT

The "P" value was 0.039502, which is much lower than 0.05, HO1 is rejected and H1 is Accepted. Thus the result shows that there is relationship between Self Analysis of Investment and Interest earned by Investor.

FINDINGS

This report was prepared to understand the various types of Investment options available in market and at the same time Investor's attitude while investing, wherein the survey was based on demographic and Psychographic factors to understand various factors those influence the Investment decisions. And the findings that we can state are as follows:-

- Along with various conventional Investment options available almost 67% people are preferring to Invest in Mutual Funds followed by Bank deposits.

- Though Insurance sector is emerging as Good investment option available in market most of people are still preferring Public Insurance Companies over the Private one. This reflects that people consider Public companies more secured.

- We can observe that people give utmost Importance to the credibility of company while investing and this response highlights the importance of Brand Image created by company along with its performance.

- Also, though while investing, maximum people are preferring to take expert advice there is increasing awareness about the market and new investors are also giving importance to Self-Analysis before Investing.

- Along with these factors there are various other factors like Company's performance in stock market, Liquidity feature offered by company and also the lock in period which investors take into consideration while investing.

- Through Correlation and Hypothesis testing we have found that there is no relationship between Age of an Investor and the Risk Taking attitude he she possess. Both the factors are insignificant to each other.

CONCLUSION

The projects aim to understand various Investment options available in market and simultaneously try to analyse various Demographic and Psychographic factors that influence the decisions of Investors while investing in any instrument. There are various new Investment schemes which are introduced in market to cater the changing needs of people, with various companies offering lucrative investment offers there is constant competitive pressure to attract investors which has led to growth of this sector. There is increase in spending capacity of people and at the same time there is rise in inflation, Uncertain natural calamities and unforeseen events like Covid Pandemic which has made people realise the importance of Investments and savings, people are preferring investing in different investment options and creating diversified portfolio. Also it can be observed that people are becoming more inclined toward taking Calculated Risk based options as there is increase in awareness and literacy about the Investments.

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Investigating Role of Learning Characteristics Factors: Learning Agility, Self-Management and Grit in E-Learning Outcomes for Post Graduate Management Students Using Inferential Statistics

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ABSTRACT
The COVID-19 pandemic, a civic well-being crisis and a global challenge, broadcasted by the World Health Organization (WHO) in January 2020 as an outburst. Over discussions with 400 students, the respondents of the survey using the convenience sampling method via questionnaires, this study assessed factors impacting students' online learning outcomes with a focus on learning characteristics during the COVID-19 pandemic. Inferential statistics were used in this investigation. The study scales' assessment results revealed that 15 observed variables were employed to investigate three research concepts. The hypothesis test findings revealed that all three learning qualities, in decreasing order, affect students' online learning outcomes, namely learning agility, optimism, and self-management.

Keywords: COVID-19, Education, Mental agility, Optimism, Online learning, Self-management

1. INTRODUCTION

Notwithstanding the global pandemic that is impeding education, Internet-based learning has become more reachable and widespread, making the learning process easier. (Habes et al., 2019; Liao et al., 2019)

As a consequence, the efficiency of E-learning and the effects of students' online learning have become a source of worry for institutions and society as a whole. In reality, there has been a surge in research on the elements that influence students' online learning results. A "prototypical change in education" involves prioritising distance education, particularly through online systems.

However, many say that online learning is currently experiencing an educational crisis, owing to the self-discipline required for online learning if technological and socioeconomic aspects are taken into account. As a result, the goal of this study was to look at the learning characteristics that influence postgraduate students' learning outcomes during online sessions. Post graduate students based in Mumbai are selected for the study based on convenience sampling method.

2. LITERATURE REVIEW

To develop a hypothesis about factors impacting students' online learning outcomes in particular and the efficacy of using technology in general, the technology acceptance model (TAM) (Davis, 1989) is employed. Davis proposed TAM to understand people's thoughts and actions in embracing technology in the face of other environmental factors. In the research of technology usage behaviour, this model is commonly used to figure out why people accept or reject information systems. Information technology has the potential to inspire innovation, create new learning environments, and revolutionise educational activities, all of which are linked to the ease with which IT operations may be carried out. The simplicity of operation, user experience convenience, and skill in information technology have a direct impact on users' perceptions and motivation to study. In research, TAM characteristics like perceived ease of use and perceived usefulness have been proven to have a positive effect on student academic achievement. (Alrefaie et al., 2020; Khadija et al., 2020; Alrefaie et al., 2020)

Using inferential statistics such as the Chi-Square test, Kolmogorov Smirnov test, Reliability Analysis, and Factor Analysis, the impact of learning agility, self-management, and grit parameters of learner characteristics on learning outcomes is investigated using inferential statistics such as the Chi-Square test, Kolmogorov Smirnov test, Reliability Analysis, and Factor Analysis (Ashwin, 2015; Ahmad , et.al, 2018 & Hair et.al, 2006)

Learner characteristics' focal constructs:
1. Self-discipline
The 5 A's construct is a unifying conceptual framework utilised by health care practitioners one-on-one or in groups (Goldstein, Whitlock, & DePue, 2004). Assess, Advise, Agree, Assist, and Arrange are the five A's (Goldstein et.al, 2004). These are a set of behavioural methods that encourage students to engage in self-management, and they will be evaluated to see if they have an impact on learning outcomes.

2. LEARNING AGILITY

Learning agility refers to a person's aptitude and desire to swiftly research a new subject and use their own learning process to get a thorough understanding before making a choice.

Accepting complexity, exploring problems in novel ways, drawing new connections, and remaining curious are all examples of - Mental agility.

Being open-minded toward others, loving connection with varied groups, and bringing out the best in others are all examples of - People agility.

Change agility is the ability to lead change activities while constantly exploring new possibilities.

Delivering results in difficult situations, adapting to challenges, and encouraging people to do more than they thought possible are all examples of - Results agility.

Reflection, understanding strengths and flaws, seeking feedback, and personal insight are all examples of - Self-awareness. (https://focus.kornferry.com/leadership-and-talent/the-organisational-x-factor-learning-agility/)

3. GRIT

Grit requires persevering in the face of hardship, maintaining effort and interest throughout time despite failure, adversity, and progress plateaus (Duckworth, 2016)

Interest - is defined as a desire to learn more about something or someone. Know that for the vast majority of people, discovering their passion entails a small amount of discovery, a lot of development, and then a lifetime of deepening.

Practice - Trying to do things better on a regular basis is an important part of perseverance.

Purpose - The reason for which something is done, formed, or exists is called its purpose.

Hope - Can you stand up eight times after falling down seven times? Hope is what enables us to persist in the face of adversity.

Long-term goal orientation: building the psychological assets of interest, practise, purpose, and hope, as well as surrounding yourself with supportive people. This leads to a focus on long-term objectives.

3. RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN
Hypothesis 1

Null Hypothesis

(Ho): Learning characteristics of learners on online learning platforms are less effective in predicting learning outcomes

Alternative Hypothesis

(H1): Learning characteristics of learners on online learning platforms are more effective in predicting learning outcomes

3.2 SAMPLING AND DATA COLLECTION

Sample size
It specifies how many samples are taken from a target demographic. The postgraduate students in India are the target audience. The sample size was calculated using the formula of variability due to the heterogeneous nature and high variability characteristics of the elements of the population. The sampling Method used to select the sample of 400 respondents by using Convenience sampling. Through the Convenience sampling, the most accessible elements have been identified.

The sample in detail.
Males made up 55 percent of the responses, according to the demographics. First-year students accounted for 46% of total replies, while second-year students accounted for 54%.

4. DATA INTERPRETATION AND ANALYSIS
The dependability of the factors used to understand learner characteristics was assessed in this study.

Table 4.1: Cronbach's Alpha (α) for 15 items

Item description	Cronbach's Alpha (α)
Assess	0.873
Advise	0.872
Agree	0.877
Assist	0.869
Arrange	0.866
Mental agility	0.859
People agility	0.854
Change agility	0.853
Results agility	0.862
Self-awareness	0.892
Interest	0.867
Practice	0.862
Purpose	0.861
Hope	0.853
Long-term goal orientation	0.858

Table 4.2: Reliability Statistics for learner characteristics

Cronbach's Alpha (α)	N of Items
.865	15

INFERENCE

The value of Alpha () is 0.865, as shown in Table 52(a). Because Cronbach's Alpha () is more than 0.8, we can conclude that the variables have a high level of internal consistency.

Learner characteristics are analysed using factor analysis.

To classify and comprehend the learner characteristics, factor analysis was performed.

KMO and Bartlett's Hypothesis Test

In Factor analysis, the KMO and Bartlett's Test of Hypothesis is an intrinsic statistical metric. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy score should always be greater than 0.5, with a significance level of less than 5%.

Table 4.3: KMO and Bartlett's Test of hypothesis (for factor analysis)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.637
Bartlett's Test of Sphericity – Value of Chi-Square	424.257
Df	105
Sig	.000

Source: Compiled from the questionnaire

(df – degrees of freedom   Sig: Significance Level)

INFERENCE

It can be seen from the table 59 that the significance (0.00) is less than the assumed value (0.05). The value of KMO measure has been observed as 0.637 which was more than 0.5. Based on this KMO measure, it can be revealed that the factor analysis for data summarization is effective for determining the learner characteristics

Table 4.4: Communalities for understanding the impact of learner characteristics on learning outcomes

Variables	Initial	Extraction
Assess	1.000	0.769
Advise	1.000	0.773
Agree	1.000	0.817
Assist	1.000	0.781
Arrange	1.000	0.761
Mental agility	1.000	0.717
People agility	1.000	0.776
Change agility	1.000	0.767
Results agility	1.000	0.756

Self-awareness	1.000	0.721
Interest	1.000	0.752
Practice	1.000	0.795
Purpose	1.000	0.719
Hope	1.000	0.772
Long-term goal orientation	1.000	0.791

Source: Compiled by the questionnaire

The degree of variance a variable share with all the other variables being investigated is referred to as communality. This is the percentage of variance that can be explained by common causes.

Table 4.5: Eigen Values explaining the Percentage of Variance

Variables	Eigenvalues	% of Variance
Assess	3.053	15.226
Advise	1.932	9.637
Agree	1.83	9.128
Assist	1.599	7.973
Arrange	1.399	6.976
Mental agility	1.339	6.677
People agility	1.288	6.423
Change agility	1.203	6.002
Results agility	1.111	5.538
Self-awareness	1.067	5.322
Interest	0.989	4.932
Practice	0.896	4.469
Purpose	0.823	4.103
Hope	0.772	3.85
Long-term goal orientation	0.751	3.744

Source: Compiled by the questionnaire

The entire variance explained by each factor is represented by eigenvalues. The number of components is determined by the Eigen values greater than one.

Table 4.6: Rotated Component Matrix (for deciding the number of factors)
[The extraction method used is Principal Component Analysis through the Rotation Method: Varimax with Kaiser Normalization]

Variables	Components	
	1	2
Assess	0.231	0.728
Advise	0.216	0.161
Agree	0.817	0.339
Assist	0.824	0.433
Arrange	0.807	0.36
Mental agility	0.814	0.441
People agility	0.803	0.313
Change agility	0.863	0.327
Results agility	0.445	0.804
Self-awareness	0.323	0.826
Interest	0.237	0.792
Practice	0.391	0.835
Purpose	0.385	0.859
Hope	0.782	0.355
Long-term goal orientation	0.389	0.794

Source: Compiled by the questionnaire

INFERENCE:
From the Table 4.6 of Rotated Component Matrix, it can be seen that the two factors can be classified as follows:

The factors are renamed as follows:

Factor 1 – LC 1

Agree

Assist

Arrange

Mental agility

People agility

Change agility

Hope

Factor 2 – LC 2

Assess

Results agility

Self-awareness

Interest

Practice

Purpose

Long-term goal orientation

From the Factor analysis it states that LC 1 and LC 2 are highly significant in understanding the impact of learner characteristics on learning outcomes

The following hypothesis has been tested by using Chi-Square test
Hypothesis 1

Hypothesis 1

Null Hypothesis

(Ho): Learning characteristics of learners on online learning platforms are less effective in predicting learning outcomes

Alternative Hypothesis

(H1): Learning characteristics of learners on online learning platforms are more effective in predicting learning outcomes

Table 4.7: Summary table of Chi-Square test to show the significant impact of Story-based animated digital assessment tools are more effective in predicting demonstrated behaviour

Item description	Chi-square value	Sig. Value
Assess	285.625	0.000
Advise	282	0.000
Agree	217.875	0.000
Assist	229.85	0.000
Arrange	230.55	0.000
Mental agility	218.975	0.000
People agility	246.925	0.000
Change agility	199.85	0.000
Results agility	224.65	0.000
Self-awareness	225	0.000

Interest	172.825	0.000
Practice	250.25	0.000
Purpose	200.475	0.000
Hope	294.875	0.000
Long-term goal orientation	315.875	0.000

Source: Compiled from the questionnaire
(Sig: Significance level)

Inference: The null hypothesis can be rejected if the significance threshold for all Chi-Square values is less than 5%. As a result, we can deduce that the learning characteristics of online learners are more successful in predicting learning outcomes.

5. LIMITATIONS

Despite the fact that this study met its initial purpose, it has certain flaws. To begin with, due to the new study's narrow scope, appropriateness may be constrained. Second, the research focuses entirely on aspects of the online learning system, ignoring factors such as student assistance and personal situations. These restrictions may be addressed in future research.

6. POLICY IMPLICATIONS AND CONCLUSION

The study's findings will aid teachers, instructors, counsellors, tutors, institutes, parents, and students in better understanding the importance of factors influencing pupils' performance during the web - based learning process, encouraging policies to improve on coordinating, constructing, and undertaking courses online throughout particular, and also higher education in general. To begin, the institute should provide training sessions to encourage students to take initiative, encourage them to actively interact with professors and classmates, and enhance their grasp of online learning. aptitude for self-study and learner characteristics (Debattista, 2018 ; Kebritchi et.al , 2017 & Khamparia et.al, 2017)

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Impact of Covid 19 on the Mode of Financial Transactions All Around the World

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ABSTRACT

A basic measure of financial inclusion is the share of adults in a country who have an account at a formal financial institution or through a mobile money provider. But account ownership is only the beginning. Financial inclusion is at its prime when adults use accounts to save, make remittances, obtain manageable credit, and mitigate economic risks. Increasingly, digital finance has been creating opportunities to expand access by reducing costs, increasing convenience and allowing consumers to transact remotely, using mobile devices—which have been extremely important during the COVID-19 pandemic.

Over the trajectory of the pandemic, governments have scampered to bring fourth financial assistance to citizens, creating opportunities and challenges for expanding financial inclusion. Financial inclusion is a process in which businesses and individuals have access to useful and affordable financial products and services that meet their needs like – transactions, remittances, credit, savings and insurance delivered in a superintended and sustainable way. This has the potential to expand inclusive access to financial services.

The global COVID-19 health crisis and responses of government, such as lockdowns restricting economic activities, escalated the need for contactless financial products and services, accelerating the shift to digital finance in many economies. Governments bestowed down digital remittances to reach vulnerable citizens and customers increasingly used phones and cards to pay merchants. Measures also included regulations to brace acquisition of digital financial services during COVID-19.

Data composed during the pandemic charts the positive shifts toward digital payment, but also highlights the unequal access to these services, especially among vulnerable groups. The adoption of digital finance embraces threats such as those interconnected to consumer protection and financial capabilities. Advances in digital financial involvement are probably to be more sustainable and equitable when accompanied by policies that address the different circumstances facing consumers and provide for the skills development, regulatory protections and product designs matched to their needs.

This research paper focuses on the impact of COVID-19 on digital financial inclusion for consumers by addressing both opportunities and risks. It identifies the channels for digital finance which are creating opportunities for greater inclusion during the COVID-19 crisis. At the same time this paper will focus on impact of pandemic across populations in financial access.

Keywords: Financial Inclusion, COVID 19, Crises, Reducing Costs, Economic activities etc.

INTRODUCTION

Over the trajectory of the pandemic, governments have scampered to bring fourth financial assistance to citizens, creating opportunities and challenges for expanding financial inclusion. Financial inclusion is a process in which businesses and individuals have access to useful and affordable financial products and services that meet their needs like – transactions, remittances, credit, savings and insurance delivered in a superintended and sustainable way. This has the potential to expand inclusive access to financial services.

The global COVID-19 health crisis and responses of government, such as lockdowns restricting economic activities, escalated the need for contactless financial products and services, accelerating the shift to digital finance in many economies. Governments bestowed down digital remittances to reach vulnerable citizens and customers increasingly used phones and cards to pay merchants. Measures also included regulations to brace acquisition of digital financial services during COVID-19.

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OBJECTIVES

- Through a detailed light on financial inclusion.

- Analyze the different modes of financial transactions amid COVID 19.

- Digital payment system and its access among different sections of the society.

METHODOLOGY

The methodology of this paper is based on strong research design, as the data is collected from different sources and is analysed using various graphical and tabular tools for better and easy understanding. The prominent sources from which data is collected are Global Findex, Garment Worker Diaries, World Bank Report, IMF and various reputed Journals and research papers.

Detailed information on digital financial inclusion during COVID-19

There is limited data on how COVID-19 has impacted digital financial transactions and financial inclusion at large. There are examples, however, of country programs and policies which have been undertaken as a response to COVID-19 and which have already provided valuable insights, and initial data in some cases, on their effectiveness.

Using a case study approach, we analyze several examples of how countries are responding to COVID-19 through a new tool naming digital finance, in some cases providing an opportunity to hasten progress toward larger use and acceptance of digital alternatives. There are also cases where digital finance has proven to be burdensome to maintain in operation during the crisis; for example, where cash-in cash-out points closed in response to lockdowns creating it more burdensome to use digital tools in environments where cash was still needed for food, fuel and other essential transactions. The cases presented here encompass government to person remittances (G2P), merchant remittances, digital wage remittances, and e-commerce. Particular attention is paid to reaching vulnerable populations counting women, the elderly and rural consumers.

➢ Government to person remittances (G2P)

Across the world and India is no exception, most people who receive government remittances report receiving them digitally, though cash remittances predominate in some low-income countries. Research shows that development comforts often follow when governments use digital channels rather than cash. Digital government remittances can reduce corruption because they are less prone to theft.

INDIA

In India, when a state government digitized social security remittances, the government saved closely $40 million annually; theft of funds went down; people spent less time collecting remittances; and recipients got more money because less was being leaked away. Cash is easy to spend—but digital remittances can be easy to save.

AFGHANISTAN

In Afghanistan, workers who automatically deposited part of their salary into a mobile savings account had higher savings and financial security than workers who acquired a mobile savings account but did not sign up for automatic deposits. For women, digital remittances made directly into accounts can improve financial control and strengthen economic empowerment, counting labour force participation.

However, Government remittances are not without challenges. They are most effective when made in a financial ecosystem characterized by strong infrastructure, counting reliable mobile meshwork coverage. When digital remittances are widely accepted at local retailers, people are more likely to transact with their accounts, rather than withdraw all their comforts in cash. And digital remittances products must be easy to use for recipients.

Different measures allowing escalating the total number of access points available have also been put in place. In contexts when G2P delivery heavily relied on cash-out points (Ecuador) efforts were made by the banking sector to expand the agent meshwork. Internal eligibility requirements for existing agents who earlier did not offer cash-out services were adjusted by banks so that they could provide cash-out services. Furthermore, there were many countries that declared remittances services providers (RSPs) and agents of such institutions as essential services providers and allowed them to continue to provide remittances services during the pandemic. Governments in both send and receive countries moved to declare RSPs, mobile money operators and their partner's essential services to keep remittances flowing as the pandemic took hold.

The UK, Mexico, India and the Philippines were early movers in this regard while most countries across the G20 (counting Russia, Argentina, Switzerland, Germany and India) permitted remittance service providers to remain open without explicit essential service declarations. Developing countries (counting Rwanda, Pakistan and Vietnam) soon followed, urged on by international call-to actions advocating for the same.

Adults who used digital remittances for the first time during the pandemic
The COVID-19 pandemic accompanied in a number of first-time digital payment users. A 2020 survey conducted for Global Findex - only in Argentina and Mexico - asked detailed questions about how adults collect government social benefits transfers, receive wages, or make utility bill remittances. Among adults in Argentina who got government transfers or public sector pensions through electronic mode in the past year, closely half of recipients—or 10 percent of all adults — acquired them digitally for the first time during the pandemic. At the same time, closely a quarter of all digital wage recipients were digital newcomers; in Mexico, the share was closely a fifth. These two economies also saw an expansion of digital utility bill remittances. In Argentina as well as Mexico, about 1 in 10 adults—or half of utility bill payers—communicated paying their bills digitally for the first time.

In Brazil, COVID-related government remittances for low-income informal workers were made through the state-owned bank Caixa Economica Federal (CEF) into fully digital accounts. Sometimes referred as "corona vouchers", but officially named "Auxilio Emergencial" (Emergency Aid), these remittances were sent to an estimated 68.3 million people through the COVID-19 emergency in 2020.

The economic impact of COVID-19 rapidly expanded the need for government relief, but in countries with a large informal sector, recognizing households that qualify for benefits and delivering the remittances poses a huge challenge. In Colombia, the government instituted several imaginative policies to reach people in need, counting a program targeted to informal workers – Ingreso Solidario (Solidarity Income) and a VAT compensation payment for the poorest citizens. By mid-May 2020, just a few months after the effects of COVID-19 were originally felt; the Ingreso Solidario program had reached 1.6 million families through more than 20 financial institutions. By mid-2021, more than 3 million households have been reached through the program. Accomplishing to digital financial inclusion and focusing on beneficiary needs were two fundamental principles for COVID-19 relief in Colombia and it took unprecedented collaboration across government and with the financial services providers (FSPs) by:

• Utilizing data from across public and private sectors to recognize citizens in need of support and reach them through mobile phones.

• Expanding the range of financial services providers who could deliver government transfers: Only ten banks were previously authorized to make G2P remittances, but the Treasury enabled other players to participate in Ingreso Solidario, counting national mobile meshwork operators which could create mobile wallets specifically for the program.

• Utilizing the low-value payment infrastructure and extensive last-mile agent meshwork.

• Providing non-digital alternatives where needed.

Colombia's response to COVID-19 did escalate the uptake of digital financial services. For example, research on households that were receiving the VAT compensation found that while only about one-third of households studied acquired their first payment in a mobile money account in April 2020, this share jumped to closely 60 percent in May and was 75 percent by November 2020.

There are also potential drawbacks to the rapid expansion of benefits using digital remittances during a pandemic. Limited familiarity with mobile wallets and digital remittances created barriers to use for new customers. Limited connectivity in some parts of the country also minimised consumer satisfaction with digital financial products. People who acquired the remittances through mobile money were twice as likely as those using cash to report delays or burdensome with the remittances.

In Jordan, the government appointed the National Aid Fund (NAF) and the Social Security Corporation (SSC) to distribute emergency aid to protect vulnerable households from the economic turmoil caused by the COVID-19 pandemic. The funds were transferred to recipients' mobile wallets and bank accounts. More than 250,000 beneficiaries acquired aid from NAF and more than 12,000 beneficiaries acquired aid from SSC, both, through mobile wallets.

Digitized government remittances to the elderly (Kenya and the UK) Providing support to the elderly during COVID-19 poses challenges due to their escalated risk of contracting the virus and their relative lack of digital skills. As a GSMA study from before COVID-19 noted, "In general, elderly people and those with less education have a harder time using smart phones and electronic devices, such as PCs and tablets. The issue is more problematic for people with visual and cognitive impairments.

For countries which had already established benefit programs for their elderly populations which paid directly to bank accounts, extending support during the COVID-19 emergency has been rapid and dependable. Following Table below provides a few examples of COVID-19 responses using cash transfer programs which have involved elderly populations, based on data collected by the World Bank. Most of these programs have been one-off remittances, often to complement existing support remittances (pensions or other benefits for people with low income).

Table : Examples of Cash Transfer Programs for COVID-19 Relief that Target / Encompass Elderly						
Country	Program name	Amount ($US)	Frequency	Digital channel	Digital payment type	Other
Bolivia	Bono Canasta Familiar	58	One time	Yes	Deposit to bank account	
India	National Social Assistance(NSAP)	13	One time	Yes	Deposit to bank account	
Jamaica	CARE Compassionate Grant	70	One time	Yes	Deposit to bank account	40% chose to receive the benefit in cash at remittance office
Suriname	General Age-Old Provision (AOV) escalate	16	Monthly	NA	NA	Top up pension for

Kenya provides a distinctive example of the power that can come from harnessing digital platforms during a time of crisis. Private sector firms and non-profit organizations created Shikilia to raise money and advocate for monthly cash transfers for low-income households in Kenya to offset the impact of COVID-19. Working in collaboration with Give Directly, a non profit organization that links online donors (counting individual donors) with people in need, Shikilia sends monthly benefits to low-income households, many of which have lost income during COVID-19, using mobile money. One of the noteworthy aspects of the Shikilia initiative is the analysis of geospatial, demographic and telecommunications data to recognize communities at greatest risk and target them for support.

But there are limits to the ability to leverage digital remittances for the elderly, even in high income economies. In the U.K. elderly residents were not able to comfortably switch from using cash to digital channels when COVID-19 lockdowns began. This is due to lack of digital skills, a lifetime of reliance on cash, and low digital access – one-third of the population age 70 or above lives in a household without internet. Stringent lockdowns meant minimised access to ATMs and in some places a under supply of cash in machines and stores. In 2020, the UK Government launched a "Call for Evidence on Access to Cash" to better understand the current and future place of cash in the economy, given that more than 50 percent of UK remittances were already handled electronically pre-COVID.

For the elderly and other residents unable to quickly shift to digital remittances, there are efforts underway to help smooth the transition. The Community Access to Cash Pilots (CACP) is working to support communities in the UK where access to cash may be challenging as branches close and movement is restricted due to COVID-19. A CACP spokesperson describes the organization's objectives as follows: "Our aim is to keep cash viable and also to give people choice. Some solutions might be to help give people confidence creating digital remittances through support or training by a trusted provider.

➢ **Digital Merchant Remittances during COVID-19:**
New Data from the Global Findex Digital remittances have a range of potential benefits for merchants as well as their customers. Digital remittances are safer alternatives for cash collecting merchants who are more vulnerable to theft in their stores and on the streets. In Kenya, for example, a study found that adoption of

mobile money by businesses minimised incidence of theft, boosted productivity, and sped up transactions between businesses and their suppliers (Beck and others 2017). Another benefit encompasses helping women entrepreneurs gain control over their money. A study in Uganda compared the effects of giving women microloans using cash versus mobile money. The mobile money group landed higher profits, and the strongest impacts were observed among women who previously had high family pressure on their finances. The flexibility afforded by digital remittances might also make it easier for firms to adapt to disruptions. For example, a study found that firms with a digital presence have been more resilient during the pandemic, possibly because online remittances have allowed them to do businesses amid lockdowns and social distancing.

But digital remittances also pose challenges for businesses. A survey of micro-merchants across India suggested that most merchants and their customers viewed cash as more convenient and reliable than digital channels; reasons encompass unreliable electricity, slow internet, and burdensomeness using point-of-sale terminals. Some merchants said that they tried adopting digital remittances but later reverted to cash because demand was limited and the challenges outweighed any benefits. Such issues are common in developing countries.

New Global Findex data on merchant remittances
In the calendar year 2020, the Global Findex survey asked adults if they used a card, mobile phone, or the internet to pay for an online purchase or to make a purchase in a store in the past year, and whether they made digital remittances for the first time during the COVID-19 pandemic. The data presented here draws from nationally representative surveys of more than 40,000 adults in 14 economies in Latin America and Caribbean (LAC) and 25 economies in Europe and Central Asia (ECA).

Use of digital merchant remittances varies across regions.
If an adult communicated in the survey that they did use a card, mobile phone, or the internet to make an online or in-person store purchase in the past year, we consider that person to make digital merchant remittances. According to this definition, at least half or more adults in most ECA economies make digital merchant remittances, with higher numbers found in Croatia and the Russian Federation, and lower numbers in parts of the Balkans and Central Asia. Use of digital merchant remittances varies more widely in LAC economies; they were relatively uncommon in Bolivia, El Salvador, and Nicaragua, while more than a third of adults use them in Argentina, Costa Rica, Peru, and Mexico. About half of adults make digital merchant remittances in Brazil, as do closely 70 percent in Venezuela.

Men and wealthy people more likely to use merchant remittances
In most of the economies surveyed, men are significantly more likely than women to report using digital merchant remittances. In Turkey, for example, use of digital merchant remittances is 14 percentage points higher among men than women, and in Mexico, men are closely twice as likely as women to make such remittances. Georgia is among the rare economies with no such gender gap.

There is also evidence of an income gap, with adults in the richest 60 percent of households using digital merchant remittances more often than those in the poorest 40 percent of households. In Colombia, Mexico, and Peru, about a fifth of poorer adults use digital merchant remittances; the share is two or three times higher among wealthier adults. Income gaps in ECA are pronounced but not as extreme. In Georgia, for example, 41 percent of poorer adults use digital merchant remittances, as do two-thirds of wealthier adults.

Figure: Gender gaps in use of digital merchant remittances
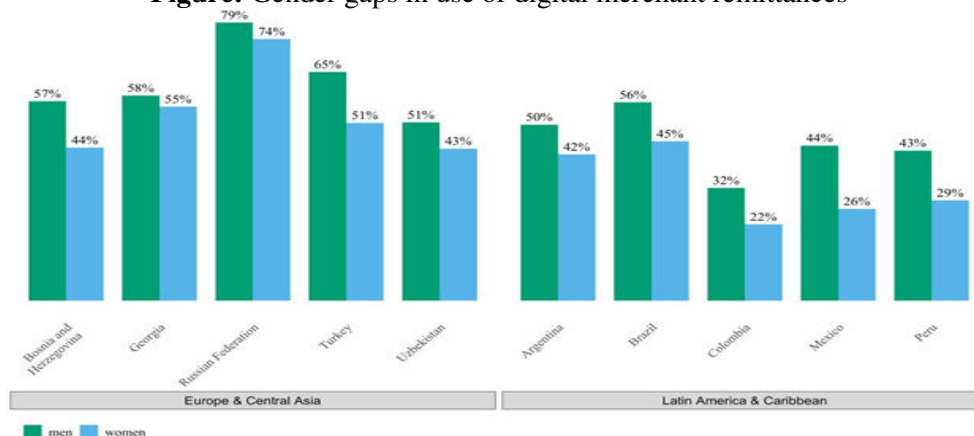
Source: Global Findex database.

While digitization has taken off during the pandemic, cash still dominates merchant remittances globally. And it is far from clear that people who adopted digital remittances during COVID-19 will keep using them when the pandemic subsides. The best way to escalate use of digital remittances is to make them more convenient and affordable than cash. That means providing reliable remittances infrastructure—counting electricity and mobile connectivity—ensuring good product design and minimizing fees that might deter adoption.

For now, cash pursues to appeal to merchants and customers—but people are clearly open to digital options. The Global Findex survey asked respondents if they had a choice of how to make purchases in stores, would they prefer to use a card or mobile phone or would they prefer to only use cash. On average, in economies for which data are available, customers were equally split between the two options.

➢ Digitizing wages during COVID-19

Digital wages have a number of advantages over cash. Cash can be vulnerable to theft and may be easy to spend or give away. Digital wages are more dependable, and they help users build savings because people tend to let the balances sit in their accounts. As part of an experiment conducted in 18 villages in eastern India, for example, researchers gave identical weekly remittances to people in cash or accounts, and those who used accounts built significantly higher savings. In *Afghanistan*, a study of 949 mostly male employees at a mobile meshwork operator found that those who automatically deposited part of their salary into a mobile savings account had higher savings and financial security than workers who acquired a mobile savings account but did not set up automatic wage remittances. And in *Bangladesh*, factory workers in greater Dhaka who took up digital wages as part of a field experiment accumulated higher savings, escalated their ability to manage economic risks, and developed financial capability over time.

Digital wage remittances are also an effective way to escalate ownership of formal financial services. Among adults globally who have an account, savagely 80 million opened their first account to collect public sector wage remittances, and another 200 million opened their first account to receive wage remittances from a private sector employer, according to the Global Findex. Most people who earn wages get paid digitally, according to the Global Findex. Worldwide, about 1 in 3 adults report that they acquired wages in the past year, with about 62 percent of these wage recipients using a financial institution account to collect wages, and half as many receiving them in cash only.

Through the pandemic, inclusive fin techs have been critical to supporting this lower-income and often-overlooked population, continuing to provide their products and services safely and digitally. In the *United Arab Emirates (UAE),* NOW Money provides an example of a fin tech firm that has contributed to financial inclusion by providing a digital payroll and payment solution for migrant workers, many of whom were unbanked and in need of an efficient way to remit funds to their families. NOW Money has helped tens of thousands of workers gain access to a formal financial account since its founding in 2016.

Digitization of Garment Industry Wages during COVID-19

The ready-made garment industry is critical for Bangladesh's economy. It is an important source of formal jobs, employing savagely 4 million people, of whom about 80 percent are women. Between 2003 and 2015, the country's exports grew by 16 percent annually, driven overwhelmingly by the garment industry; at the end of that period, the export share of GDP had tripled, magnifying a solid run of economic growth in the country (World Bank Group 2017).

The COVID-19 pandemic negatively impacted the garment industry. When the virus arrived in 2020, many companies cancelled export orders from Bangladesh, resulting in billions of dollars in lost revenue. Some factories which had completed orders had to wait longer than usual to receive payment following the start of the pandemic. Amid outcry from civil society, some brands paid up, but some buyers have not compensated their suppliers, resulting in factory closures and supply chain disruptions. A survey of garment workers in Bangladesh and other paramount exporting countries found that many were grappling with hunger and turning to informal loans following the collapse of formal employment during the pandemic.

Bangladesh's government moved to support factories and workers as the pandemic's economic fallout took hold. In late March 2020, the finance ministry rolled out a stimulus package worth closely US $600 million. The funds were earmarked to support four million workers, with remittances to be distributed by commercial banks using mobile money accounts 19 and bank accounts. The government also moved to provide support to five million needy households (not necessarily connected to the garment industry) via mobile money (IMF 2021). At the same time, the finance ministry provided factories with subsidies to cover interest remittances on working capital loans and introduced a stimulus for micro entrepreneurs. The central bank enacted various emergency

measures, such as waiving credit card fees, suspending interest remittances on loans, and delaying classification of nonperforming loans (IMF 2021).

Figure: Bangladesh Garment Worker Salaries
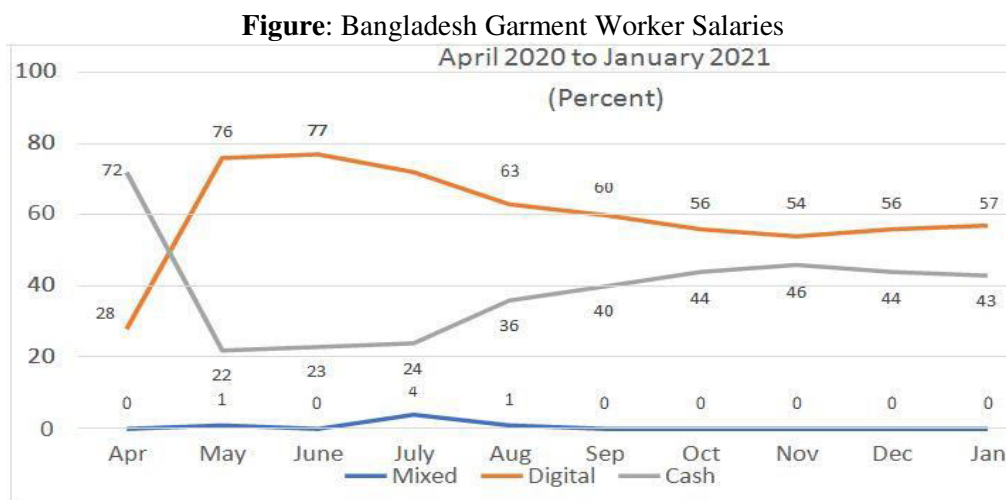
Source: Microfinance Opportunities Garment Worker Diaries, January 2021 update.

The overwhelming paramount of workers communicated that they preferred to withdraw their entire salaries instantly. Few workers communicated burdensome transacting: 95 percent were able to withdraw their salary on their first attempt, and closely 80 percent communicated waiting in line for less than ten minutes. The preference for cashing out salaries reflects the fact that factory workers overwhelmingly transact in cash.

Person-to-person remittance transfers are the most common type of digital transaction. Many people who work in urban garment factories migrated from rural areas and send money to their families back home. Studies have found that using digital remittances for these domestic remittances can have important development benefits. In Bangladesh, researchers did a field experiment with 815 households that encompassed training in how to use mobile money services and assistance with opening accounts. They found that when urban migrants took up mobile money, their remittance volumes to rural areas escalated by 26 percent; consumption rose in rural areas by more than 7 percent; extreme poverty trickled; and remittance-receiving households escalated savings and consumption and minimised their reliance on borrowing. The Garment Worker Diaries show that during the first summer of the pandemic, closely half of domestic remittance transfers were sent digitally. But the use of digital transactions varied by how workers were paid, with women who acquired their salaries digitally being far more likely to use digital transfers than those who were paid in cash.

Circumstance is key to building financial capability and confidence with digital remittances, according to a recent study of factory workers in Bangladesh. Researchers did a field experiment with more than 3,000 workers in two garment factories in greater Dhaka to move employees from receiving wages in cash to receiving them digitally. The results show that over time, workers enrolled in digital wage remittances conducted fewer transactions with the help of bank agents and carried out more transactions on their own. Compared to workers who acquired an account but were not enrolled in digital wages, the workers who acquired digital wages were 24 percentage points more likely to make a send-money transaction and 60 percentage points more likely to make a withdrawal from their account without receiving assistance. The workers also learned how to dodge illicit fees from banking merchants, built their savings, and escalated their resilience to financial shocks. Overall, the findings suggest that the circumstance of receiving digital wage remittances helped these workers build their financial capability.

The garment worker diaries collected by Microfinance Opportunities also speak to the importance of circumstance. They suggest that workers who had circumstance using accounts and digital transactions prior to the pandemic were better able to manage the economic fallout and bounced back more quickly than those who were in circumstanced. For example, circumstanced users were slightly less likely to be food in dependable and were more likely to withdraw money from a digital account when they were experiencing food insecurity, which suggests that they were using savings to main consumption levels—an example of financial resilience.

Table: Examples of new and niche platforms

COUNTRY	PLATFORM	MAIN FOCUS	PAYMENT METHODS	CREDIT	COVID-19 RESPONSE
Kenya	Twiga Foods	Agriculture (business to business)	Mobile money	Digital credit (piloted with IBM Research)	Launched business-to-consumer solution in partnership with Jumia
Kenya	Sendy	Transport, deliveries, logistics (business to business)	Mobile money	-	Launched grocery deliveries in partnership with stores and supermarkets
Nigeria	FarmCrowdy	Agriculture	Cash on delivery, mobile money	Linked to crowd-funding platform CrowdInvest	Increased demand to participate in the platform. Had to discontinue mobile payments due to disruption in agency network
Kenya/ Nigeria	Flutterwave	Payments	Online payments	-	Launched Flutterwave Market to help MSMEs digitize their business
Uganda	SafeBoda	Motorbike taxis	Prepaid e-wallet, cash on delivery	Loan for motorbike purchases in partnership with Finca Uganda	Launched grocery and restaurant deliveries via motorbike taxi fleet
Ethiopia	Helloomarket	General merchandise	Mobile money, cash on delivery, deposits at agents or bank branches	Plans to partner with banks for credit product	Increased interest from vendors and sale of essential items
Brazil	Compre Local	Local grocery stores and restaurants	Payment link via SMS and WhatsApp	-	Started to support local businesses affected by the lockdown

Source: Totolo, Baijal and Dean, 2020.

Opportunities and risks of digital financing:
COVID-19 has created an environment for accelerating digital financial inclusion in markets around the world, led by a rapid expansion in digital remittances to keep economies functioning while mobility is restricted. Taken together, a well-functioning digital finance ecosystem can escalate competition in financial services and help to reduce costs and improve quality and convenience for consumers. However, there are also risks to a rapid expansion of digital financial inclusion, especially for consumers who have not previously used formal finance or who have limited digital access, skills and circumstance. Uptake of digital financial products and services may also be slowed by economy-wide factors from inadequate technological infrastructure to high levels of informality which reduce the demand for digital – and more transparent – financial transactions.

- **Leverage Government-to-Person (G2P) remittances:** More than 100 countries have announced plans to scale up social assistance remittances to mitigate the economic impact from COVID-19. Combined with a need to minimize movement to reduce contagion, digital government remittances (G2P) have rapidly expanded worldwide. Ensuring that this expansion marshals to sustainable gains in digital financial inclusion requires attention to account design, involvement of a wider array of private sector partners and incentives that help to strengthen the digital ecosystem and escalate use of digital remittances, savings and other services rather than simply withdrawing cash.

- **Prioritize infrastructure and connectivity:** Growth of digital remittances and digital finance is linked to infrastructure, counting reliable electricity, mobile phone penetration and internet connectivity. While beyond the scope of the financial sector, infrastructure problems can make digital remittances less effective and these needs to be taken into account when solutions are deployed, whether by government or the private sector. In particular, strategies designed specifically for rural and remote communities may need to be developed to account for infrastructure gaps. This encompasses designing products that work on feature phones and creating an ecosystem which accounts for gaps in connectivity. In the medium to long term, the ability to conduct financial, commercial and government transactions remotely, supported through digital finance, provides further justification for investments in infrastructure.

- **Encourage interoperability to make digital remittances more convenient:** In some contexts, interoperability between agents facilitates choice for recipients of social protection remittances and helps the agent to obtain liquid resources – but this is not consistantly the case. Particularly in remote locations, interoperability may overwhelm agents, as these are areas where the digital remittances acceptance meshwork is less developed, and there is under supply of other cash-out points, such as ATMs and branches. Hence, interoperability needs to be paired with many other measures to work, counting: data-based tools to recognize areas where agents may be overwhelmed by liquidity requirements from customers and social protection remittances' recipients; a sustainable business model for agents funding cash withdrawals with their own resources or through external resources such as credit; tiered agent arrangements that monitor 24

and provide cash facilities to agents; a strong digital remittances acceptance meshwork, as well as convenient ways for consumers to use such means; and a thorough liquidity planning capacity in the context of delivery of large volume remittances, such as G2P remittances.

- Focus on the customer circumstance with particular attention to women and other underserved and vulnerable populations (elderly, low-income, rural).

- Promote responsible finance by building financial capability and enforcing financial consumer protection.

KEY FINDINGS

o A basic measure of financial inclusion is the share of adults in a country who have an account at a formal financial institution or through a mobile money provider.

o It is widely understood that the pandemic's impacts have been uneven across populations and disparities in financial access make it harder for vulnerable and excluded groups to recover from the crisis.

o Bridging these gaps requires better access to technology, capacity building and intentionality, which can involve leveraging other parts of the digital finance ecosystem, such as government-to-person (G2P) remittances, to hasten uptake and support usage. In fact, digital remittances, counting government remittances—which have been expanded in many countries as a response to COVID-19—have historically been an important driver of financial inclusion.

o A World Bank tally of policy responses to the pandemic finds that at least 58 governments in developing countries have used digital remittances to deliver COVID-19 relief.

o Over the course of the pandemic, governments have rushed to provide financial assistance to citizens, creating opportunities and challenges for expanding financial inclusion.

o The private sector also shifted to digital remittances and digital finance during COVID-19.

o International remittances proved resilient in the pandemic's first year.

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Critical Analysis of Financial Model – With Special Reference to a Start-Up Entity

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ABSTRACT

Through this study we are going to access the financial model of a start-up which is in its early stages and also check the overall viability of the model. In order to check the viability of the model with respect to the business case study of a start-up - Infobucket is taken. Through this case study various financial aspects are highlighted leading to a conclusion regarding feasibility of the business and the model itself. The research has also paved a way in understanding various aspects from creation of the model till its overall utility for a particular business, and for other businesses in general. Finally, it explains how important it is to create a financial model for every business which seeks investments or partnerships for its growth and the difference created by the same. Further, if the systematic approach is adopted since beginning, it helps the business to track the performance over the period and also supports the decision-making process.

Keywords: Financial Model Financial statements Info-bucket

INTRODUCTION

Over the time as the business have evolved and witness great advancements. As the business systems have moved to virtual space and now online it has facilitated various stakeholders among the corporate space, one these came in the domain of financial tools which are helpful for estimation, calculation, forecasting, disclosure, etc.

The digital overhaul in the recent years in various domains of business and management has led to effective efficiency and increased transparency towards its stakeholders. The innovations and developments in the functioning of the business and improved transparency has created more compliance requirements but the same is less cumbersome due to its digital nature, ease to present and deliver.

The Financial model is an advance tool that displays forecast, financial statements and its analysis, cash flows and various other financial data. Which basically displays summary of a company's performance over a period and forecast of future financial performance based on a decision or variables considered. Financial modeling is the process of creation of financial model. It is the represents company's operation and performance of past, present and future in quantitative terms. Financial modeling is helpful in valuation of the company, for industry comparison and for assessing overall operational capacity of the company.

A Financial model is a systematic and organized representation of company's data. It is based on certain assumptions and principals laid down as per the applicable financial reporting framework. A Financial model is crucial in understanding the business in and out especially from a potential investors point of view since as lucrative the idea behind a business is but in practical terms how that idea can be sowed, nurtured and grown into a fully functioning business entity and what support it will receive or it should ideally receive basically the financial road map to the goal of the business both short term as well as long term can be formulated through the financial model of that business.

In context to the current study the financial model of Infobucket technoplex LLP company will showcase the company's financial position, profitability and liquidity until the current period as well as for next 3 years. This will be an important tool for overall assessment of the company, especially for the potential investors as well as the stakeholders since they will get complete disclosure of company's activities which will enable them to form an opinion about the investment in the company.

The accuracy of the financial model is subjective to current position of the company, its external environment and the skill of the one who creates it. Even though the financial model is not truly perfect or accurate in quantitative terms yet it is very much valued and given importance since it answers to various qualitative questions with respective of company's position in five years, its growth, its overall potential to generate revenue, its market position, its ability to survive, its budget for various expenses basically its spending capacity, its cash flow, liquidity and its liquidity preference, its risk appetite and its nature towards risk taking, its ability to generate returns, its capital structure, its ability for cost cutting and increasing profit margin and finally its ability to reinvest.

LITERATURE REVIEW

➢ Zichun Yan & Kai Wang (2018), the main objective of the study is to study financing for internet-based start-ups. It also studies crowd funding to explore the effects of entrepreneur's background subject to uncertainty of entrepreneur's external environment in his country. The method used for research is data mining. From the research it is clear that the start-ups should use funding methods like crowd funding since it has proven convenient and successful also entrepreneur's background positively impacts on crowd funding.

➢ Jitendra Gaur & Kumkum Bharti (2021), the primary objective of the research is to identify various obstacles in operating of a start-up and focus on solutions to those obstacles. The research is carried out using fuzzy analytic hierarchy and fuzzy TOPSIS method. The study found four major obstacles with multiple components of each and also suggested various solutions for the same in detail.

➢ Ravi Thodla & Seeboli Ghosh Kundu (2017), the primary agenda of the research was to study equity crowd funding as a feasible option for raising pre-seed funding for IT based start-ups. The study focused on the availability of various options for fund raising especially for IT start-ups. It is a conceptual paper which focused on researching equity crowd funding and has used co-relation and regression analysis method.

➢ Zoran Lukić (2017), through his research the author has elaborated uses of financial model, along with stages of financial model, this is a conceptual article that also identified various assumptions that a financial model needs to make while building a financial model. The article also exhibits challenges of a good financial model construction.

OBJECTIVES FOR STUDY

✓ To understand various investment or financing options available in India where start-ups are concerned.

✓ To understand significance of making a good financial model.

✓ To study significance of good financial model and to gauge how a good financial model can be made.

NEED FOR STUDY

To understand how a sound financial model can be created, the components of a financial model, importance of financial model for funding of start-ups, things to take while preparing financial model i.e. dos & don'ts for creating financial model and to get an overview of start-up eco space in India.

FRAMEWORK

✓ Dos	✖ Don'ts
✓ Standardised Format	✖ Not as per applicable laws
✓ As per Financial reporting framework	✖ Not well defined & lack of disclosures
✓ Clarity, additional information & or disclosures if any	✖ There is a mismatch in actual & presented figures
✓ Precise and well defined	✖ Lack of standard flow

➢ **Financial Model:** Financial model is an advance tool that displays forecast, financial statements and its analysis, cash flows and various other financial data. A Financial model is a systematic and organized representation of company's data. It is based on certain assumptions and principals laid down as per the applicable financial reporting framework.

➢ **Financial statements:** Financial statements are records containing financial data of an entity which represents the overall performance and the position of a business, in a given period of time. Financial statements include income statement, balance sheet and cash flow statement. The income statement indicates profit or during the year, the balance shows the current position of the company and cash flow portrays the flow of cash from various activities.

➢ **Infobucket:** A start-up which primarily focuses on providing solutions to the educational institutions and students by bridging the gap between the two by means of providing a solid technology platform. Infobucket Technoplex LLP is a start-up founded by Omkar Kanerkar, currently incubatee with COEI. Infobucket is based on subscription-based model, the colleges and institutes can subscribe to the app. The main idea of this app is to connect teachers and management to students directly in the most sophisticated way possible, at the same time reducing all the confusion and stress caused by miscommunication or lack of communication

between teachers, management and students and streamlining it into a smooth and hassle-free process for all the parties involved.

CASE STUDY
Components of financial model
The financial model gives a complete financial aspect of business in the current scenario based on the past performance if any, as well as the future prospect. The financial model consists of various financial statements which are prepared as per the applicable financial reporting framework. The components of financial model are as follows:

➢ **Assumptions:** The financial model starts with assumptions which are fundamental to the whole model, since these assumptions propel the whole financial analysis and helps to formulate for the creator as well as understand to the reader.

➢ **Revenue Model:** The revenue model showcases historical revenue if any and projected revenue for next few years.

➢ **Operating Expenses:** The operating expense statement consists of actual operating expenses incurred during previous year, current year, if any and estimation for future years.

➢ **Capital expenditure:** Capital expenditure that is being incurred for starting of the business and yet be incurred in future years is included in capital expenditure statement.

➢ **Income statement:** Income statement shows profit or loss for the previous year & current year if any and projection of the same for future years.

➢ **Balance sheet:** Based on the statements created earlier and with additional information balance sheet is created for these years. It shows the position of business in a particular year.

➢ **Cash flow statement:** Cash flow statement is created to understand the clarity regarding the flow of cash in a business for a given period. Based on the earlier created statements cash is created.

Financial Model of Infobucket

Operating Expenses Statement

Operating Expenses of Infobucket LLP

Year	2022	2023	2024
Direct Cost:			
App Development	₹ 8,00,000.00	₹ 9,60,000.00	₹ 11,52,000.00
Website & Domain	₹ 1,50,000.00	₹ 1,80,000.00	₹ 2,16,000.00
Anti-virus software	₹ 6,500.00	₹ 7,800.00	₹ 9,360.00
Ms Suite (2 Unit)	₹ 1,500.00	₹ 1,500.00	₹ 1,500.00
Total Direct Cost(per year)	₹ 9,58,000.00	₹ 11,49,300.00	₹ 13,78,860.00
Total Direct Cost(per month)	₹ 79,833.33	₹ 95,775.00	₹ 1,14,905.00
Administration Costs:			
IT Interns -	₹ 2,88,000.00	₹ 3,60,000.00	₹ 4,50,000.00
Marketing Interns - 2 (₹ 10,000 each)	₹ 2,40,000.00	₹ 3,00,000.00	₹ 3,75,000.00
Brand Development Interns - 2 (₹ 10,000 ea	₹ 2,40,000.00	₹ 3,00,000.00	₹ 3,75,000.00
Rent	₹ 84,000.00	₹ 1,05,000.00	₹ 1,31,250.00
Security Deposit (Refundable)	₹ 5,000.00	₹ 5,000.00	₹ 5,000.00
Marketing & advertisement	₹ 6,00,000.00	₹ 12,00,000.00	₹ 24,00,000.00
Printing & stationary	₹ 10,000.00	₹ 12,500.00	₹ 15,625.00
Registration Fees	₹ 10,000.00	₹ -	₹ -
Logo Registrations Fees	₹ 15,000.00	₹ -	₹ -
Legal Advisor's Fees	₹ 30,000.00	₹ -	₹ -
Depreciation	₹ 3,500.00	₹ 3,962.50	₹ 5,295.94
Total Administration cost (per year)	₹ 15,25,500.00	₹ 22,86,462.50	₹ 37,57,170.94
Total Administration cost (per month)	₹ 1,27,125.00	₹ 1,90,538.54	₹ 3,13,097.58
Total Operating Expenses (yearly)	₹ 24,83,500.00	₹ 34,35,762.50	₹ 51,36,030.94
Total Operating Expenses (monthly)	₹ 2,06,958.33	₹ 2,86,313.54	₹ 4,28,002.58

Capital Expenditure of Infobucket LLP

Capital Expenditure	Useful Life(Years)	2022	2023	2024
Capital Exp				
Desktop		₹ 1,00,000.00	₹ 1,22,500.00	₹ 1,69,437.50
Other hardware		₹ 10,000.00	₹ 9,000.00	₹ 10,600.00
Total Capex		₹ 1,10,000.00	₹ 1,31,500.00	₹ 1,80,037.50
Depreciation				
Desktop	10	₹ 2,500.00	₹ 3,062.50	4,235.94
Other hardware	5	₹ 1,000.00	₹ 900.00	1,060.00
Total Depreciation		₹ 3,500.00	₹ 3,962.50	₹ 5,295.94

Capital Expenditure Statement

Income Statement

Income Statement Model of Infobucket LLP

Years	2022	2023	2024
Revenue	₹ 2,281,000.00	₹ 8,601,000.00	₹ 13,499,000.00
Growth(%)		277%	57%
Total Operating Expenses	₹ 2,483,500.00	₹ 3,435,762.50	₹ 5,136,030.94
EBITDA	₹ -202,500.00	₹ 5,165,237.50	₹ 8,362,969.06
Depreciation and Amortisation	₹ 3,500.00	₹ 3,962.50	₹ 5,295.94
EBIT	₹ -206,000.00	₹ 5,161,275.00	₹ 8,357,673.13
Interest Payment	0	0	0
EBT	₹ -206,000.00	₹ 5,161,275.00	₹ 8,357,673.13
Tax Rate(%)	₹ -	₹ 2,064,510.00	₹ 3,343,069.25
Net Income	₹ -206,000.00	₹ 3,096,765.00	₹ 5,014,603.88

Cash flow statement

Cash Flow statement of Infobucket LLP

Particulars	2022	2023	2024
A. CF from operating activities			
Net profit	₹ -206,000.00	₹ 3,096,765.00	₹ 5,014,603.88
(+) Non cash items			
Depreciation	₹ 3,500.00	₹ 3,962.50	₹ 5,295.94
(-)Gain on sale of long term investment			
(+)Loss on sale of machinery	₹ 3,500.00		
CF from operating activities (A)	₹ -199,000.00	₹ 3,100,727.50	₹ 5,019,899.81
CF from investing activities			
Invested in short term securities	₹ -		
Long term investment sold	₹ -		
Machinery purchased during the year	₹ -110,000.00	₹ -25,000.00	₹ -50,000.00
part of machinery sold	₹ -	₹ -	₹ -
CF from investing activities (B)	₹ -110,000.00	₹ -25,000.00	₹ -50,000.00
CF from financing activities			
Increase in secured loan	₹ -		
Increase in share capital	₹ 500,000.00	₹ -	₹ -
CF from financing activities ©	₹ 500,000.00	₹ -	₹ -
CF generated during the year (A+B+C)	₹ 191,000.00	₹ 3,075,727.50	₹ 4,969,899.81
Opening C/B balance	₹ -	₹ 191,000.00	₹ 3,266,727.50
Closing C/B balance	₹ 191,000.00	₹ 3,266,727.50	₹ 8,236,627.31

FINDINGS

As per the study a sound financial model is one which reflects the business in financial terms and has proper explanations wherever necessary as well as it is prepared in accordance with applicable financial reporting framework.
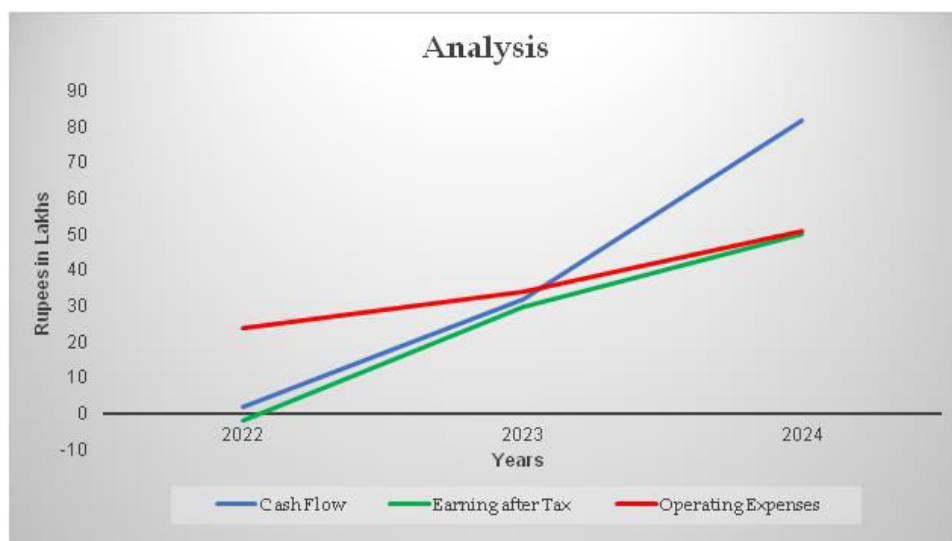
The above chart indicates cash flow over the years. There is a steady growth of cash flow throughout the years which indicating that the company is cash rich, has healthy cash balance and has great growth potential.

Also, the income statement of Infobucket LLP indicates growth followed by stability which is generally the scenario for new businesses. Hence it proves the feasibility of the financial model and makes it highly practical in the given case.

Also, the financial model of Infobucket LLP shows that the start-up has a great potential, has strong business model and can grow soundly over the period given the right opportunity of investment.

CONCLUSION

A financial model which showcases the true vision of the business in the most practical and systematic way possible. It also highlights the need of strong business model which would be either a unique in its own or it should provide a unique outlook in order to create an impact as business. Also, the focus on problem solving has garnered various new solutions and successful new businesses. These developments have come up in light with the entrepreneurs exploiting every opportunity they got and fully utilizing the market potential.

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Annexure

Assumptions

ASSUMPTIONS

Price: (per Subscription)	Amount Rs.
Monthly Plan	₹ 4,000.00
Quarterly Plan	₹ 10,500.00
Annual Plan	₹ 36,000.00
Advertisement revenue annual	₹ 12,00,000.00

Operating Expenses	Rate	Per month	Per annum
Direct Cost:			
App Development			₹ 8,00,000.00
Website & Domain			₹ 1,50,000.00
Anti-virus software			₹ 6,500.00
Ms Suite (2 Unit)			₹ 1,500.00
Administration Costs:			
IT Interns -	2 x 12000 x 12		₹ 2,88,000.00
Marketing Interns - 2 (₹ 10,000 each)	2 x 10000 x 12		₹ 2,40,000.00
Brand Development Interns - 2 (₹ 10,000 each)	2 x 10000 x 12		₹ 2,40,000.00
Rent	7000 x 12	₹ 7,000.00	₹ 84,000.00
Security Deposit (Refundable)		₹ –	₹ 5,000.00
Registration Fees			₹ 10,000.00
Logo Registrations Fees			₹ 15,000.00
Legal Advisor's Fees			₹ 30,000.00
Marketing & advertisement			₹ 6,00,000.00
Printing & stationary			₹ 10,000.00
Total Operating Expenses		₹ 7,000.00	₹ 24,80,000.00

	Notes:
1	This is an financial model of Infobucket LLP.
2	Price of the application package is fixed based on monthly, quarterly and annually per college.
3	The development of the software is done by the hired expert and the total expenses are as above.
4	The maintainance of the software is being done by the hired IT interns and by the founder.
5	The marketing interns would be part of marketing team headed by the founder.
6	The brading team consisting of hired interns would be responsible for logo management, etc.

Revenue model year 1

Revenue Model of Infobucket LLP

Year	2022 (Phase 1)												31.12.22
Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Subscriptions (monthly)	-	-	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	13.00
Subscriptions (quarterly)	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	3.00	3.00	4.00	4.00	26.00
Subscriptions (annual)	-	-	-	1.00	1.00	1.00	2.00	2.00	2.00	3.00	4.00	5.00	21.00
Price (monthly)	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	
Price (quarterly)	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	
Price (annual)	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	
Total Revenue (in Rs.)(monthly)	₹ –	₹ –	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 8,000.00	₹ 8,000.00	₹ 8,000.00	₹ 4,000.00	₹ 4,000.00	₹ 52,000.00
Total Revenue (in Rs.)(quarterly)	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 21,000.00	₹ 21,000.00	₹ 21,000.00	₹ 21,000.00	₹ 21,000.00	₹ 31,500.00	₹ 31,500.00	₹ 42,000.00	₹ 42,000.00	₹ 2,73,000.00
Total Revenue (in Rs.)(annual)	₹ –	₹ –	₹ –	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 72,000.00	₹ 72,000.00	₹ 72,000.00	₹ 1,08,000.00	₹ 1,44,000.00	₹ 1,80,000.00	₹ 7,56,000.00
Advertisement revenue	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 1,00,000.00	₹ 12,00,000.00
Grand Total Revenue (in Rs.)	₹ 1,10,500.00	₹ 1,10,500.00	₹ 1,14,500.00	₹ 1,50,500.00	₹ 1,61,000.00	₹ 1,61,000.00	₹ 1,97,000.00	₹ 2,01,000.00	₹ 2,11,500.00	₹ 2,47,500.00	₹ 2,90,000.00	₹ 3,26,000.00	₹ 22,81,000.00
Total subscriptions	1.00	1.00	2.00	3.00	4.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	60.00

	Notes:
1	The whole revenue model is divided into two Phases, Phase 1 will be initial year and Phase 2 would be subsequent 2 years.
2	Advertisement revenue is estimated Rs. 12,00,000 annually and is being divided equally to avoid complexity and ambiguity, also it is estimated to rise 25% in every subsequent year.

Revenue model year 2

Revenue Model of Infobucket LLP

Year							2023 (Phase 2)						31.12.23
Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Subscriptions (monthly)	2.00	3.00	4.00	5.00	4.00	5.00	6.00	4.00	5.00	5.00	6.00	5.00	54.00
Subscriptions (quarterly)	6.00	7.00	7.00	8.00	9.00	10.00	12.00	14.00	15.00	15.00	17.00	18.00	138.00
Subscriptions (annual)	7.00	8.00	9.00	10.00	12.00	12.00	12.00	15.00	15.00	17.00	17.00	17.00	151.00
Price (monthly)	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00
Price (quarterly)	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00
Price (annual)	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00
Total Revenue (in Rs.)(monthly)	₹ 8,000.00	₹ 12,000.00	₹ 16,000.00	₹ 20,000.00	₹ 16,000.00	₹ 20,000.00	₹ 24,000.00	₹ 16,000.00	₹ 20,000.00	₹ 20,000.00	₹ 24,000.00	₹ 20,000.00	₹ 2,16,000.00
Total Revenue (in Rs.)(quarterly)	₹ 63,000.00	₹ 73,500.00	₹ 73,500.00	₹ 84,000.00	₹ 94,500.00	₹ 1,05,000.00	₹ 1,26,000.00	₹ 1,47,000.00	₹ 1,57,500.00	₹ 1,57,500.00	₹ 1,78,500.00	₹ 1,89,000.00	₹ 14,49,000.00
Total Revenue (in Rs.)(annual)	₹ 2,52,000.00	₹ 2,88,000.00	₹ 3,24,000.00	₹ 3,60,000.00	₹ 4,32,000.00	₹ 4,32,000.00	₹ 4,32,000.00	₹ 5,40,000.00	₹ 5,40,000.00	₹ 6,12,000.00	₹ 6,12,000.00	₹ 6,12,000.00	₹ 54,36,000.00
Advertisement revenue	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 1,25,000.00	₹ 15,00,000.00
Grand Total Revenue (in Rs.)	₹ 4,48,000.00	₹ 4,98,500.00	₹ 5,38,500.00	₹ 5,89,000.00	₹ 6,67,500.00	₹ 6,82,000.00	₹ 7,07,000.00	₹ 8,28,000.00	₹ 8,42,500.00	₹ 9,14,500.00	₹ 9,39,500.00	₹ 9,46,000.00	₹ 86,01,000.00
Total subscriptions	15.00	18.00	20.00	23.00	25.00	27.00	30.00	33.00	35.00	37.00	40.00	40.00	343.00

Revenue model year 2

Revenue Model of Infobucket LLP

Year							2024 (Phase 2)						31.12.24
Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	TOTAL
Subscriptions (monthly)	5.00	6.00	6.00	5.00	5.00	4.00	6.00	5.00	5.00	5.00	5.00	5.00	62.00
Subscriptions (quarterly)	18.00	18.00	18.00	18.00	20.00	20.00	20.00	21.00	21.00	22.00	22.00	22.00	240.00
Subscriptions (annual)	18.00	18.00	18.00	20.00	20.00	21.00	21.00	21.00	22.00	22.00	22.00	23.00	246.00
Price (monthly)	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00	₹ 4,000.00
Price (quarterly)	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00	₹ 10,500.00
Price (annual)	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00	₹ 36,000.00
Total Revenue (in Rs.)(monthly)	₹ 20,000.00	₹ 24,000.00	₹ 24,000.00	₹ 20,000.00	₹ 20,000.00	₹ 16,000.00	₹ 24,000.00	₹ 20,000.00	₹ 20,000.00	₹ 20,000.00	₹ 20,000.00	₹ 20,000.00	₹ 2,48,000.00
Total Revenue (in Rs.)(quarterly)	₹ 1,89,000.00	₹ 1,89,000.00	₹ 1,89,000.00	₹ 1,89,000.00	₹ 2,10,000.00	₹ 2,10,000.00	₹ 2,10,000.00	₹ 2,20,500.00	₹ 2,20,500.00	₹ 2,31,000.00	₹ 2,31,000.00	₹ 2,31,000.00	₹ 25,20,000.00
Total Revenue (in Rs.)(annual)	₹ 6,48,000.00	₹ 6,48,000.00	₹ 6,48,000.00	₹ 7,20,000.00	₹ 7,20,000.00	₹ 7,56,000.00	₹ 7,56,000.00	₹ 7,56,000.00	₹ 7,92,000.00	₹ 7,92,000.00	₹ 7,92,000.00	₹ 8,28,000.00	₹ 88,56,000.00
Advertisement revenue	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 1,56,250.00	₹ 18,75,000.00
Grand Total Revenue (in Rs.)	₹10,13,250.00	₹ 10,17,250.00	₹ 10,17,250.00	₹ 10,85,250.00	₹11,06,250.00	₹11,38,250.00	₹11,46,250.00	₹11,52,750.00	₹11,88,750.00	₹11,99,250.00	₹11,99,250.00	₹ 12,35,250.00	₹ 1,34,99,000.00
Total subscriptions	41.00	42.00	42.00	43.00	45.00	45.00	47.00	47.00	48.00	49.00	49.00	50.00	548.00

Balance sheet

Balance Sheet of Infobucket LLP

Year	2022	2023	2024
ASSETS			
Non-Current Assets			
Fixed Assets	₹ 106,500.00	₹ 131,500.00	₹ 180,037.50
Total Non-Current Assets	₹ 106,500.00	₹ 131,500.00	₹ 180,037.50
Current Assets:			
Cash	₹ 191,000.00	₹ 3,266,727.50	₹ 8,236,627.31
Other current assets	₹ -	₹ 2,263,047.50	₹ 441,008.31
Total Current Assets	₹ 191,000.00	₹ 5,529,775.00	₹ 8,677,635.62
TOTAL ASSETS	₹ 297,500.00	₹ 5,661,275.00	₹ 8,857,673.12
EQUITY & LIABILITIES			
Equity	₹ 500,000.00	₹ 500,000.00	₹ 500,000.00
Retained earnings	₹ -206,000.00	₹ 3,096,765.00	₹ 5,014,603.88
Total Equity	₹ 294,000.00	₹ 3,596,765.00	₹ 5,514,603.88
Non-Current Liabilities:			
Total Non-Current Liabilities	₹ -	₹ -	₹ -
Current Liabilities			
Tax payable	₹ -	₹ 2,064,510.00	₹ 3,343,069.25
Trade payable	₹ 3,500.00	0	0
Total Current Liabilities	₹ 3,500.00	₹ 2,064,510.00	₹ 3,343,069.25
TOTAL EQUITY & LIABILITIES	₹ 297,500.00	₹ 5,661,275.00	₹ 8,857,673.13

Technological Trends in Human Resource Management

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ABSTRACT

The idea of a "conventional workstation" has become obsolete in the age of technology and mobile computing. Employees may now work from any location at any time. Human resources have been fundamentally redefined over the world as a result of technological advancements. Recent developments from sourcing to performance, technology has changed practically every element of HR. Technology, according to several industry analysts, is one aspect that is influencing the market. To a large extent, the HR department is responsible.

Keywords: Human Resource, Technology, Trends, Industry, Technological advancements

1. INTRODUCTION

HR technology companies are increasingly crafting apps with employees in mind, allowing employees to learn and grow, engage, give feedback, realize their potential, and even manage others more productively. The trend constitutes a substantial transition from a decade ago, when HR technologies were largely aimed to expedite HR administration, increase record-keeping, and assist in the redesign of HR procedures. From sourcing and hiring to talent and performance management, digital technology has revolutionized virtually every facet of HR today. Any HR technology used to seek, employ, retain, and manage human resources, while also support HR administration and streamline HR management.

HR managers have depended on technology to bridge any gaps generated by distance and new hurdles to employee engagement as a result of the current change. And they look to be doing well so far. According to a Flex Jobs poll from 2020, 51% of remote workers claim they are much more efficient when they work from home. This overriding tendency appears to be set to continue even after the outbreak, with 61 percent of employees embracing remote work and 56 percent having occupations that enable for it.

2. RECENT TECHNOLOGICAL TRENDS IN HR

1) **Artificial intelligence (AI) in HR Tech -**

AI-enabled systems are becoming increasingly significant in the recruitment and hiring procedures of businesses. They can shorten the time it takes for recruiters to evaluate and sort through a large quantity of resumes. AI can help with labour market analysis, matching talents and identifying competences, and maybe detecting and mimicking prejudice in job descriptions. Chatbots may also connect with prospective prospects prior to in-person job interviews, which helps speed up an otherwise lengthy recruiting process.

2) **Employee self-service systems (ESS) -**

Employee self-service systems have enabled the employees to have access, revise and update their personal information on their own. Implementation of ESS has enabled faster delivery of HR related information in an efficient way to the employees. These tools have also helped in improving the communication of various important matters such as company holidays, change in health care plans, and other time sensitive information between the management and the employees. These self-service tools are being used extensively in learning and development programs, thereby assisting the employees to upgrade their skills and expand their knowledge base.

3) **Wellness Apps** -

With an increase in awareness and understanding of the importance of the need to maintain a healthy work-life balance to ensure that the employees are physically and mentally well to perform at their best and maximum levels, wellness and health apps are being introduced to the employees by the HR department. Usage of these wellness apps can allow the employees to set realistic goals with respect to performance and increase the chances of achieving these performance goals thereby improving physical and mental health and wellbeing.

4) **Cloud based HR tools** -

Cloud based HR tools and systems have enabled connect various data in one piece software. Adoption of cloud based HR systems has given the organizations a computing power and chance to potentially survive and prosper in this technological era. Cloud based HR tools have enabled to carry out real time performance assessment accurately and efficiently. In terms of cost, these tools are economical compared to proprietary HR management softwares, thus proving to be more cost effective option.

Adoption and implantation of these technological trends have certainly proved to a boon to the Human Resource domain. It is easy to access to the information related to employees and has helped in simplifying the decision making process as all the employee essential information is instantly available to access. The automation of these tools has helped to carry out time consuming manual processes with ease, thus, allowing managing time effectively. The security of employee essential information is guaranteed as one can control who gets to access this information.

3. REVIEW OF LITERATURE

Dr. Alok Mishra and Dr. Ibrahim Akman (2010) through their research study aimed to study the application of Information Technology (IT) in Human Resource Management (HRM). The key focus of their research was learning about different trends of IT used in HRM in organizations in various sectors in Turkey. The primary data collection was done using survey method, using 106 responses as the sample size for this research study. The data collected showed that IT is widely used to perform various HRM functions in the organizations of different sectors in Turkey. The results indicated that IT has significant impact on HRM of the organization of different sectors and the IT tools varied significantly within recruitment, maintenance and developmental tasks. However, it was also revealed that organizations failed to maturely and systematically apply these technologies in the performance of the HRM functions.

Sanchita C. Banerji (2013) in her research study explained the wide range of application of IT have greatly impacted operations of the organizations. Integration and acceptance of new technologies is a challenge face by the organizations. Implementation of these technologies requires radical change in the way HR professionals perceive their roles and responsibilities. Proficient knowledge of the traditional HR practices and skills and applying the same via technology will ensure in successful implementation and acceptance of these technologies.

Dr. N. Muthu, K.R. Kishore Kumar, S. MuthuKumar (2015) conducted research study on the trends that are emerging in changing HR technology. Through their study, they have emphasized on the effects and impact of the technology used to enhance the HR thereby helping the business to prosper. They say that technology will provide required platform to develop terminologies, metrics and data models that are in accordance of and support the global HR standards. Application of HR – IT in HRM as employee assessment tool (application server model –ASM), computerized performance monitoring (CPM), E- recruitment tool, workflow technology and others have been given as examples to cary out various HR functions with ease. The researchers while concluding say that HR professional should implement programmes, strategies and system that encourage experience, collaboration and decision making practices.

Ghanshyam Mhatre and Dr. Vijay Dhole (2018) in their research study based on the secondary data collected believe that due to implementation of technology in HRM, smart digital context of HR practices with better quality of data is accessible now which allow management of huge and complex data and better decision making practices. They believe that the HR domain is shifting from transaction to interaction field which emphasizes on the interaction belween the employer and the employees.

Dr. S Yuvaraj and M. S. Sunganthiya (2021) have explained the impacts of technology on Human Resource Management and various functions of HR. Due to adoption of technology, recruitment & selection processes, training and development programs, appraisal systems are now using internet as their prime source to carry out these functions. These methods have now become more cost and time effective. Computer software programs are used to help to improve employees' performance. They believe technological tools have helped to improve communication, encourage creativity and innovation and save time and manage time effectively. On the other hand, it has also lead to distraction during work, high maintenance cost and is affecting workplace relationships. The researchers believe that organizations that adopt technology to perform HR functions will prosper more than those who do not invest in these technologies.

4. OBJECTIVES OF THE STUDY

1. To learn about different technological tools used in HRM by organizations.

2. To find out benefits and disadvantages of the technological tools.

3. To find effectiveness of the use of technology on various HR functions.

4. To find effectiveness of the technological tools with respect to cost, productivity and stress levels of the employees and communication and transparency level between the employees and the employer.

5. RESEARCH METHODOLOGY

Research design: The type of the research study is descriptive in nature.

Research tool: Both primary and secondary data collection method is used to collect information needed to do this research. Primary data is collected using questionnaire. The questionnaire was circulated among HR professionals for response. Sample size of 45 is used for the study. Secondary data is collected from research papers, research articles and websites.

6. DATA ANALYSIS AND INTERPRETATION
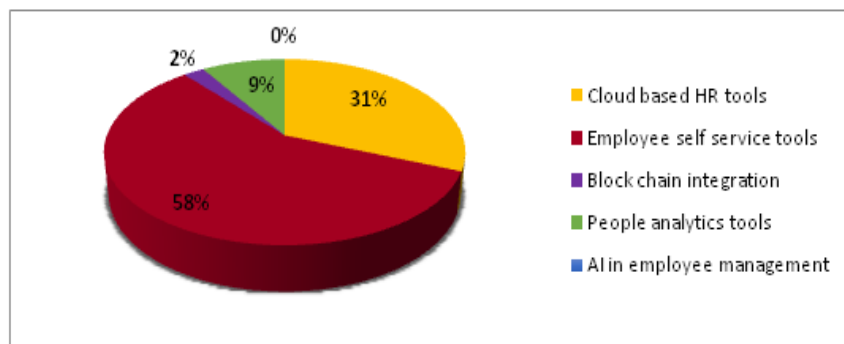
Fig. 1: Technological trends used by company for HR functions

From Fig.1, it can be inferred that the most widely used technological tool used by the organization for human resource management is Employee Self Service (ESS) tools that allows the employees have access and update necessary information on their own, thus facilitating in faster delivery of information. Cloud based HR tools are second widely used tools by the organizations. People analytics tools which enables faster collection of talent data and its application to boost talent and business outcomes followed by block chain integration tools.
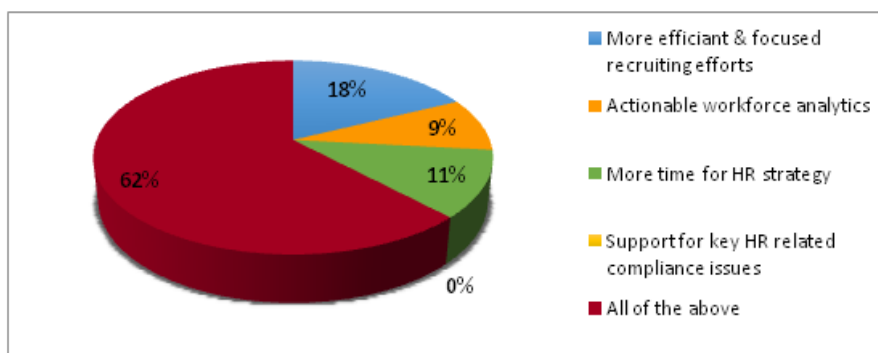
Fig.2: Benefits of using technology in HR functions

From Fig.2, it can be inferred that 62% believe that implementation of technology in various HR functions have multiple benefits such as the recruitment process becoming more focused and effective by using application tacking software supervise the hiring process, managing workforce analytics to track different costs, competencies and characteristics of Goal and result oriented employees, thereby helping in effective planning and decision making process, supporting with compliance issues, and leaving more time for strategizing HR. 18% believe that technology has greatly helped them with the recruitment process followed by 11% thinking that the only advantage of use of technology would ensure more time to work on strategies.
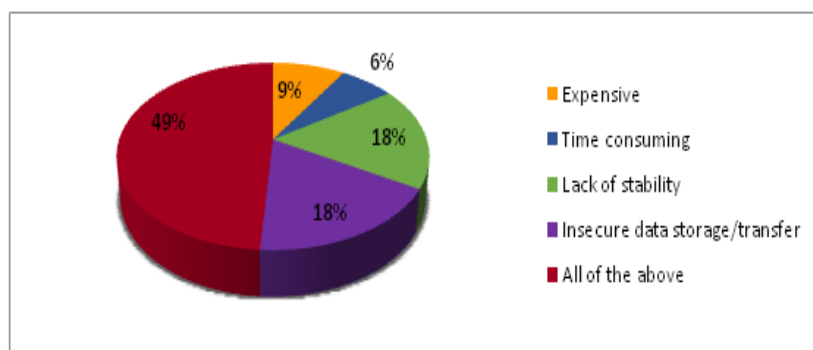
Fig.3: Challenges faced while using technology in HR functions

From Fig.3, it can be inferred that 49% of respondents believe that high cost, more time consumption, lack of stability, threat to data because of insecure data storage tools are the disadvantages or challenges faced while using technology to carry out HR functions. 18% respondents face challenge of insecure data storage/transfer and stability issues respectively. 9% respondents think that the technology used by their company in HRM is not cost effective and 9% think it is time consuming.
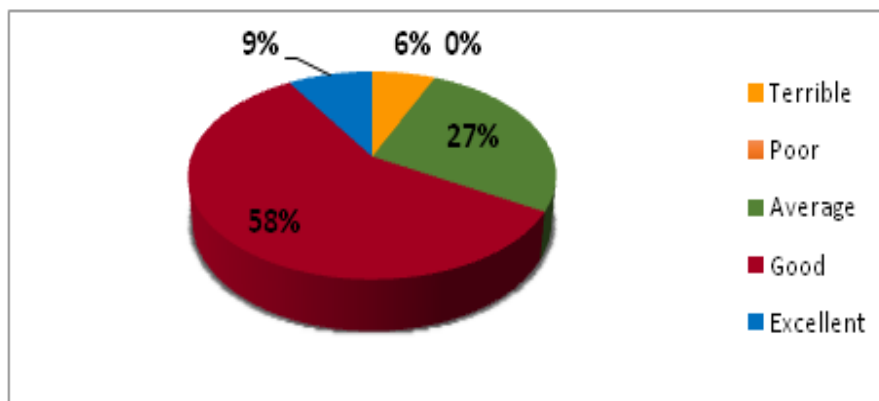
Fig.4: Technological assistance in HR funtions within your company

From Fig.4, it can be inferred that majority of the respondents (58%) think that the technology used in their organization for HR functions is good whereas 27% think it is neither good nor poor. 9% respondents are extremely happy with the given technological assistance whereas 6% respondents think that the technology used is poor and needs to upgrade.
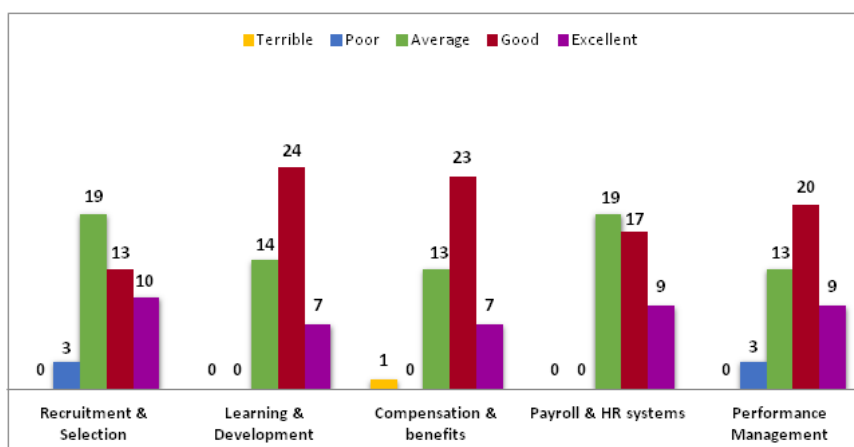
Fig.5: Effectiveness of technology used to perform following HR function

From Fig.5, it can be inferred that majority people working in HR(19 out of 45) think that impact technology on recruitment and selection process is neither good nor poor. Same is the case with payroll and HR systems function. 24 out of 45 respondents think the technology used for learning & development programmes is good, 23 out of 45 respondents think the impact of technology on compensation & benefits is good. For performance management as well the impact is good.
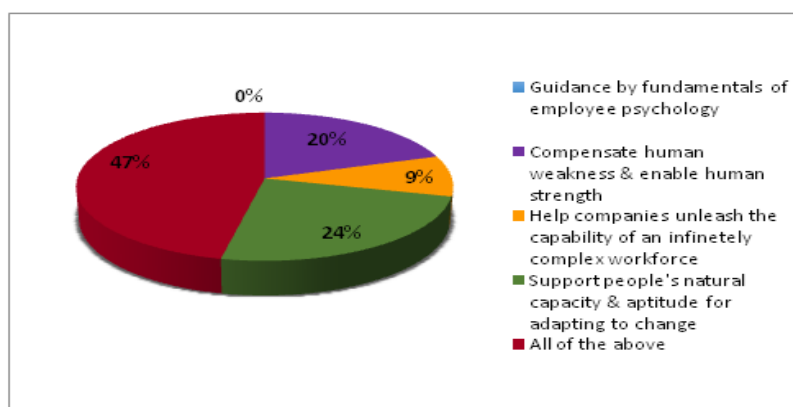
Fig.6 Trends that have the most impact on in future

From Fig.6, it can be inferred that Technology is definitely going to impact the way HR department functions. Majority of respondents (47%) think technology is going to help in understanding employees' psychology, encouraging to focus more on the strengths and the weaknesses will be taken over by the technology, helping the organizations to make use of the talents of the workforce to its highest potential and allowing and supporting the natural attitude of people towards adapting change.
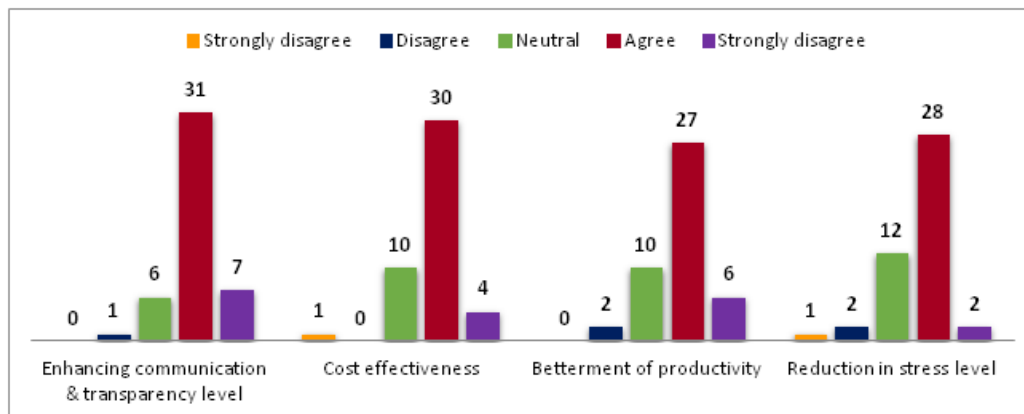
Fig.7 Effect of technological trends on HRM

Fig.7 represents the effect of technological trends on HRM on various factors like enhancement of communication and transparency levels between employees and employer, reduction in cost incurred by the company to carry out various HR functions smoothly, improving the productivity of the employees and reducing the stress levels. In all the cases majority of the respondents agree that implementation of technological trends in major HR functions has really good impact on all the factors mentioned above. (31 out of 45 responses for communication & transparency level, 30 out 45 responses for cost effectiveness, 27 out of 28 responses for improvement in productivity level and 28 out of 45 responses for reduction in stress levels).

7. LIMITATIONS OF THE STUDY
- All the employees were busy with their schedules, thus the data received may not be accurate.

- The scope of the research is very vast. All the current technological trends and their impacts on various HR functions could not be discussed in depth due to time.

8. SUGGESTIONS
- Technology is changing and upgrading rapidly. Thus, the management needs to ensure that proper training and access is provided to the employees so that they can work with the new technological change with ease and accuracy which in turn will help in betterment of the organization.

- All HR tech solutions first need to focus on resolving basic HR problems like quick and easy onboarding, easy leave/regularization generation, employee friendly tax declaration, etc. and then can move on complex issues like complex workforce and psychology.

- There has to be an awareness drive so that transparency is maintained at all levels. Management needs to invest in HR training and orientation on a sustained basis.

9. CONCLUSION
Technology is surely bringing some reforms in Human Resource Management. The processes have become more convenient, reliable, user friendly, time and cost effective due to implementations of various technological tools. HR managers have real time access to all the data and performance of the employees, thus, giving them an upper edge to face a challenge or a problem and come back with solution faster. Various HR functions are also carried on with ease. The communication and transparency level between employees and employer has improved also the productivity of the employees has enhanced. HR professionals are relatively less stressed than before due to implementation of technology.

However, as the technology of today has become more complex, qualified and proficient tech professionals are needed to educate the employees and enhance the existing technology as per requirements.

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Impact of Individual, Institutional Factors and Research Contribution on Career Advancement of Academicians in Higher Education Institutions across Mumbai

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ABSTRACT

The overall growth of a country in terms of human capital, society, economic growth depends a lot on the higher education framework through universities and Higher Education Institutions. The world bank has defined a knowledge economy by innovation, training and education, where HEIs have a significant role to play. The pillars in effective functioning of any higher education system is the level of consultancy, training & research work it engages into. The teaching staff which is the most important human resource of any HEI is mainly responsible to carry out the research, consultancy & training activity. So, in today's time Human resource development of these educators in terms of effective recruitment & selection process, training, career mapping, career advancement and performance appraisal is highly significant for satisfaction & retention. This study is undertaken to understand the influence of factors on career advancement of teachers in higher education institutions across Mumbai. In India promotion or career advancement of faculties happen through performance appraisal or promotion on API scores. One of the key components of API is research productivity of a faculty. There is ample of research available on influence of various factors on career growth, success and development of teachers in higher education institutions. There is a huge gap in number of studies available to evaluate the role of factors on research and further influence of research on career advancement. This research paper used data of 213 faculties who are associated with government and private institutions across Mumbai. The convergent validity and discriminant validity was established by Confirmatory factor analysis (CFA). The hypothesis was tested using Structural equation modelling. The overall fitment of model was also established through SEM. The findings of this study revealed a significant influence of Networking, Institutional factors and Individual factors on research output of a teacher in higher education institution. Further, research productivity was found to have a predominant effect on API and thus career advancement of a faculty. The study adopted both descriptive research design as well as exploratory research design to test the theoretical and conceptual model. The aim of this study to contribute towards highlighting the importance of research output and productivity on career success and growth of faculties in higher education institutions.

Keywords: Institutional Factors, Individual Factors, Networking, Research Contribution, Career Advancement, Higher Education.

1. INTRODUCTION

Education is not only the most important pillar in a country's development but also plays a vital role in evolution of an individual through awareness, deepening and enhancing their thought process (Times of India 2020). The substantial and sustainable development is possible through quality education in long run by promoting technological and entrepreneurial growth (Ozturk, 2001). The improvement & enhancement of values, efficiency, productivity, creativity happens through educational framework of a country. The quality of a nation depends on the quality of its citizens which is formed by its educational framework which ultimately depends on its faculties. There is a significant relationship between the development of a society and the quality of the higher education framework of that country. An efficient and effective higher education system produces colleges and institutions which contribute significantly towards the holistic development of their students. These students further become more responsible and accountable citizens who have the right knowledge, skills, competencies, aptitude, and ability to contribute towards the growth of the nation. Further, to make their students ethically, morally responsible towards society and nation higher education institution requires competent, skilled, knowledgeable faculties who have both the right attitude and aptitude to groom students towards facing future challenges.

While there are many limitations or barriers the higher education sector constantly encounters to maintain the quality and quantity of its teaching fraternity. Many research papers and articles have been written about the limitations, problems, or challenges encountered by the Indian higher education system, and almost in all studies, low quality of teaching and learning in terms of a chronic shortage of quality faculty has been highlighted (Sanklecha, 2017). To attract quality faculty to join and remain in academics, this sector needs to be lucrative in terms of its extrinsic and intrinsic incentives which it should promise to offer academicians who

want to join this field. Postgraduate or adequately qualified personnel has an option to either join corporate or be into academics. The decision to choose a career depends on a lot of factors and amongst the most important one's the degree to which that sector provides avenues for advancement, progression, or growth.

While numerous studies have been conducted in past to study the impact of individual factors on career advancement, effect of institutional factors on career advancement and influence of research productivity on career advancement of an academician. During literature review only few national and international research has been found which attempts to study all these factors today. This research paper tries to eliminate the gap of earlier studies by evaluating the impact of individual, institutional factors and research contribution on career advancement of an academician in Indian Higher education environment.

1. LITERATURE REVIEW AND HYPOTHESIS FORMULATION

2.1 Theoretical Model
Hedge and Rineer (2017) in their career pathways model also described the meaning of a career In terms of an employee gaining experience and evolving in their career w.r.t knowledge and skills that they gather while doing so. After a thorough literature review, they proposed two models the first one from the perspective of employees and the second one from the perspective of employers. The model developed by them from the viewpoint of employee's career success and career growth depends on behaviors or career performance perceptions, the program characteristics of a career pathway, individual career management factors, work-life balance factors, and organizational factors. The second model which they developed which was employer-focused had aspects of recruitment, training, job analysis, and employees as well as organizational performance evaluation. The proposed theoretical model in this study is to measure the impact of three variables which are individual factors of an academician, institutional factors and research productivity which effects career advancement.

2.2 Defining Constructs
Table 1 below summarizes the definition of different constructs & sub constructs:

Sr. No.	Construct	Definition
1.	**Individual Factors (IF)**	Giragama & Sooriyabandara (2018), defined individual factors as self-assessment, career mapping, perception, motivation, attitude, potential of an individual which contribute towards career growth.
2.	**Institutional Factors (INSF)**	Ahmad (2015), defined organizational factors in terms of exchange relationship between leader & member, content of work, political skills & commitment
3.	**Research Contribution (RC)**	Nakhaie (2007), said that for an academician to have both objective as well as subjective career success it is important to enhance publications in terms of reports, books, research papers etc. The research contribution is determined in terms of both quantity as well as quality of publications
4.	**Career Advancement (CA)**	Jinping Liu, Bai, Bai, and Liu (2018) elaborated the meaning of career advancement in a broader context in terms of the propensity of an individual to engage in challenging tasks and taking on more responsibilities which can be attributed to both levels of intra organization and inter-organization career progression.

Table 1: Constructs and Definitions

2.3 Hypothesis Formulation
1. Individual Factors (IF) and Career Advancement (CA)
Arthur, Khapova and Wilderom (2005) also said that the internal factors or perceptions of an individual w.r.t his or her career forms the subjective career success while the outward accomplishments and achievements form the objective career progression which is in terms of monetary, designation or promotion. According to their research there is relationship between the career theory and career success of an individual at both inter organization and intra organization level. Their study incorporated comparative evaluation between subjective and objective driven individual's. They found that career advancement also further leads to career mobility and career success comes before the mobility. For career advancement competencies, adaptability, resources are important variables as per their findings.

H1: Individual Factors (IF) has a positive impact on Career Advancement (CA)
2. Institutional Factors (INSF) and Career Advancement (CA)
Seema and Sujatha (2017), through their descriptive study, empirically studied academicians in Indian higher education context and found important correlation between perceived organization support and career success w.r.t the available prospects in respective career, the commitment of employees towards their career and eventual emotional feeling of achievement which can be termed as career satisfaction.

H2: Institutional Factors (INSF) has a positive impact on Career Advancement (CA)
3. Research Contribution (RC) and Career Advancement (CA)
Hesli, Lee, and Mitchell (2012), said that probability or chance of getting promoted for an academician from one level to another depends on the type of publications and number of publications. The publications involved research papers published in national & international journals with considerable impact factor, number of books published or number of chapters in book etc. Their study found a greater impact of research output on advancement of faculties.

H3: Research Contribution (RC) has a positive impact on Career Advancement (CA)
2.4 Research Model
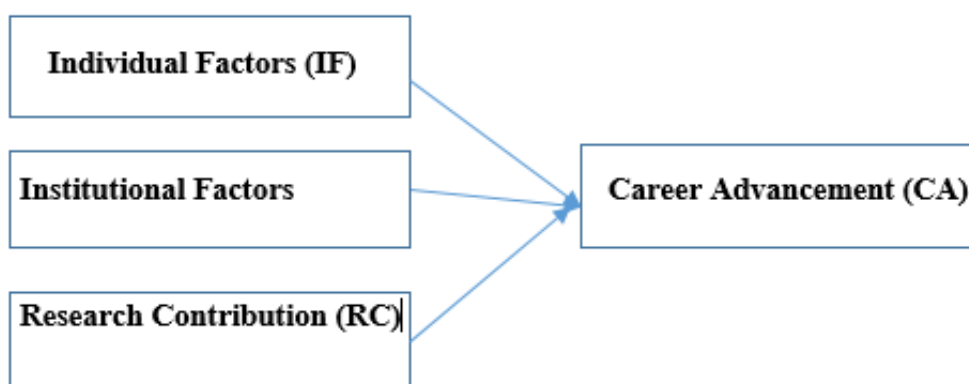
Fig. 1: Proposed Research Model

6. DATA COLLECTION
A five-point rating scale based questionnaire using Likert Scale was used to gather data from 300 academicians from higher education institutions across Mumbai. The demographic information of respondents is mentioned in Table2. After detailed review of literature four constructs were identified which are individual factors, institutional factors, research contribution and career advancement.

Variable	Category	Number	%
Gender	**Male**	103	34.3
	Female	197	65.6
Age	**Upto 30**	168	56
	31-40	68	22.66
	41-50	37	12.33
	50& Above	27	9
Experience	**Up to 5**	158	52.66
	6-15	64	21.33
	16-25	44	14.66
	Above 25	34	11.33

Table 2: Demographic Description

7. DATA ANALYSIS
Using AMOS (Analysis of Moment Structures), Confirmatory factor analysis (CFA) and Structural Equation Modeling (SEM) were used as tools for data analysis. To validate empirically the Career Advancement Model, Structural Equation Modeling was used. SEM consists of two elements: a measurement model relating a set of observed variables to a more restricted set of latent variables and a structural model linking the latent variables through a series of recursive and non-recursive variables relationships. Structural Equation Models (SEM) describe the relationships between variables. This amounts to combining multiple regression and factor analysis. SEM offers a more efficient way to deal with multi-collinearity and has methods to account for the unreliability of data.

8. DATA TESTING AND RESULTS
Confirmatory Factor Analysis (CFA)

Indices	Saturated model	Suggested value
Chi-square value	164.870	
Chi-square value /df	1.150	< 5.00 (Hair et al., 1998)
P value	0.184	> 0.05 (Hair et al., 1998)
GFI	0.910	> 0.90 (Hu and Bentler, 1999)
AGFI	0.885	> 0.90 (Hair et al. 2006)
NFI	0.910	> 0.90 (Hu and Bentler, 1999)
CFI	0.982	> 0.90 (Daire et al., 2008)
RMR	0.068	< 0.08 (Hair et al. 2006)
RMSEA	0.033	< 0.08 (Hair et al. 2006)

Table3: CFA results

The overall fitment of the model with reliability & validity is shown in tables above. The Confirmatory Factor Analysis (CFA) is next step in the process and by performing EFA the factors identified in literature review are evaluated.
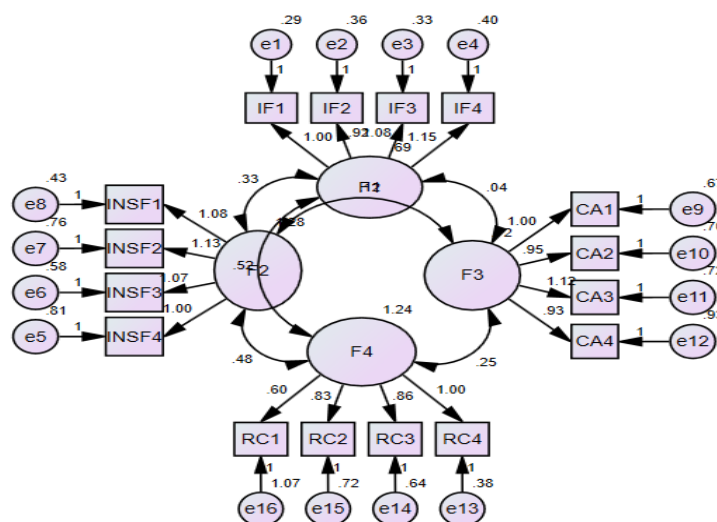
Fig. 2: Measurement Model

Factor and items	Factor loading	Critical ratio	@	Average Variance Extracted	Construct Reliability
Individual Factors (IF)			0.863	0.639	0.865
IF1	0.819	11.789			
IF2	0.821	12.056			
IF3	0.817	11.888			
IF4	0.811	Fixed			
Institutional Factors (INSF)			0.879	0.645	0.875
INSF1	0.800	10.856			
INSF2	0.811	11.582			
INSF3	0.825	15.308			
INSF4	0.833	Fixed			
Research Contribution (RC)			0.890	0.680	0.880
RC1	0.807	10.719			
RC2	0.813	Fixed			

RC3	0.825	15.309			
RC4	0.881	17.586			
Career Advancement(CA)			0.900	0.800	0.803
CA1	0.827	12.076			
CA2	0.840	12.234			
CA3	0.894	Fixed			
CA4	0.851	12.441			

Table4: Measurement Model (CFA)

Factors	AVE	Squared Interconstruct Correlation (SIC)				
		CSE	PE	PP	CAD	CA
CSE	0.644	0.801*				
PE	0.659	0.333	0.806*			
PP	0.663	0.714	0.262	0.822*		
CAD	0.524	0.310	0.064	0.244	0.732*	
CA	0.700	0.680	0.390	0.650	0.220	0.838*

Table 5: Discriminant Validity Test

The values of AVE and Squared Interconstruct Correlation are given in above table which was obtained by measurement model. It is found from above evaluation that model has good discriminant validity because AVE values are more than Squared Interconstruct Correlation.

2. STRUCTURAL EQUATION MODEL ANALYSIS

The Variables used in structural equation model are:
I. Observed, endogenous variables
1. Career Advancement

II. Observed, exogenous variables
1. Individual Factors (IF)

2. Institutional Factors (INSF)

3. Research Contribution (RC)

III. Unobserved, exogenous variables
1. e1: Career Advancement

Hence the number of variable in the SEM is
Number of variables in model   : 5

Number of observed variables   : 4

Number of unobserved variables   : 1

Number of exogenous variables   : 3

Number of endogenous variables   : 1
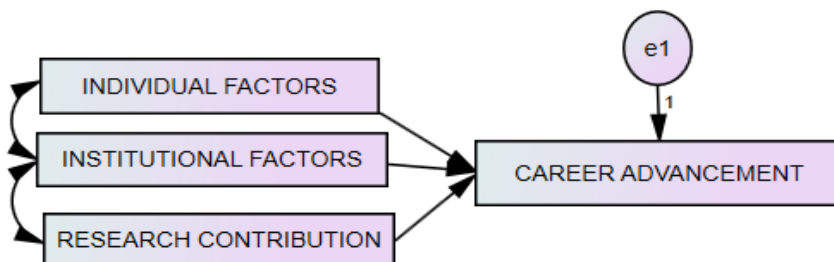
Figure3: Structural Equation Model (SEM)

Variables	Unstandardized co-efficient (B)	S.E of B	Standardised co-efficient (Beta)	t value	P value	Hypothesis
CA<---IF	0.017	0.043	0.189	3.370	0.001	Accepted

CA<---INSF	0.130	0.041	0.190	3.270	0.001	Accepted
CA<---RC	0.490	0.054	0.550	9.160	***	Accepted
Goodness of fit indices: **P=0.550, CMIN/DF=0.305 ; CFI=0.999 ; GFI=0.998 ; AGFI=0.995 ; NFI=0.989 ; IFI=0.990 ; TLI=0.996 ; RMSEA=0.000 , SRMR=0.0076**						

Table 6: Variables in the Structural Equation Model Analysis

6. DISCUSSION

Gyansah and Guantai (2018) defined a career as different roles that an individual will engage himself during the lifetime. With changing times, the definition of a career has changed which was earlier linked to a single job and now is described more in terms of continued learning and professional growth of an individual. They said that the process is lifetime and is divided into several stages and each stage has various issues that individual encounters during his professional life. According to them in most situations, an individual will drive the goals and targets in their career while in some it is not restricted to a single organization. While Nkechi and Dialoke (2017) defined career growth or advancement as how an individual perceives his or her career success or development within the organization. His definition incorporated three important terms which were career development, career advancement, and career growth. He said the constant progress in one's career through the acquisition of skills, knowledge, abilities, and experience lays the foundation of career advancement. According to his definition, the total of various roles, jobs that a person engages himself in is the career growth of the individual. His study elaborately defined career advancement using numerous constructs like growth in the remuneration, the speed of promotion, developing the professional ability, and goal progress in career.

7. IMPLICATIONS AND RECOMMENDATIONS

Academia is a profession that is still not on par with corporate jobs and roles in terms of status, remuneration, career growth, and development. It is a profession that is observed to have more intrinsic satisfaction of educating, imparting knowledge to students to prepare them for their future. Professionals either enter this profession out of choice or by chance. Either of them has to survive the pros and cons associated with this vocation. It is easy for an individual to obtain a job but it is difficult to survive the challenges of the same and eventually make a career out of it. Even if career development is a governmental and organizational process, the perspective of employees towards one's career growth and advancement is an individual desire. Many eminent researchers have tried to put forward the meaning of career which is mainly in terms of different roles and responsibilities that a person undertakes during his professional life. A career is a person's developmental process throughout his or her life. Organizations give career opportunities to their workers so their workers can grow professionally, which allows them to move vertically, horizontally, or linearly and thus advance in their careers, occupying a series of positions at work (Jáuregui & Olivos, 2018). It is also understood as the evolution of the work experience of an individual which is the sequence of different positions that he occupies over the years

8. LIMITATIONS

The first and foremost limitation is of sample size which was only 300 faculties in higher education universities and colleges across Mumbai. An in-depth study with larger sample size which would cover more geographical area can be undertaken on same topic in future. A detailed comprehensive study involving other stakeholders like principals, vice principals, HOD's can be undertaken. More variables and factors can be evaluated to make the research findings more applicable. There was limitation in extent of review of literature which can be undertaken in more detailed and in-depth manner.

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Exploratory Study of the Relation between Brand and Business Performance in the Business-To-Business Scenario

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ABSTRACT

Introduction: Typically, Brand is seen as a subject that is more associated with Advertising and that to with large spends. It is also seen as mainly for the B2C world and a deliverable of only the Marketing function. Brand building as an exercise attracts a lot of attention from the Board, Investors, consumers, trade channel, and the overall community too. This paper would like to investigate all these facets and present a fact-based analysis

Purpose: The main purpose of the paper is to highlight the critical role of Brand in the wellbeing and growth of any B2B organisation, small or large, ir-respective of industry type.

This paper looks at how one can prove this hypothesis - that brand can provide an uplift to sales, profitability and other tangible benefits in the B2B context too. It also aims to identify aspects of Brand that are beyond pure imagery in the specific context and unique to the B2B industry today.

Methodology: This paper will be based on an extensive secondary research in India and outside India over the last few years. It will look at several data points in the public domain in the B2B arena as well as independent agencies monitoring Brand and its impact. Will also involve researching expert views on the subject over the years on specific Brands and their parent companies.

Results: The results of the study indicate, that the most valued and successful B2B corporations in the world have all a very strong Brand presence hence it does imply a cause-and-effect relation. Also, we have seen that there are several variables like commitment of the Board, Cross functional involvement, a systematic measurement and monitoring process that goes into building a Brand and they each impact the process to give a far greater output.

Limitation and Scope for Future Research: This study is based on Secondary research, and some companies have not shared primary information on impact of their Brand building activities.

This can be improved in future with a larger Primary study. Separately a new area of study could be to understand the connecting points between Brand and Business Strategy

Keywords: Brand management, B2B, Sales Growth, business impact .

1. INTRODUCTION
Brands have always been the domain of the Consumer or as is commonly known B2C market. The Business Markets or B2B markets have always been a bit cautious of Branding, probably because of the definition of Brands have often been limited to the realm of communication, and brand has been linked to the visible domain of advertisements and communication. Branding is mainly a subject connected with emotions and cannot offer value to a business to a B2B scenario per the paper 'the organizational decision-making process' (Robinson, Faris, & Wind, 1967).

This gives rise to a holistic meaning of Brand and an application to B2B seems not only possible, but also a value-add process.

2. RESEARCH PROBLEM - RESEARCH QUESTION
Often Brand is seen only as a communication tool to create awareness. In specific in B2B businesses its role as s critical element of a running business is not understood and hence the attention and investments given to building Brand is absent. Thus, an opportunity is lost in gaining sales and getting premium, which the B2C industry has been practicing regularly.

The Question therefore is

Can a brand be an asset in uplifting sales & profitability in a Business-to-Business operation, if so, can its impact be measured in a tangible way?

3. LITERATURE REVIEW

Over the years several Authors have worked on Branding as a subject of investigation in the B2B segment. For instance, Sheena Lee & George C, came up with a detailed process of the challenges B2B brands face, including lack of funding and other resources, not enough data pts to uses references (like B2C) and other areas. Similarly, Mariana Gomes, Teresa Fernandes and Amélia Brandão studied what was relevant vs not in the service sector. Cassia F and Magno F created a framework for B2B Branding strategies, different from the B2C way of looking at Brands, which had a far larger audience and had to look at the consumption cycle too. Haakon Jensen, looked at B2B brands though only in the context of Social Media only while it left out all the other traditional channels which play a major role even today in B2B. Kerri-Ann L. Kuhn, Frank Alpert, used the Keller Brand Equity Model specifically in the B2B context with a large focus being on Corporate Brands. Corporate brands are viewed by customers in a diff way and often the value proposition are much loftier and not what customers are looking for form a product angle but do have a rub off on them as well.

None of these however focussed on the cross functional team that if guided properly could amplify the awareness created by ads and build Brand in the truest sense

Author, Year	Area of Study	Gaps and Variables not covered
Sheena Leek , George Christodoulides, 2011	Challenges of Branding in B2B	Role of functions in building Brand not investigated
Mariana Gomes, Teresa Fernandes and Amélia Brandão, 2016	Brand relevance in a B2B Service context	Limited to Service element only
Cassia, F. and Magno, F. 2019	Framework for man B2B branding strategies	Suggests branding specific to a customer – not practical
Haakon Jensen, 2009	Impact of Social media on B2B Branding	Limited to only social media
Niklas Persson, 2009	Linkage of B2B brand image and price premia	Overlooks role of internal functions in building brand and hence premium.
Kerri-Ann L. Kuhn, Frank Alpert, 2008	Application of a brand equity model in the Business-to-Business context	Focuses on Corporate brands, also seems to suggest industry specific patterns

Table 1 – previous publications & gaps

This paper looked at live examples of an Indian company, where a sustained Brand building effort was initiated to great effect

Finally, the paper examined several of Interbrand's Brand valuation reports over the years to understand the relation of the Top B2B brands and their performance

4. Identification of Variables & their relationship
4.1 Internal Factors
- Commitment of Board/CEO (Independent Variable)
This is an important factor as it means the blessing of the decision takers and importantly a willingness to invest in an area for future dividend

- Strategy in pace (Dependent Variable)
A firm strategy aligned with stake holders to believe in the power of Brand building is important for sustenance

- Strong Marketing Team to visualize and execute (Dependent Variable)
  A marketing team is required to bring the vision into reality, as this is a separate soft skill set that will bring the intangible piece of Brand into the customers mind as something real and translate into a purchase decision

- Process of Measurement, Monitoring and Reporting of Metrics (Dependent Variable)
This is essential to hold accountability for every rupee spent, and see what's working against a set of quantified targets

- Buy in of other Function heads, especially Finance (Dependent Variable)

This is an important piece as Brand is not built by the Marketing or sales or product team, it is the belief that must be shared across the customers journey across functional touch points. Finance becomes important as they control the sanction to invest in brand building

4.2 External Factors
- Maturity of Branding Initiatives in the Industry (Independent Variable)

Branding impact may be different depending on how many cycles Branding has been in place and the exposure customers have received

- Environment and Context of Industry (Independent Variable)

The particular situation of the industry may make it amenable or otherwise to the need for Brand building

4.3 Firmographic Factors
- Age of organisation (Independent Variable)

If an organisation is new, it may need more awareness building and hence the quantum of intensity of the brand building might be more, conversely less for an older organisation

- **Industry type (Independent Variable)**

Different industries may have a diff take on the impact/relevance of Brand, hence a cut by the industry type would be important to check

- **Size of organization (Independent Variable)**

A large organisation with hundreds of employees across functions and geographic location would require a brand initiative of a diff scale as compared to a smaller one

Independent Variables	Dependent Variables
Commitment of Board/CEO	Strategy in place
Age Of Organisation	Strong Marketing Team
Industry Type	Measurement/Monitoring Systems
Size of organisation	Buy in - functions
	Maturity of Branding in Industry
	Environment and Industry Context

Table 2 – Independent & Dependent Variables

4.4 Output Variables
These can be tangible outcomes like Sales and Profitability

5. Theoretical Framework
Thus, to summarize the relationship in a framework please find enclosed as below figure
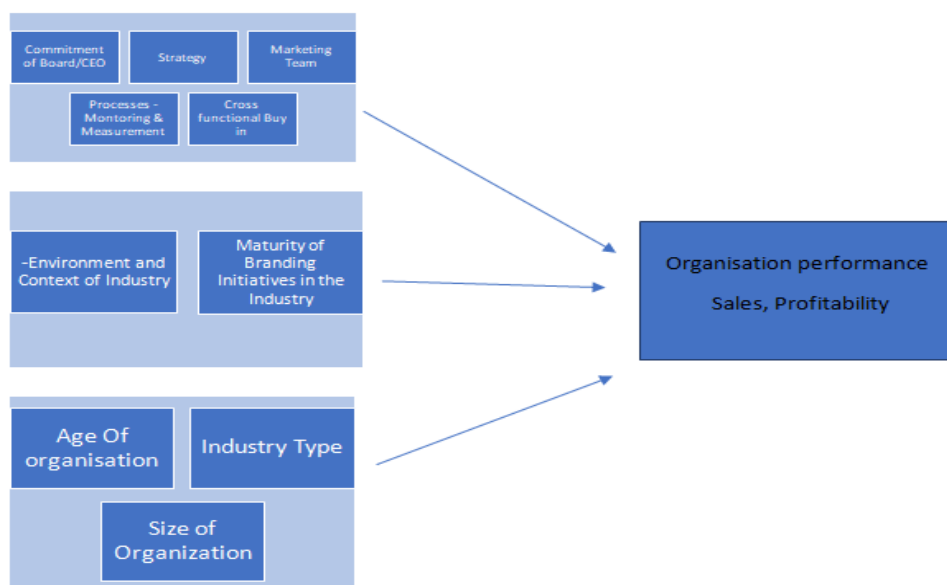
Figure 1-Theoretical Framework

6. Objectives taken for study with assumptions:

1) To confirm Building Brand involves working on aspects beyond communication
If proven this will enable the focus to shift from only building ads to a wholistic approach using other functions

2) To determine if Brand Building exercise (Brand Equity & Brand Strength) influences sales and valuation of a company.

If proven this will enable more investment in Brand building in the B2B companies as there is evidence of a tangible outcome

These hypotheses were developed by studying the existing literature as in the review above and the Interbrand top 100 Brands reports which suggest a linkage between the strength of Brand building activity and performance of an organisation

7. METHODOLOGY

7.1 RESEARCH DESIGN

The research is a secondary research. A total of 35 research papers were studied from listed journals across the globe. The present literature review based on 9 shortlisted research papers falls into three main categories: Relevance of Brand in the B2B context, constituents of Brand Building activities beyond communication, and the experiments reported on the success or otherwise of brand building activities This study is driven by two research questions: What actions constitute a Brand Building activity and How much does Brand building build in tangible results in a B2B context? To examine these questions, the study evaluated scholarly work in international business over the time period 2005- 2020. A content analysis of these articles was conducted. In addition, Interbrand's annual top brands survey was studied for the last 3 years, and a business case of an Indian conglomerate was studied

7.2 DATA DESIGN

This process involved a triangulation of information coming from the literature survey, Interbrand's top 100 Brand annual surveys and an example from a current company experimenting with this process.

8. RESULTS & DISCUSSION

The section of results and discussion has been divided into three parts: Interbrand's mathematical model, the example form a leading Indian company and its implications, and the theoretical framework. The mathematical model aims at establishing a mathematical relationship between Role of Brand, strength of Brand and the Financial performance leading to success in this case a higher ranking in the Top Brand list. The analysis of the Indian example proves the impact of cross functional working together not only improves the Brand Valuation, but also impacts measurable and tangible metrics like sales of an organisation. The theoretical framework presented earlier on the other hand proposes non-mathematical or theoretical relationships between the variables of study aiming to throw new light into the existing literature review. This model establishes a cyclical and a reciprocal relationship between the independent and the dependent variables as highlighted in Fig 1

8.1 Interbrand Best Global Brands study

This paper studied Interbrand reports which have been an authority in Brand valuation over the years to understand the impact of Brand Building on the stature and performance of B2B Brands

Interbrand pioneered the concept of Brand Valuation based on a model designed with the London Business School in 1984 and this methodology has already been used for over 5000 valuations worldwide. Their annual Best Global Brands study has become the recognized global standard for valuing brands.

Interbrand's methodology essentially encapsulates three core factors, Financial performance (essentially EVA), Role of Brand (i.e. full potential of Brand) and Brand Strength (i.e. its real delivery).

The Brand Strength parameters point out in particular the role of other aspects, like product quality and consistency, responsiveness, distribution beyond communication which contribute to the Brand being a part of the life of customers. Thus, Brand gets built by factors far beyond pure communication and everyone has a role to play in it is an important point that gets highlighted. Thus, a good rating in Brand valuation implies that the company has been able to use the various touch points in the Customer journey to good effect by ensuring delivery as per expectations if not more on areas beyond communication.

Brand Strength

Internal Factors	External Factors
Clarity	Authenticity
Commitment	Relevance
Governance	Differentiation
Responsiveness	Consistency
	Presence

Table 3 – factors affecting Brand strength
Source Interbrand's annual hand booklet 2019

The Interbrand reports for the last three years suggest that across the year at least 20% of the Brands figuring in their IB top 100 list are B2B brands and all of them are super performers on all traditional metrics like Profitability and Turnover. This clearly indicates that there is a direct linkage between the effort the B2B companies have put in building the brand (in all its aspects as indicated by the Brand Strength Analysis) and their financial results.

Prominent amongst these are Microsoft, Intel, IBM, Sap, JP Morgan, Adobe, Caterpillar and many more

Separately the Internal factors highlighted appear quite relevant for the top brands while the external ones, or the firmographics do not seem to play a major role given the listing that cuts across type, size and age of organization.

Figure 2- 2020 list

Figure 3- 2019 list

Figure 4- 2020 list

A specific Study and analysis of a brand closer to home in India – XX Industries on a sustained effort on Brand Building revealed the following results

- Increase in all major Consumer metrics and including changes in perception for

- Range awareness

- Disposition to purchase

- Empathy with consumers

- Sales continue to grow

- Its lead SKU, back in red and the reckoning at No 2 after 11 years

- Overall over10% growth over category growth numbers

And to top it all – XX Industries was valued at almost 3 Billion USD, close to breaching the top 100 list of Interbrand

9. CONCLUSION

Given the evidence of the Interbrand Lists over the years, it is clear that the hypothesis we had is proven, indeed investing in a B2B Brand does yield to tangible results in their performance. Also, it's not only communication that helps in building brand but other elements like commitment, clarity, responsiveness, presence, as seen from The Role of Brand & Brand strength scores in the Interbrand methodology, which implies other activities beyond communication and hence other functions too play a critical role in building Brand.

10. Managerial implication & Future Areas of research

The study shows that investing in Brand pays in the context of B2B as much if not more than B2C. Hence effort must be made to convince Senior Management using powerful examples as the top Brands List to invest in the medium to long term in Brand. Also, all the touch points in the Customer Journey be they in terms of financial transactions, R&D efforts, Manufacturing process, all impact the Brand and so all functions play a role in building a B2B brand and hence

Intersection between Brand and Business strategy – possible future Area of research. Some thoughts

1. Relation between Mission, vision and values and brand essence and promise

2. Similarly, Relation between Organization culture brand archetype and personality

3. Correlation between value proposition, sources of differentiation and brand positioning

4. Brand extension and the need for strategic partnerships

11. LIMITATION AND SCOPE FOR FUTURE RESEARCH

This paper is based on Secondary Published information only, some of the private companies studied are not willing to be quoted in the study.

Also, since it studied the top 100 companies only, may be good to study companies other than the top 100 also to see the impact of Brand on their success.

Primary interviews may help in the future course of the study, also there needs to be an effort to build a road map for Brand strategy to be part of Business strategy and how do we achieve that involving Cross functional leadership. In this regard critical to have people with strategy at their core and people with customer insight and analytics background as key members of the brand management team. This can be an area of further research.

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Economics of GIG Economy and a Review of Benefits and Threats

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ABSTRACT

Purpose: The purpose of this paper is to examine how concept of gig economy developed from labour economics by reviewing literature how new labour-entrepreneurship-contract with internet technology interact with theories of labour economics – demand supply of labour, behavioural economics, institutional economics, modern capitalism and internal labour market. Further it is to explore the benefits and threats of gig economy.

Design/methodology/approach: It is a conceptual paper and literature has been explored and put into pattern a) labour economics, b) Gig Economy and c) benefits and threats of participants. The labour economics has also been seen from perspectives of Institutional Economics, Behavioural Economics, Internal labour Markets, and Changing Capitalist forms.

Findings: .Gig Economy takes its lead from behavioural economics but contract entrepreneurship behaviour is different. Gig income is extremely volatile. Thoroughly designed contractual agreements may exclude some gig workers from suing platforms. Both service providers and service users reap benefits in the gig economy. But they face many threats.

Keywords: Gig Economy, Demand supply, Institutional Economics, behavioural economics, New capitalism, New contract entrepreneurs

INTRODUCTION

Adam Smith proposed a trade theory based on a highly tight labor market in 1776. Wage differentials between jobs, he claims, compensate for variations in workers' skills and the complexity of the job. As a consequence, wages help to balance market forces for all kinds of employment.

1 a) Objectives and Methodology: It is a conceptual paper and literature has been explored and put into pattern a) labour economics, b) Gig Economy and c) benefits and threats of participants. The labour economics has also been seen from perspectives of Institutional Economics, Behavioural Economics, Internal labour Markets, and Changing Capitalist forms. The present paper is an attempt to review the literature wherein the researchers have explained how Gig economy has taken its present shape and the economics behind it. Section 2 explains labour economic theories, section 3 explains gig economy in the light of classical theories, section 4 emphasizes the benefits and threats for various actors of gig economy and section 5 concludes with major findings.

2. Labour Economics (Literature Review)

During 1930s, many economists like Edward Chamberlin, Joan Robinser and J.R. Hicks, John Dunlop, Clark Kerr, etc analysed imperfect competition. Lloyd Reynold developed separately "Labour economics" as an independent discipline in 1940. Their approach was primarily descriptive to understand a better way for the wage formation, the level of employment, and in general all the elements that go to make up wage relationship. Theory of labour economics covers a very large field and provide some explanation for economic & social problems of the world in general. Labour economics provide an insight as well as helps to explain variation of wages, employment, unemployment, the cost of labour, the number of hours worked per week, difficulty of task, differences in the ability of workers, employees being fired, employees strike and many other features of today's modern society. Since the 1970, labour economics has undergone an evolution. In the last three decades of the twentieth century, this discipline no longer concentrates on descriptive or institutional approaches. There is presence of conceptualization, construction of theoretical models on the basis of principles, comparison of model to the facts by using empirical tests and surveys etc. Today, labour economics, like many other areas of economic analysis, give pride of place to teaching methods based on mathematical models, (Agarwal, M., 2005, Cahuc, et al, 2004)

2.1 Institutional Economics

Realism of assumptions is not an appropriate criterion for evaluating a theory—only predictive ability is—and thus the institutional critique of D/S theory is null and void. If labour markets are inherently imperfect, certain revisionist implications also arise concerning the economic effects of institutional interventions such as trade unions and protective labour law (e.g., a minimum wage). The neoclassical approach to evaluating these institutions is to begin with "assume a competitive labour market"

2.2 Behavioural Economics

Behavioural economics is defined as the inverse of the traditional economic entity, who is a self-interested, rational, and forward-looking homo economicus, with perfect foresight, whose utility function is stable and well-behaved. Behavioural economics examines psychological, cognitive, emotional, cultural and social factors on the decisions of individuals and institutions and how those decisions vary from those implied by classical economic theory. Babcock et al (2012) state that labour market policies succeed or fail depending on how well they reflect or account for behavioural responses. The key implications of behavioural economics are related to delay, difficulties in dealing with complexity, and potentially biased labour market expectations for the design of selected labour market policies including unemployment compensation, employment services and job search assistance, and job training.

2.3 Internal labour Markets

Wage setting is administered via a series of bureaucratic procedures, which delay and diffuse market forces. Well defined procedures and company norms govern job security rules. Training typically is on-the-job and firm-specific. This makes inter-firm mobility difficult".

"The new organizational forms literature essentially asserts that hierarchies are becoming increasingly infused with elements of the market, such as high-powered incentives and entrepreneurial units with a large degree of discretion in the use of assets, and markets are likewise claimed to be increasingly infused with characteristics of the hierarchy, such as information channels with a broad bandwidth. Thus, the boundaries between firms and markets seem less definite and more permeable than they are portrayed in the economics of organization"

3.   Gig Economy

The Internet's global reach and social web applications have generated new options for contractors. Recognized by many names, one of them is the gig economy, which is a term coined to characterize interactions in which a worker signs on for a gig, or typically a quick job such as a musical performance or delivering a service like a taxi.

3.1Types of Gig Economy

Gig workers can be categorised based on how duties are completed: 1. those who work online – in the cloud (crowd work); 2. those who work offline – on purchases made via smartphone platforms (work on demand via apps or gig work). Crowd labour is done using digital platforms, which allow clients and employees across the world to interact with an endless number of organisations and individuals over the Internet. It frequently involves highly skilled experts, programmers, translators, and designers.

3.2 Online Gig Wages

Employers can flick through the mob to satisfy their ceaselessly dynamic recruitment demands and workers remain without security or protection. Algorithms can allocate labour and regulate rates of pay. There are efforts all over the world through legal systems to protect employees against such excessive types of commodification. In exchange for the economic advantaged of supervision over their personnel, hiring instructions impose upon employers several protective constraints: workers have to adhere to their employers' demands, and experience a fundamental degree of cohesion and economic security as a token of appreciation. Absolutely autonomous service suppliers are free to decide on their customers, to establish their prices, and to debate over terms and clauses. Labour is reshaped as entrepreneurship, and work advertised as a technology. Numerous platforms cover digital work intermediation. To provide steadily systematized products and services to customers, gig-economy operators vigorously tailor the whole transaction through close supervision over their personnel to guarantee adequate performance and remuneration.

Hyers, & Kovacova (2018) emphasize that the affirmed resilience of on-demand labour may swiftly turn into economic instability, because gig income is extremely volatile. Thoroughly designed contractual agreements may exclude some gig workers from suing platforms. Gig labour harmonizes adroitly into a more far-reaching movement of fissurization, from short-term agency employment to supply-chain outsourcing. Purportedly ground breaking aspects of platforms' approaches may be meant for strengthening current operators against eventual entrants.

4. Benefits and Threats for Gig Economy Participants

According to labour economics, there are three actors – firm, workers and government. Government collects taxes as well as frame laws for security and safety of labour. However, in gig economy, technology-based user-based demand and supply is main actor. The worker tends to become entrepreneur with limited freedom which

makes it difficult for Governments to make any law for these entrepreneur -labour. Nonetheless, there are benefits to consumer, service providers and so-called entrepreneurs.

4.1 Benefits

Ostoj, (2019) analysed benefits and threats of gig workers and other participants. Jeremias Prassl (2018) writes that "in thinking about the gig economy, it's crucial that we look beyond platforms' contractual terms and powerful technology. The gig economy's product, first and foremost, is work".

4.2 Threats

All service providers face the danger of demand and revenue instability, as well as the lack of a guarantee of remuneration (no hourly rate, no minimum wage). - compensation for delivering a specific service (independent of the time involved), - unequal distribution of tasks over time, - enormous, infinite competition pressure

5. Major Findings with Concluding Remarks

Societies are in a process of flow. The global presence of the Internet and social web applications have given rise to new opportunities for free-lance workers. In Gig Economy, workers are trapped in the terms of self-employment, contract and wages. When there is heterogeneity in the extent to which individuals' behaviour, departs from standard economic assumptions, these hurdles may generate inefficiency leaving the most vulnerable.

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A Study on Effectiveness of Online Teaching in Secondary Education in Mumbai City during Covid-19 Pandemic

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ABSTRACT

A global pandemic like Covid-19 prompted social isolation. Inactivity indoors resulted in mental stress. Online learning played a critical role in helping people stay engaged mentally and healthy .With virtual classrooms, teachers could work from home and have access to all necessary tools, making online sessions just as effective as in-person sessions. Pandemic forced students to stay at home for prolonged periods of time, impeding the learning process. This research article is an attempt to find out the impact of online education on students during covid 19 pandemic. Several tools and technology has been adopted to impart smooth education so that learning cannot be compromised. Students have faced a paradigm shift with exposure to virtual learning. This research will also highlight parents and teachers perception on virtual learning. Efforts were visible on teaching staff in adopting new technology for the changing needs so that continuity of the education is maintained. Parents were equally supportive in virtual learning by providing resources and cooperation to schools.

Keywords: online education, secondary education, students, virtual learning

INTRODUCTION

Distance Education, is Web-based Instructing and Learning, often termed as Online Education in India. The demand for online education expanded dramatically around the world since the coronavirus disease 2019 (COVID-19) pandemic in early 2020. A pandemic was declared globally, resulting in the closure of schools and colleges in many parts of the world affecting the Education System.

Education System had a paradigm shift from offline to online mediums so that students are not affected in their academic path. The shift of the education system from traditional classrooms to virtual learning maintains continuity in education. A lot of efforts were introduced to maintain the balance of online and offline mediums using advanced technology and steps were taken to implement it periodically depending on the surge of Covid spread.

Online education became a compulsion and an important medium to give education to students during the COVID-19 pandemic. As some grades are not allowed to attend the offline class they are attending it through online classrooms, radio programs. Teachers who were experts in blackboard, chalk, book, and classroom teaching found it a little difficult to cope with the new technologies. Great efforts were visible by teachers to adapt from traditional pedagogy to online medium. The training was provided at all steps, hence education ministry made it mandate to all educational institutes to upgrade the technological standards so that education can be continued from online mode,

The government department took several initiatives to ensure that school-going students don't lag in their studies during the COVID-19 pandemic. The school discussed technological needs with the parents and briefed them about providing a technical support system for successful online learning. They also started some online certification courses for students as well as teachers.

Considering the current scenario, it becomes important for us to understand the perception of Students, Teachers, and Parents on their experience with Online education and the Covid19 Pandemic. Various aspects of student learning are debatable, hence this research will help us to understand the odds in favor of online learning with respect to offline.

During the COVID-19 pandemic, the government encouraged the use of online education to ensure academic continuity. Although many high-end private and public institutions have successfully transitioned to online platforms such as Zoom, Google Classrooms, and Microsoft Teams, some still struggle.

A multi-pronged approach was adopted to ensure that every student gets continued access to education, despite education being on the concurrent list of the Constitution. In order to improve access to education in multiple modes, PM e-VIDYA, part of Atma Nirbhar Bharat Abhiyan, was launched on 17th May 2020 which unified all efforts related to digital/online/on-air education to enable multi-mode access to education. The initiative included: Digitally accessible information developed for the visually and hearing

impaired on NIOS's website and YouTube. Extensive use of Radio, Community radio, and CBSE Podcast-Shiksha Vani. A QR-coded Energized Textbook for every grade is available on the DIKSHA (one nation, one digital platform) digital infrastructure for e-content for school education in states/UTs.

REVIEW OF LITERATURE

Yashvee Unmesh Dixit (2021) showed that a sample survey was done in which it was found that 19% of students were satisfied with the online education necessitated by the pandemic. Whereas 23.8% of students found it difficult to cope with the syllabus. It has also been concluded that technology has played a very important role in the online education system as the only mode of education that has come into existence. Bhoomika Gupta and Bhavyanshi Ahuja(2021) In their research paper it was concluded that as half of India's population lives in rural areas, they have lack access to basic necessities. So, if the government wishes to educate themselves they should provide them with the basic necessities first. Also according to the survey conducted by the researcher, it was also found that 86.5% of the students claimed that they think the learning process takes place better in physical classrooms than through online education. Andreas Schleicher (2020) In this research, it was concluded that 11% of public expenditure was devoted to education before the pandemic. Also, 60% of the teachers received professional development in ICT. Whereas 42% of upper secondary students are enrolled in vocational education and training. Azees Maria(2021) According to the study it was found that Online Education in Nepal(Tribhuvan University) started using the e-learning mode effectively. Also, it was found that ideal reactions by instructors in all parts of the learning process led to better results. Dr. Susil Kumar Sarangi and Dr. Harini Rajan(2021) A sample survey was conducted and found that it is important that colleges and universities understand the experience and issues of the students and accordingly prepare the further study pattern. This article recommends providing proper electricity facilities to every village so that they can get internet access and implement successful learning.

OBJECTIVES OF THE STUDY

STUDENT'S PERSPECTIVE

To know which medium is preferable for learning.

To understand the psychological effects of online education.

To understand an effective learning

Parent's perspective

Their Readiness to support online learning

Parent's perception on kids personalities due to online.

To understand kids social interaction with family.

Teacher's perspective

To understand the Ease of teaching

To understand the Effectiveness of teaching

To know whether the students are attentive in online class

To know whether the students are maintaining discipline

To know whether there are any technical glitches while teaching

METHODOLOGY

A primary survey using a questionnaire was conducted online and an approximate sample size of 114 respondents from Mumbai was collected the respondents included students, parents, and teachers. The sample size break up is as follows

Students – 56

Parents – 32

Teachers -26

Credible articles from the published secondary resources were also used for the literature review to support the research.

DATA FINDINGS AND ANALYSIS

Students Perspective

Data was collected from 56 Mumbai students studying in secondary education. Their Learning was fully on online mode. Following findings were depicted from the sample.

- Almost 17.9% agree that online teaching is easy and preferable and 41.1% have no comments on it

- Almost 30.4% feel that good content knowledge in maintained in virtual learning.

- Almost 12.5% agree that learning is same in both online and offline mode.

- Almost 17.9% feel that distractions are less in online learning.

- Almost 19.6% feel that concept understanding is there in virtual learning.

- Almost 35.7% feel that assignments are completed without difficulties.

- Almost 35.7% agree that online learning leads to physical strain.

- Almost 32.1% feel that interactions with friends are missed during online lectures.

- Almost 14.3% feel that doubts are easily cleared.

- Almost 33.9% agree that personal touch is missing in online classes.
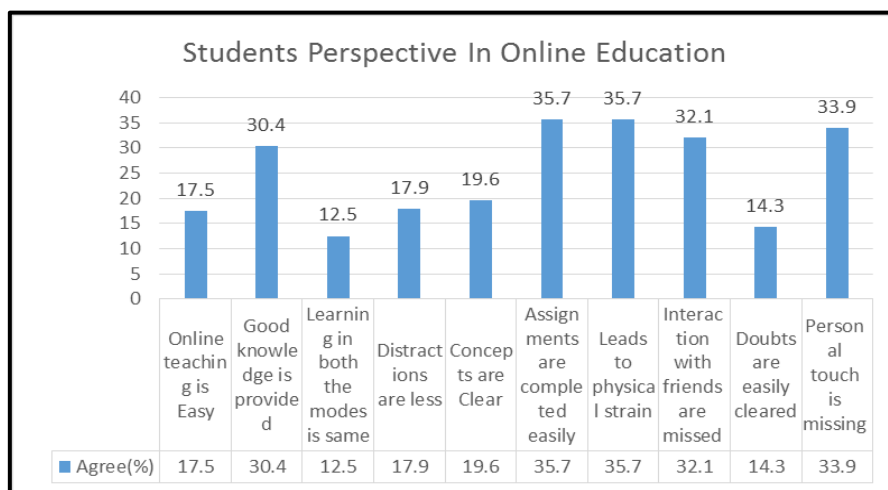
Figure 1 -Students Perspective on Online Education during Covid-19

Based on the observation in Fig.1, we analyze that students are not clear about their preference of whether online teaching is easy and preferable, hence a lot of development is required to boost this online mode of learning. There is an indication that there is widespread knowledgeable content available in online mode. Students find a lot of differences between online and offline learning. Learning distractions are comparatively less in online learning may be because concentration span is more and focus is more. Concepts are well cleared and understood by the students. The assignments are completed by students without any confusion as the concept is understood by them. Students feel that studying online for a longer period leads to physical strain. They also feel that their interactions with their friends are missing in the online class.

PARENTS FINDINGS

Data was collected from 32 Parents from Mumbai city. Following findings were depicted from the sample.

- Almost 45.5% admits that Online teaching has made reduction in Social Interactions of kids.

- Almost 33.3% agree that Childs Academic progress is assured in Online learning.

- Almost 42.2% agree that they were able to provide the required technology to kids.

- Almost 24.2% agree that their kid's personality is not compromised in Online classes.

- Almost 15.2% agree that children take Virtual learning seriously.

- Almost 39.4% agree that Online learning mode affects the physical health of their kids.
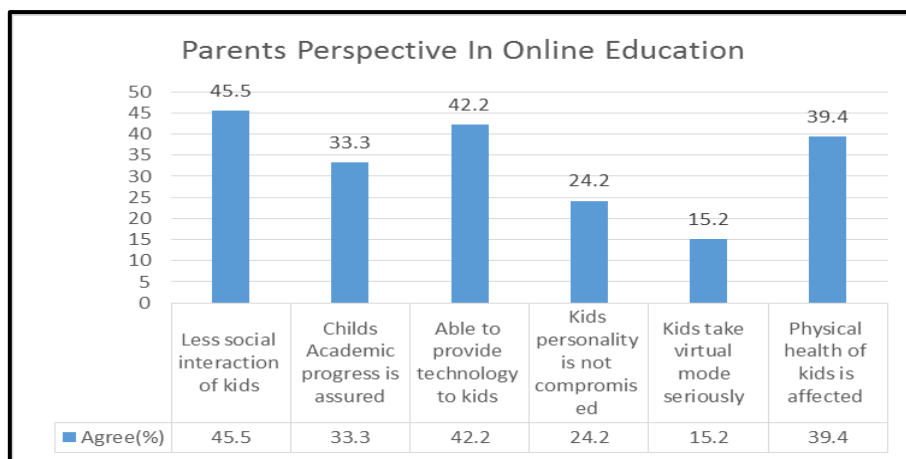
Figure 2 -Parents perspective on online education during covid-19

Based on the observation in Fig.2, we analyse that the children are interacting less with other people due to online lectures. The parent's perspective indicates that the child's academic progress is assured in online learning as the concepts taught are been understood clearly. They also conclude that they were able to provide the required technology required for their kids to attend their online classes. The parents perspective also indicates that the online teaching mode affects their child's physical health, which may be because of continuously looking at the screen and attending lectures for longer hours.

TEACHERS FINDINGS
Data were collected from 26 Teachers from Mumbai city. Following findings were depicted from the sample.

- Almost 15.4% sample agree that online teaching has less interruptions.

- Almost 7.7% sample feel that Students are interactive in Online Lectures.

- Almost 15.4% sample agree that Students doubts are easily cleared in Online learning.

- Almost 38.5% sample agree that technology is easily adapted and used.

- Almost 15.4% sample agree that virtual teaching is preferable and convenient.

- Almost 7.7% sample agree that Traditional teaching is Convenient and preferred.

- Almost 15.4 % agree that concentration of kids is maintained in Online learning.
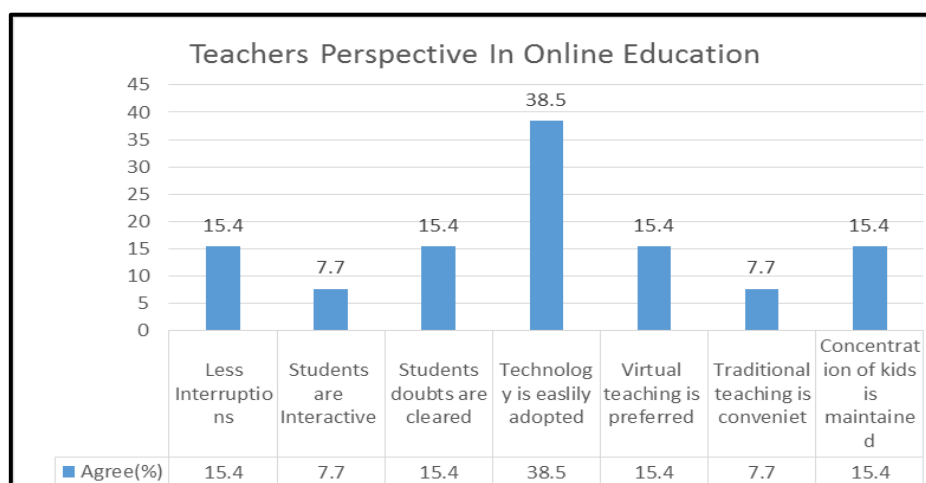
Figure 3-Teachers perspective on online education during Covid-19

Based on the observation in Fig.3, teachers perspective shows that there are fewer interruptions while teaching in the online class, but sometimes there may be some connectivity issues that may cause interruptions. Their observation indicates that the students are interactive in an online class and doubts are cleared in virtual learning. Online teaching is convenient and also preferred by the teachers. Most of the teachers agree that the traditional mode for teaching is the most convenient and preferred mode for teaching, as there are also interactions with the students.

CONCLUSION

Generally, in the education sector, technology plays a very imperative role due to which the online education mode as the only mode of education comes into existence. For eg. As the coin has two sides, a positive side which is for the winning team, and a negative side which is for the losing team. So similarly, if we say that online education has been a good choice, it might be good and vice versa. If the online learning mode would not be available then many students across India would have faced issues that would affect their future. Students too prefer online learning as they are able to complete the assignments with ease as well as understand the concepts, but they also miss their friends during the online lectures. The students also faced some psychological effects like physical strain due to continuous online lectures. Parents also supported their kids during the online learning as well as made the resources available required for online learning. They felt that their kids are interacting less with others due to online lectures. Teacher's sometimes face technical glitches while conducting online lectures which may have caused due to network issues. Whereas some teachers feel that offline learning is more convenient to teach as there are interactions with the students.

LIMITATIONS

There was difficulty in data collection and constraints were faced due to covid restrictions. Fatigue and stress brought obstacles in responding to the survey. Teachers were hesitant to express their opinion fully as online teaching did not come to their choice but was made mandatory during covid times. Data collection was only in Mumbai, hence scope of research paper could have been more explored in Tier 2 or Tier 3 cities.

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Study of Perception of Tourists towards Agritourism with Reference to Western Maharashtra

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ABSTRACT

Tourism is the act and process of spending time away from home in pursuit of recreation, relaxation, and pleasure, while making use of the commercial provision of services. Tourism refers to the business of providing accommodation & associated services to the people visiting places. Tourism involves two elements i.e. the journey to the destination & stay. Tourism is a temporary short term moment of people of destinations outside the place of their residence. Tourism is undertaken for recreation, sight seen, pilgrimage for medical reasons, for adventure etc. There are various types of tourism, some of them are Recreational tourism, Historical tourism, Ethnic tourism, Adventure tourism, Pilgrimage tourism etc. Agritourism is one more type of tourism which is upcoming and has sustainable growth. This research is to study perception of tourist about agritourism. Research is based on secondary as well as primary data. Outcome of the research is agritourism has sentiments towards environment. It is practical approach to understand nature. It provides knowledge about how to grow vegetables, fruits which are consumed every day. Hardship of farmers to produce these crops and challenges faced by them can be observed in the agritourism.

Keywords: Agritourism, Tourists, Perception, Tourism, Socio economic profile

INTRODUCTION

Agritourism is often referred as rural tourism but is subset of rural tourism. This is agrarian tourism which is based on farms. Tourism and Agriculture are two forms of economic activities providing benefit to our country, Agritourism is a composite of these activities. To define Agritourism it is 'the practice of touring agricultural areas to see farms and often to participate in farm activities'. Basic principle of agritourism are, Have something for visitors to see, Have something for visitors to do and Have something for visitors to buy.

Since year 2004 Agri-tourism is operative in India. It started in Baramati Maharashtra under guidance of Mr. Pandurang Taware, since then has dispersed across different regions of India. Maharashtra is the third largest state of India, both in area and population. Nestled in the Western Ghats and the Sahyadri mountain range are several hill stations and water reservoirs with semi-evergreen and deciduous forests. There are many tourist centres in Maharashtra which are the supporting natural environment for the agritourism. Western Maharashtra is epicentre for tourist locations as well rich in agricultural activities due to rivers and soil richness.

Maharashtra has densely populated cities like Mumbai, Pune. The city dwellers are favouring innovative forms of tourism which are environment based, agritourism fulfils these requirements. Awareness of agritourism is increasing with number of increase of agritourism centres and services. The current study is conducted to understand perception of tourists visited agritourism centres in Western Maharashtra.

LITERATURE REVIEW

Manu Sharma & R. K. (2020) Agro-tourism is both economical and connects urbanites to rural life. It gives tourists lifelong memories and helps farmers earn money. Agrotourism has two objectives: fun and education.. It has significant promise in India, especially in Uttarakhand. Gharwal and Kumaon regions make up Uttarakhand. The state administration has designated 11 districts for agro-tourism. The CE concept commits the government to creating an ecosystem that secures tourist and farmer revenue.

Saugat and Mamata Shrestha (2019) Nepal offers much to offer agricultural tourists seeking an adrenaline sensation. But the country has yet to reach its full potential. However, agro-tourism in Nepal has had its ups and downs. The tourist industry is always looking for opportunities to get involved. Agro-tourism may be a new rising tourism industry in Nepal, a country known for its agriculture and tourism. Selling goods and services online offers big cash for farmers. Thus, the public, corporate, and community sectors must collaborate to promote Agro-tourism. Nepal has been in a decade-long civil conflict with Maoist rioters. This has affected the economy. This small country nestled between China and India relies heavily on tourism.

Weerapon Thongma, Suvit Suwanno (2018) Resident views about various agro-tourism consequences were examined, as were their influence on participation in the development of agrotourism. Residents see agro-

tourism as beneficial to themselves and their community. They felt agro-tourism has improved their lives by increasing tourism-related business opportunities. Agro-tourism has improved their lives by increasing recreational and farming activities. Using local community resources totally enhances local community pride. The report says residents and visitors may learn from one other and exchange farming practices. Decreased awareness of agro-importance tourism's in environmental conservation. Road, sanitation, parking, and landscape improvements. Tew and Barbieri (2012), Shaffril et al. (2015), and Srisomyong and Meyer (2015) (2015). It improved residents' moods.

Widya Filipina (2017) Local economies and poverty have benefited from agro-tourism. Agro-tourism must be created holistically, taking into account the environmental, social, and cultural environments. Academics, businesspeople, and governments must collaborate to promote agrotourism (triple helix).

Fahmi, Azimi (2017) The survey indicated that respondents were only moderately involved in agro-tourism programs, limiting sector expansion. Locals should be involved in tourism activities that do not undermine the industry. Tourism is a localized sector that relies on local cultures and natural resources (Lillywhite and Lillywhite, 1991). It is necessary to conduct further research on factors like engagement and involvement, as well as their impact.

S K R Dewandini1, A Dananto (2021) The study's goal is to assess visitor satisfaction with Kampung Flory agritourism and the factors that influence it. The IPA index suggests that satisfaction is at 80%, indicating that Kampung Flory agritourism can very well satisfy visitors. The Spearman rank correlation shows a link between product quality, service quality, emotional, cost, and convenience. However, ticket prices are unrelated to consumer satisfaction. Based on these findings, the Kampung Flory agritourism should keep the positive aspects. Quadrant II includes employee friendliness, security, comfort, and cleanliness. Also, factors related to visitor satisfaction like product quality, service quality, emotional, cost, and convenience must be improved. This can be done by giving employees a briefing before work to motivate and encourage them to prioritise quality service. Agritourism Kampung Flory hopes to maintain and even improve the visitor index. This can be done by increasing employee ability, employee politeness, and food and beverage taste.

Deepa Ingavale (2015) said, agritourism is unravelling village life. It allows tourists to see rural life, eat traditional food, and live in peace. ATDC began with one agritourism centre and now has 152. Currently, agritourism services are provided by few agripreneurs. The Ministry of Agriculture, the Central and State Tourism Departments, and farmers must support agritourism. Few Agri Tourism Centers are for profit. So it is necessary to promote the concept to encourage farmers to participate in agritourism. A service industry requires knowledge of facility maintenance, hospitality, and public relations. Urban customers expect agritourism service providers to provide safe and clean lodging, clean water, and healthy food. Media such as television and radio can help raise awareness among urban customers. Farmers, government agencies, farmer co-ops, and NGOs should help promote Agri Business services.

RESEARCH METHODOLOGY

Research methodology: Base of the present research is primary data. Information from 140 respondents is collected. Persons visited any of agritourism center are respondents for the study. Information is collected through structured questionnaire to understand perception of their visit to agritourism. Respondents visited agritourism centers in western Maharashtra are included in the study.

Stratified random sampling method is used. Information about persons visited agritourism centers is obtained from respective centers for collection of primary data. Data is processed using SPSS software to get valid results.

OBJECTIVES OF STUDY ARE AS FOLLOWS.
1. To study socio economic profile of respondents visiting Agritourism centers of western Maharashtra.

2. To study perception of respondents towards Agritourism centers in western Maharashtra.

Data Analysis: To study first objective data is classified according to socio economic profile of respondents. Information about gender classified in to two categories. Out of total 140 respondents, 95 are male and remaining 45 are female respondents. This indicates there is considerable interest of male and female respondents towards agritourism. Classification of respondents according to educational qualification indicates that there are 21 respondents of educational level up to HSC, highest number of respondents are graduate. It is recorded 80 out of 140. Post graduate level of respondents are recorded as 35 and only 4 respondents belongs to professional category. This is clear indication that qualified respondents has an inclination towards agritourism.

Information about qualification of respondents is collected and classified. Results of classification indicate that there are 65 respondents belongs to 'services', 25 respondents are having either business or self-employed, 29 are students and remaining 21 belongs to homemaker category.

To study second objective following tables are presented which is outcome of analysis of primary data.

Purpose of visit to Agritourism center: Focus of the study is to identify perception of respondents towards agritourism. One sample non-parametric Chi-square test is applied. Results are as follows.

	Observed N	Expected N	Residual
Closeness to nature	74	35.0	39.0
Call from tradition and Culture	23	35.0	-12.0
Adventure	24	35.0	-11.0
Routine Change	19	35.0	-16.0
Total	**140**		

Table no.1 Purpose of visit

Above table indicate that proportion of respondents visiting agritourism for the purpose of 'Closeness to nature'. There are 74 respondents out of 140 visit agritourism to close to the nature and to understand the nature. There are 23 respondents who visit agritourism for the reason of 'Call from tradition and Culture'. This indicates respondents care and respect their tradition and culture. This information is presented using bar diagram as shown below.
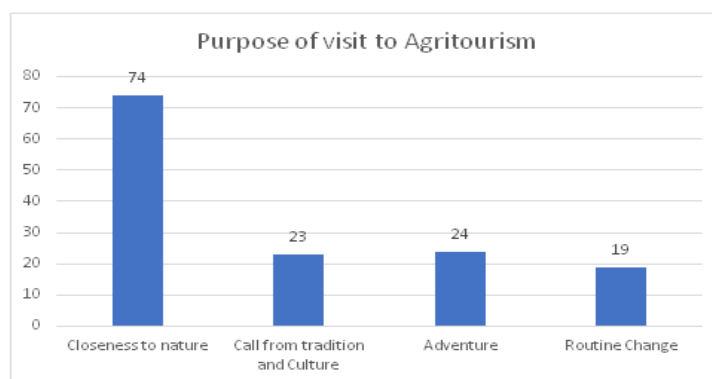
Availability of Agritourist place

	Observed N	Expected N	Residual
No	28	70.0	-42.0
Yes	112	70.0	42.0
Total	**140**		

Table No. 2 Availability of Agritourist place

The above table indicates, availabilty of agritourism centres for stay and visit for respondents. Only 28 repondents said the agritourism was not avilable easily. And 112 out of 140 respondents experience ease in finding agritourism centre for stay and visit. This indicates agritourists place is available to majority of tourists for visit
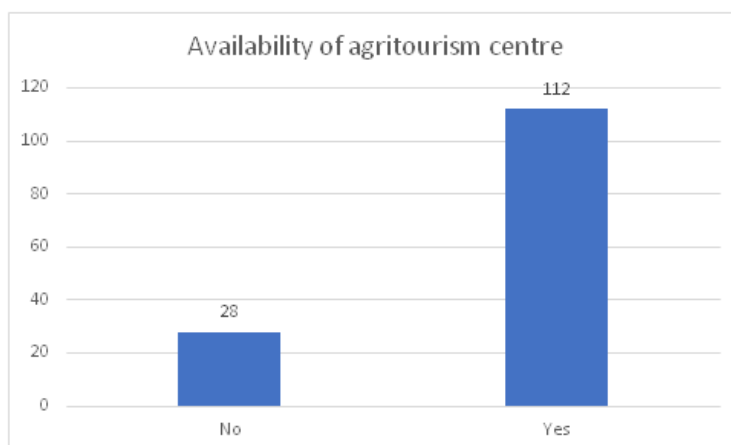
Agritourist centre is informative

	Observed N	Expected N	Residual
No	48	70.0	-22.0
Yes	92	70.0	22.0
Total	140		

Table No. 3 Agritourist centre is informative

The above table indicates the respondent's opinion on centres are informative about agriculture activities, rural life. 92 respondents out of 140 replied agritourism is informative experience. 48 respondents did not agree agritourism is informative. This indicates 34% tourists felt the informative experience in agritourism can enhanced.
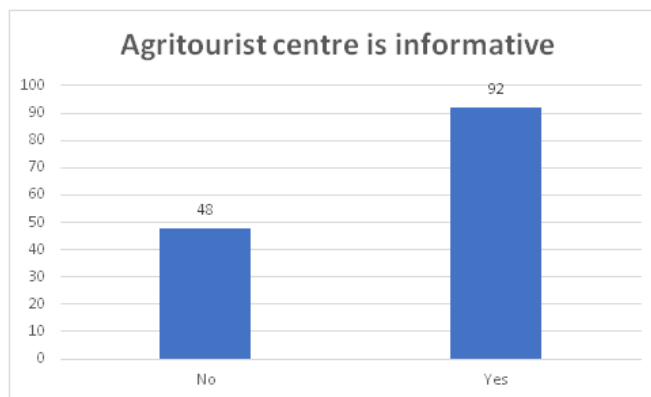
Hospitality at Agritourism place

	Observed N	Expected N	Residual
Good	115	70.0	45.0
Need Improvement	25	70.0	-45.0
Total	140		

Table No.4 Hospitality at Agritourism place

The above table indicates opinion of respondents on hospitality at agritourism place. 115 respondents out of 140 implied Hospitality as good. Only 25 out of 140 feel hospitality needs to improve. So this table suggests agritourism place hospitality is liked by majority of tourists.
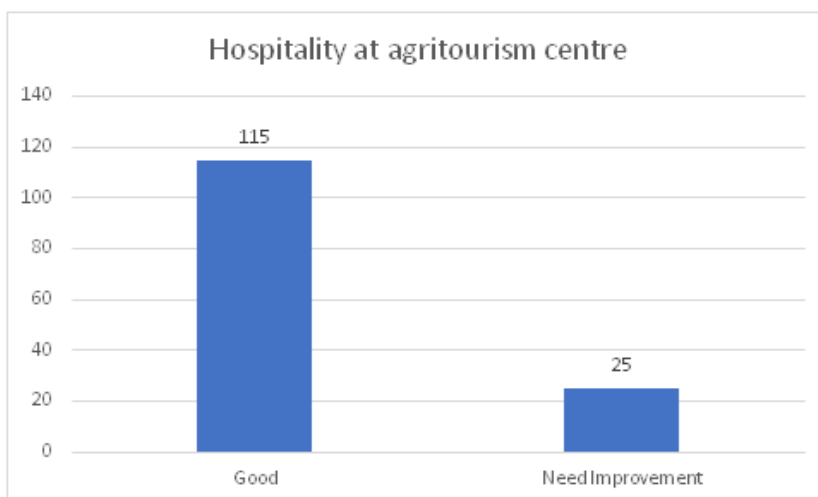
Price of products at Agritourism centre

	Observed N	Expected N	Residual
Cheap	18	46.7	-28.7
Reasonable	96	46.7	49.3
Expensive	26	46.7	-20.7
Total	140		

Table No. 5 Price of products at Agritourism centre

The table above indicates respondents' opinion on prices of products sold at agritourism centre. 18 out 140 respondents the products are cheap. 96 out of 140 responded products are reasonable. Whereas 26 out of 140 felt the products are expensive. This implies almost 81% of people visiting agritourism feel the products sold there are either cheap or reasonable.
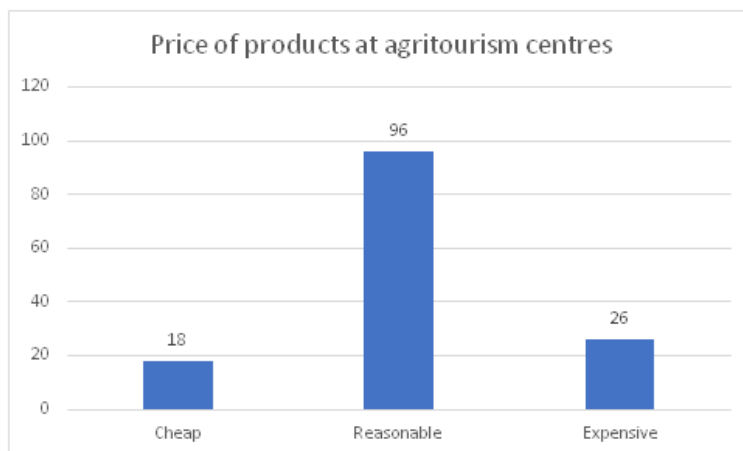
Results of Non-parametric square test are applied to check significance.

Results as follows.

	Que3 Purpose of visit	Que7 Availability of Agritourist place	Que 8 Agritourist center is informative	Que9 hospitality at Agritourism place	Que16 Price of products at Agritourism centre
Chi-Square	58.343[b]	50.400[a]	13.829[a]	57.857[a]	78.914[c]
df	3	1	1	1	2
Asymp. Sig.	.000	.000	.000	.000	.000

Above table indicates that p-values for all samples are less than 0.05. Therefore there is significant results of the parameters under the study.

FINDINGS AND DISCUSSION

On basis of data analysis, we can find that qualified people are highly inclined towards agritourism. The reason of people to visit agritourism is closeness to nature. Tourists visiting agritourism are conscious and aware about environment and environment-based tourism activity. Agritourism provides people opportunity to experience it. The data also shows that availability of agritourism place in Western Maharashtra is high, this can be one reason tourists want to visit agritourism. To avoid hassles of all other tourists place as difficulty in availability and too much of crowd, tourists can prefer agritourism. Also the experience of agritourism tourists indicated as informative and hospitality as good. This indicates tourists have positive opinion about agritourism experience and services. Majority of tourists found the products sold at centre as reasonable. Though some tourists suggested improvement for hospitality, Overall tourists visiting agritourism perceive experience as good and satisfactory.

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Understanding Blockchain Technology and CryptoCurrency – An Investors Point of View

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ABSTRACT

This paper focuses on understanding the block chain technology & Crypto Currency from an investor's point of view. The methodology adopted in this study is quantitative in nature, with a samplesize of 111. This paper helps in finding the key issues faced by investors & their knowledge level.

Keywords**:** Block chain Technology, Crypto Currency, Virtual Currency, Digital Currency, Investorsknowledge, Tokens

1. INTRODUCTION

"Crypto Currency is such a powerful concept that it can almost overturn governments"

-Charles Lee (2022)

"Paper money is going away, and crypto is a far better way to transfer value than pieces of paper"

-Elon Musk (2022)

Block chain are Blocks that contains information, it went almost unnoticed until it was first used by Satoshi Nakamoto in 2009, who created the digital Crypto Currency Bitcoins. Block chain is an openledger, having an interesting property, once some data has been recorded into a Block chain it becomesimpossible to change, hack or cheat it.

The question here arises is how does that work? Let's consider an empty block for recording data, each block contains a unique hash which consists information of the current block as well as of previous block. Here hash acts as a function that helps to decode the encrypted data. For example, Bitcoins Store details about transactions, such as the sender, the receiver, and the amount of coins collected. A Block also has a Hash, you can compare hash to a fingerprint for identification of its owner. Block too has its own unique method of identification.

Block chain is a peer-to-peer network which allows fastest online payment and transactions to transferfrom one party to another without going through any government interference or financial institutions.Digital Signature they provide with security. Benefits of using block chain are commission to third party and double spending is avoided.

Crypto meaning secret, Currency meaning medium of purchase of Goods & Services, It is a peer to peer network meaning person to person network not just limited to one but everyone in the network is maintaining this ledger. It is maintained by Block chain, which is a chain of Block for example a coaches of the train, are connected with passengers sitting inside similarly block contains data and every block is chained together. Block chain is not limited to one computer it is made available in every computer with transparency, in such case if one tries to cheat, fraud it can be tracked with ease.

Every Transactions is checked within a few seconds with accuracy. So whoever is maintaining this public ledger and is taking responsibility they are called **"Miners"** and in this process to maintain it, validate it this process is called **"Mining".** It is wholly system generated, automatic and requires special computers, special software and in this process ample amount of time, money, high energy consumption is involved, so to rewards these miners they are paid off with digital currency.

1(a). Crypto coins and Tokens:

Crypto coins are traceable due to block chain technology to keep a track of all the data whereas tokens implies using someone else's block chain as your own infrastructure while you basically pay for its rent.

When you create a token you don't have to create a block chain which is full of codes and worry about how it should be validated.

Tokens runs on the block chain of someone else's coins. Avery well known examples of Ethereumhas its own block chain, its shows value and validates transactions i.e. ERC20 which is a token ofEthereum.

1(b). Demand and Supply:

Total how many coins will be produced are fixed, pre-defined or limited for Example, In a Fixed Land area and when Buyers increase, so does the market value for that Land, similarly the pricing of Crypto currency can be seen fluctuating. Currently we have 18,925,137 Bitcoins in existence, that almost 19 million, Since Bitcoins has it maximum limit of 21 million on the supply, limited supply makes it a scarce commodity and increase future pricing.

1(c). Mining Crypto:

Crypto currencies can be mined, mining is a process in which new currency is created and added to the circulation which means a new transactions takes place it is an essential part of the ledger's maintenance towards Block chain.

This means to mine is a very challenging task since it requires having a hardware which can solve arduous math calculations, whichever computer is able to crack/ solve first earns the first block. To mine for Crypto Currency you require Graphic Processing Unit (GPU) or (ASIC) Application Specific Integrated Circuit.

1(d). Trading Crypto:

The Initial method to earn Crypto currency is through Mining and the other way around is trading. As mining can be a painstakingly longer and not a feasible process, hence trading in crypto currency is preferred. Due to its popularity the purchase of crypto currencies can be seen as a trending pattern of investment amongst investors in global market. Some of the well-known crypto currency exchange apps used in India are: WazirX, Coinbase, Binance, Coinswitch, luno etc.

2. Features of block chain technology and crypto currency:

Block chain is a cheaper and faster way to transfer any given Currency without third party or government interference which makes it a decentralized form of investment.

The Drawbacks of trading in crypto currency is frequent price momentum, high usage of unethical software's resulting in criminal activities.

Crypto currency enjoys support from investors due to its high trading volumes and some crypt currency do not have volume. At present 10,000 crypto currencies as of February 2022, are established. Some of the widely traded and volatile crypto currencies are Bitcoin, Ethereum, Litecoin, Cardano, polka dot, Stellar, Doge coin etc.

2(a). History of Block Chain

Year	Narrative
1991	Cryptographically put forth for the first time by Stuart Haber and W Scott Stornett
1998	"Bit Gold" which is a decentralized digital currency which was first started Nick Szabo.
2000	A theory was published on Cryptography by Stefan Konst
2008	Satoshi Nakamoto Released a white paper initiating the block chain model.
2009	Bitcoins are made public by Satoshi Nakamoto.

Source: wikipedia.com

3. Privacy & Securities

If you try to change some data inside the block, it will change the Hash as well, causing changes in the entire transactions which is merely impossible to change such large amount of transactions and ingo.

The first Block containing data is called the Genesis block, which cannot be counterfeited, since many Crypto currencies are decentralized networks, they are Block chain technology based which ensures no government interference manipulation, and no government controlling allows crypto currency to exist globally.

Privacy- Cryptography Since mentioned Block chain technology is an open public ledger it, raises several questions of privacy, so to answer them, Block chain Works on Cryptography. Cryptography means everything is coded.

4. CHARACTERISTICS

1. Block chain is Decentralized Structure

2. In Block Chain Technology the Records of transactions are unalterable, it is an end to endencryption mode,

and this ensure security and privacy of its user

3. Manual work or Manpower is reduced; Reporting and auditing data is made easy

4. Immobility ensures the host or origin is traceable in order to avoid any hacking orchangesdone

5. Control is given individually, It is upon the user to decide the data they are willing toshare,with limitations

6. Tokenization is very important aspect of the Block Chain technology, which means it can convert or add value to an asset of digital token, Non Fungible Token (NFT's) are used to selldigital art at present Instagram influencers are engaged in NFT's transaction

5. REVIEW OF LITERATURE

Ryoshi (2021) : The founder of Shiba Inu in an articles states that unmasking his identity will be of no success as he is just a guy behind the major growth of shiba inu even though the controversy is going around of him becoming a millionaire overnight, he said in an open statement "I own Zero Shiba Inu".

Vitalik Buterin (2021): Buterin in an interview with Bloomberg said that "people who invest in crypto or build their own crypto, a lot of them welcome bearish market, it tends to invite a lot of shortterm investor attentions".

Vijay Ayyar (2022): Vijay Ayyar being the head of Asia - pacific with crypto exchange luno, he saidthat "With memecoins it can be hard to speculate the actual reason behind the price momentum".

Pete et al. (2020): Crypto currencies are clearly different from classical asset investment, mainly due to its behavioral pattern of high variance and departure from normal trading. Crypto currencies are considered diverse due to its clustering analytical nature.

Karame et al. (2012): Due to its fast transaction support investors are attracted, although each transactions needs an average time of 10 minutes to form into a block chain and more than an hour tovalidate, this results in prevention from attacks.

Goldman Sachs (2021): Recently in article "noted to their investors that ethereum has a good change of overtaking the 660 $ billion market cap of Bitcoins".

Dan Gambardello (2022): Founder of Crypto Capital Venture, "Said that (ADA) Cardano is built to provide financial infrastructure globally Cardano is the Biggest Sleeping Giant and it will explode in the years to come".

6. OBJECTIVES

Based on the Review of Literature the gap of studies is found and following objectives are framed forthe study.

•   To understand the technology of Block chain & Crypto Currency

•   To Measure the knowledge level of Citizen in Mumbai Region

•   To Measure the Level of Investment done by citizens of Mumbai Region in CryptoCurrency

7. RESEARCH METHODOLOGY

To achieve the objectives of the study primary data has been collected and analyzed using statisticalmethod like Percentage analysis (Pie chart).

Primary Data is collected using Online Questionnaire via Google forms. Sample size of 111 isconsidered in this study. The data is collected using convenient sampling technique.

8. DATA ANALYSIS AND INTERPRETATION

Here the study analysis and interprets the data collected

CHART 1(a)

Gender
111 responses

Male
Female

45%

55%
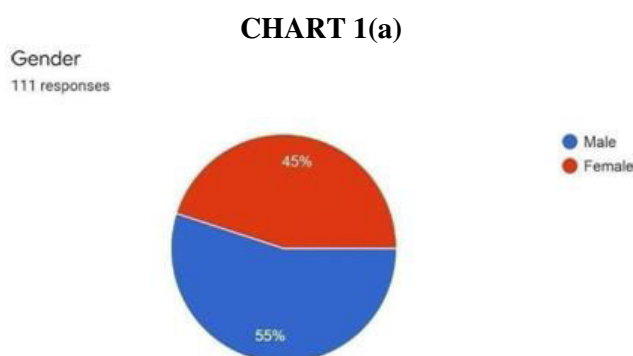
INTERPRETATION

Based on the survey, the color Blue represents male and Red represents Female category respectively. From the above Pie Chart 1 (a), 55% Male Dominated this category and remaining 45% were Females. Gender based question was asked to see the pattern of investment amongst male and female, and a total of 111 responses were collected. Further, we can assume that approx. 50 females and 61 males invest which is altogether fair in comparison.

CHART 1(b)

Age
111 responses

- 0-25
- 26-35
- 36-45
- 46 and above

90.1%
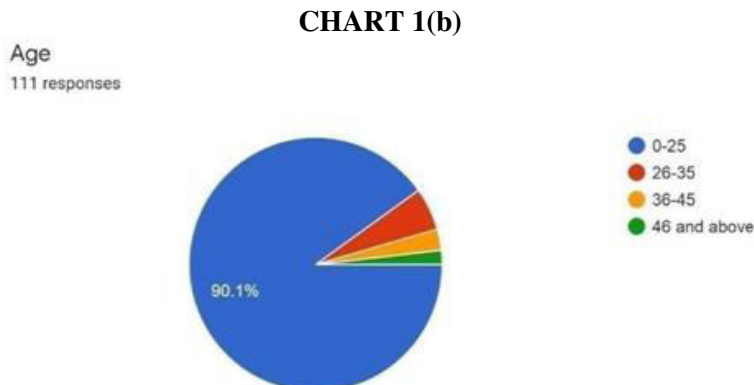
INTERPRETATION

This category was distributed amongst various age group and 0 to 25 age took the majority of this survey consisting of 90.1%, followed by the age group of 26 to 35 years.

CHART 2

1. Have you heard about Crypto Currency?
111 responses

- Yes
- No
- Not Much
- Just heard about it now in this survey

91.9%
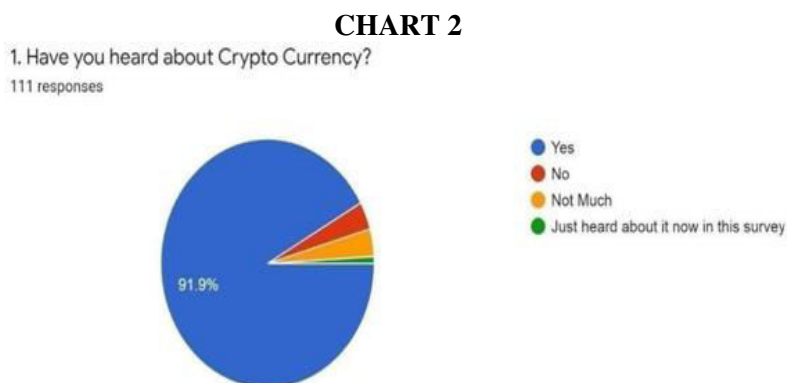
INTERPRETATION

Based on responses received outcome shows that 91.9% know about Crypto Currency. Whereas, remaining 8.10% were unaware. And 3.6% were acquainted about Crypto while taking the survey. 0.9% were completely unaware prior to taking this survey

CHART 3

2. Do you invest in Crypto Currency?
111 responses

- Yes
- No

85.6%

14.4%
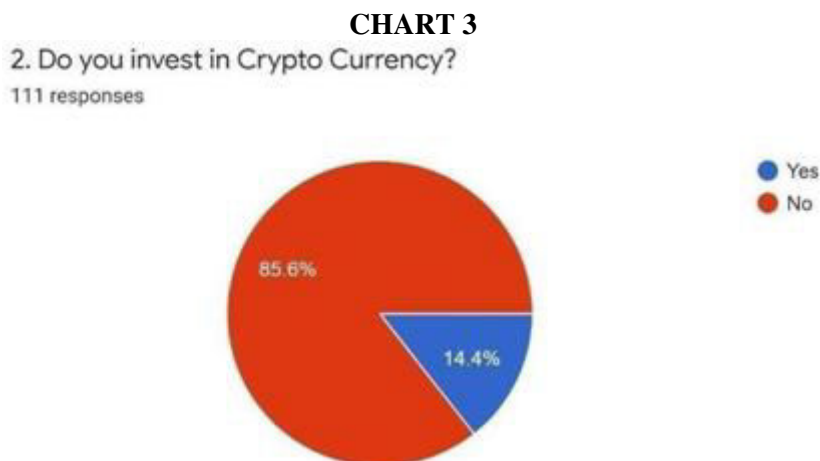
INTERPRETATION

A very small amount of respondents said 14.4% said they invest in Crypto Currency rest 85.6% did not prefer or want to disclose about investing in Crypto currency as their medium of investment.

CHART 4

3. Do you know about Block Chain Technology?
111 responses
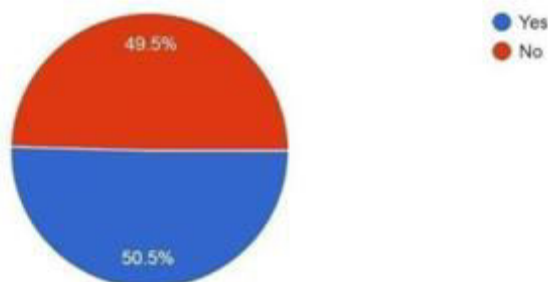
INTERPRETATION

When asked about Block chain technology, the response was on par 49.5% & 50.5% simultaneously, when compared with PIE CHART 2, Respondents know about Block Chain technology but not about Crypto Currency.

CHART 5

4. Does any of your Family or Friends invest in Cryptocurrency?
111 responses
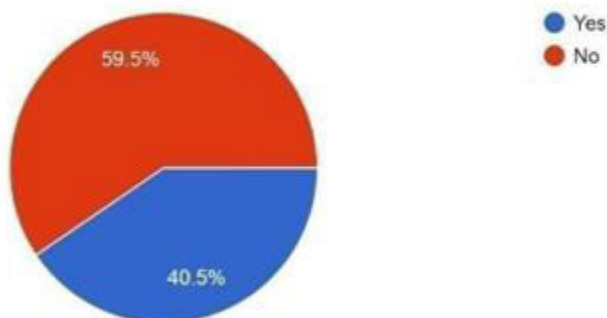
INTERPRETATION

People themselves who do not invest in crypto Currency know at least 1 out of 2 people that do, and they are influenced by some of their close Family Members, Friends, and Colleagues etc.

CHART 6

5. Do you know the Platform's for trading Crypto Currency?
111 responses
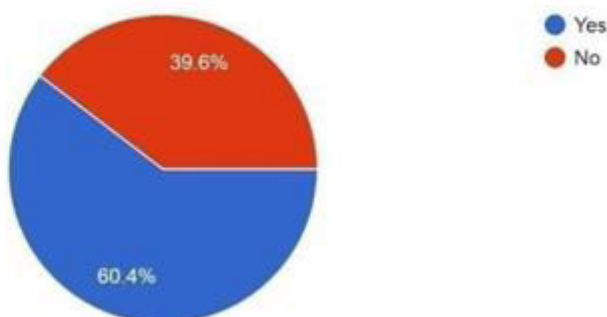
INTERPRETATION

People who do not Trade themselves, are aware of the trading platforms provided for Crypto Currency trading, here we interpret that crypto being an advance method of Investment only few people trade by themselves, and others prefer third party or broker to trade on behalf of them.

CHART 7

6. Do you find any security issues in Investment of Crypto Currency?
111 responses
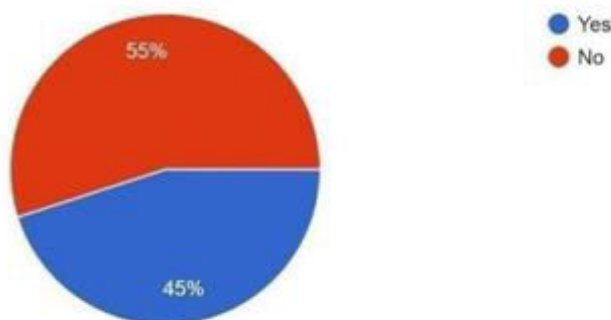
INTERPRETATION

As Crypto Currency was used keeping Privacy as their top priority, Yet 45% feel that Crypto Currency Trading Platforms needs to be more secure with respect to the Data that that collect at the time of Account opening.

CHART 8

7. Will you invest in crypto Currency if proper training is provided?
111 responses
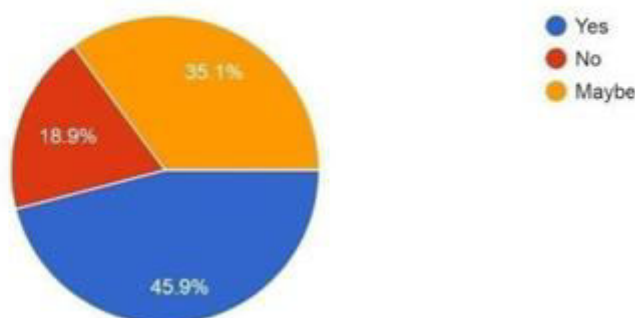
INTERPRETATION

81% were interested to Invest in Crypto Currency if proper training and knowledge is providedto them, yet 18.9% were unsure considering the risk involved in Crypto Market Since it is a decentralized Currency.

CHART 9

Which do you think would be more profitable, investing in the stock market or investing in cryptocurrency?
111 responses
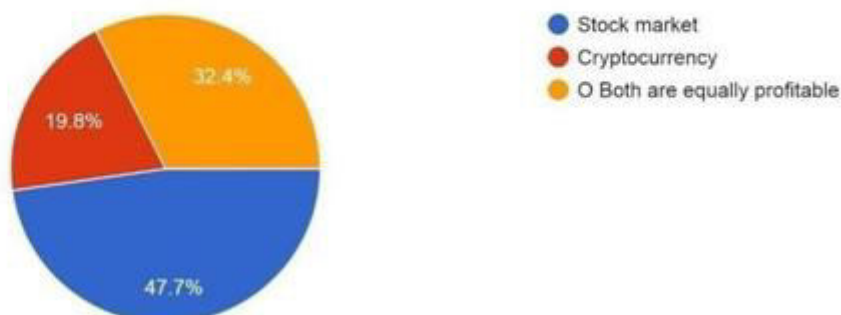
INTERPRETATION

47.7% who find stock market profitable are probably trading in Equity and 19.8% feel that CryptoCurrency is more profitable as compared to stock market. Since, Crypto is a very volatile market with only 10,000 Crypto currency in existence (as of Feb 2022), volume is more in the Equity Market.

CHART 10

9. Do you feel cryptocurrency is more valuable than Equity?
111 responses

- Yes
- No

67.6%
32.4%
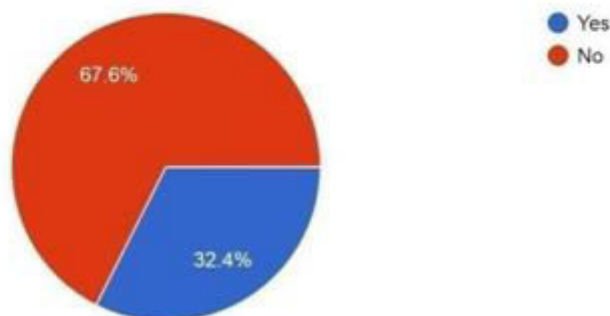
INTERPRETATION:

According to the Pie chart we can observe that 67.6% believe Crypto Currency is not a valuable mode of investment as compared to previous (PIE CHART 3) only 14.4% invest in Crypto currency and an increase in 32.4% shows that who do not Invest In crypto Yet find it more valuablethan equity, maybe the reason being, not adequate amount of Knowledge or resources

CHART 11

10. How much percentage of your total income will you invest in cryptocurrency?
111 responses

- 0-20%
- 20-40%
- 40-80%
- 80-100%

21.6%
73%
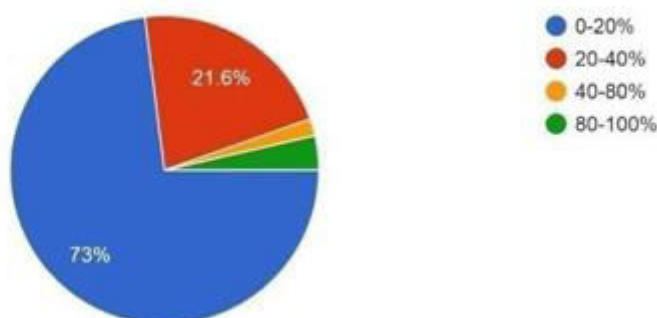
INTERPRETATION

A very large amount of people believe that they won't invest more than 20% of their income, whereas only 21.6% are willing to invest more than 20% but not more than 40% of their total income.

9. LIMITATIONS AND SCOPE FOR FUTURE STUDIES:

The study covers sample only from Mumbai region, The study is conducted in the time frame of 30 days only, There was no financial grants was received for this study

Researchers are further encouraged to consider larger sample size and bigger geographical area with more parameters to measure the customer point of view.

10. CONCLUSION:

Crypto Currency & Block Chain technology being a newly established currency not many are familiar with its functioning and some of them who are aware prefer Crypto currency as a mediumof investment other than Stock market. Block chain technology came into existence due to Bitcoins. Here we can see that Bitcoins play a major role in the formation of the Crypto Currencymarket and many investors were introduced to Crypto currency due to viral news initiating bitcoins.

Block chain technology is thriving in the tech-driven world owing to its smart capabilities such as faster transaction speed, low transaction fees, transparency, utmost cyber security, and many more. But there is a need to have a clear understanding of the difference between the market trend and reality in sync with the business goals of an organization. Multiple organizations need to be aware common block chain mistakes to avoid any serious consequences in the nearby future.

Even though Crypto Currency being decentralized wherein no governing bodies intervenes it is widely accepted around the globe. Hence we conclude that Income, Age, Financial literacy and Cultural factors such as family and friends play a major role in modelling/influence the investor minds.

Here we conclude that people are not hesitant to invest in crypto currency they are willing to invest,if given formal training 45.90% said yes to invest in Future. Whereas 35.1% needed proper instruction. So overall 81% of people were intrigue to invest in crypto market.

In conclusion, online trading is accessible and there is a vast number of exchange sites available to a range of users, including beginners. Bitcoin mining, on the other hand, is a great option for anyone that is looking for long-term involvement with the block chain network.

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An Exploratory Study on Personal Stress Faced By Working and Non-Working Women

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ABSTRACT

Women are rightly called the backbone of the family and their role in our lives cannot be denied. The motive of the study was to identify the key indicators, which will help understand the personal stress faced by working and non-working women. The study used interviews of both working and non-working women and qualitative analysis was performed on these interviews using NVivo 12 software. The results of the study revealed the primary challenges faced by both categories of women. These were managing household work with no support; fulfilling all the needs within the family budget; lack of respect and emotional support from family; failure to give proper time to kids and managing the daily hassles; financial pressure; maintaining health and beauty; taking care of parents and gender discrimination. The stress can be well handled provided women get love, care, support, understanding and acceptance from their families. Future studies can be conducted using quantitative techniques and identifying other types of stress faced by women.

Keywords: Exploratory, Working Women, Non - Working Women, Personal Stress.

BACKGROUND

Stress can be defined as an emotional as well as physical feeling of tension that is being experienced by an individual that directly affects the health of that person and can cause different types of health issues. Stress can be experienced from any event, thought or feeling which would make an individual nervous, angry and frustrated.

Stress is also being defined a reaction of an individual's body to a specific challenge, pressure or demand. Stress can be positive or could be negative which depends upon the particular situation the individual is facing. On a shorter term, stress could be positive, affects the body in a positive manner. Stress is experienced at that time when it helps to avoid any type of danger or when to meet a deadline. In case if the stress is for a longer period, then it could affect the health of the individual in a harmful manner.

Stress can be referred to as a feeling of the normal individual about some specific aspects. Stress is classified into two different types that is Chronic Stress and Acute Stress.

Personal Stress can be defined as stress that involves strain, hardship, emotional, mental and physical pressures in the personal lives of an individual. It is the response of the high pressure to the stress being faced on personal front of the individual. Stress is caused because of the demands, placed on the mental and physical energy.

Stress is usually happens because of being under lot of pressure, to worry about something and while facing big problems or change.

Working-women also face stress on the personal front of their lives. But still working women individual are trying their best for managing the increased demands on the professional as well as personal front but still the level of stress among them is on an increase. The amount of stress being experienced by them is more in comparison with their male counterparts. According to a survey, which was being made on the employees in UK, about 79% of women employees as in comparison with 66% of men employees face work stress affecting their personal lives. Women in the age group of 35-49 experience far worst personal stress. Women are trying to balance heavy workloads along with family priorities and it is affecting their health and creating financial tensions affecting their mental and physical health.

In **non-working women,** the stress is resulted because of managing their family and fulfilling their wishes. Non-completion of this, will eventually lead to creation of stress among them.

SIGNIFICANCE

The world is getting competitive day by day and stress has become part and parcel of life. Stress is known to impact the lives of each and every individual. When it comes to personal stress, both working and non-working women have different types of responsibilities and have their fair share of stress too. Personal stress is the stress faced by an individual in the daily routine of their life. The study tried addressing the issue of stress from the viewpoint of both working and non-working women. Though it is considered that working-women have dual responsibility, the fact that non-working women have fair share of personal challenges cannot be ignored.

Hence, the study contributes by finding out the main reasons of personal stress faced by both working and non-working women.

MATERIALS AND METHODS

Exploratory and qualitative research design is adopted for the current study .It is based on inductive approach. Face to face interview was taken of 40 women (working and non-working women). The current study adopts non-random convenience sampling technique. NVIVO 12 and text mining techniques viz. mind map, word cloud & word frequency table have been used for the study.

RESULTS

Table No. 1: Summary Table

WORD	LENGTH	COUNT	WEIGHTED PERCENTAGE (%)
HOUSEHOLD WORK	13	70	6.74
DAILY HASSLE	11	67	6.45
FAMILY BUDGET	12	63	6.07
RESPECT	7	60	5.78
EMOTIONAL SUPPORT	16	58	5.59
ATTENTION TO KIDS	15	56	5.39
EARLY MARRIAGE	13	54	5.20
DECISIONMAKING	14	50	4.82
EMI PRESSURE	11	48	4.62
MEDICINES	9	46	4.43
PCOD	4	44	4.24
FERTILITY ISSUE	14	42	4.05
SOCIALEVENT	11	40	3.85
BEAUTY CONCERN	13	38	3.66
BORKEN FAMILY	12	36	3.47
DIVORCE	7	34	3.28
FIGHT AT HOME	11	34	3.28
MENSTRUATION	12	30	2.89
JOINT FAMILY	11	28	2.70
PARENTS RESPONSIBILITY	21	25	2.41
PRESSURE OF MALE CHILD	17	24	2.31
DEATHINFAMILY	13	18	1.73
LOVE LESS MARRIAGE	16	16	1.54
CONSERVATIVE THINKING	20	15	1.45
KIDS CAREER	10	12	1.16
IN LAW RESPONSIBILITY	19	11	1.06
POST PREGNANCY	13	8	0.77
NO FUTURE SAVINGS	15	5	0.48
GENDER DISCRIMINATION	20	4	0.39
LOW STATUS IN SOCIETY	18	2	0.19

As shown in the above table the important problems faced by working and non-working women are household work with 70 counts and 6.74 weighted percentage; daily hassle with 67 counts and 6.45 weighted percentage; family budget with 63 counts and 6.07 weighted percentage, respect with 60 counts and 5.78 weighted percentage, emotional support with 58 count and 5.59 weighted percentage, attention to kids with 56 counts and 5.39 weighted percentage, early marriage with 54 counts and 5.20 weighted percentage, decision making with 50 counts and 4.82 weighted percentage, EMI pressure with 48 counts and 4.62 weighted percentage, medicines with 46 counts and 4.43 weighted percentage, PCOD with 44 counts and 4.24 weighted percentage, fertility issue with 42 counts and 4.05 weighted percentage, social event with 40 counts and 3.85 weighted percentage, beauty concern with 38 count and 3.66 weighted percentage, broken family with 36 counts and 3.47 weighted percentage, divorce with 34 counts and 3.28 weighted percentage, fight at home with 34 counts and 3.28 weighted percentage, menstruation with 30 counts and 2.89 weighted percentage, joint family with 28 counts and 2.20 weighted percentage , parents responsibility with 25 counts and 2.41 weighted percentage, pressure of male child with 24 counts and 2.31 weighted percentage, death in family with 18 counts with 1.73 weighted percentage, love less marriage with 16 counts and 1.54 weighted percentage, conservative thinking with 15

counts and 1.45 weighted percentage, kids career with 12 counts and 1.16 weighted percentage, in laws responsibility with counts 11 and 1.06 weighted percentage, post pregnancy with 8 counts and 0.77 weighted percentage, no future savings with counts 5 and 0.48 weighted percentage, gender discrimination with 4 counts and 0.39 weighted percentage and low status in society with 2 counts and 0.19 weighted percentage.

Figure No.1 : Word Cloud

As per above figure No. 1 it is seen that the most crucial personal problems faced by working and non-working women are no support for household work, daily hassle, managing family budget , respect in family , No emotional support. Moderate problems are fertility issue, social event, beauty concern, broken family and divorce. Slight important problems are in law responsibility, post pregnancy, no future saving, gender discrimination and low status in society.

Figure No. 2: Mind Map
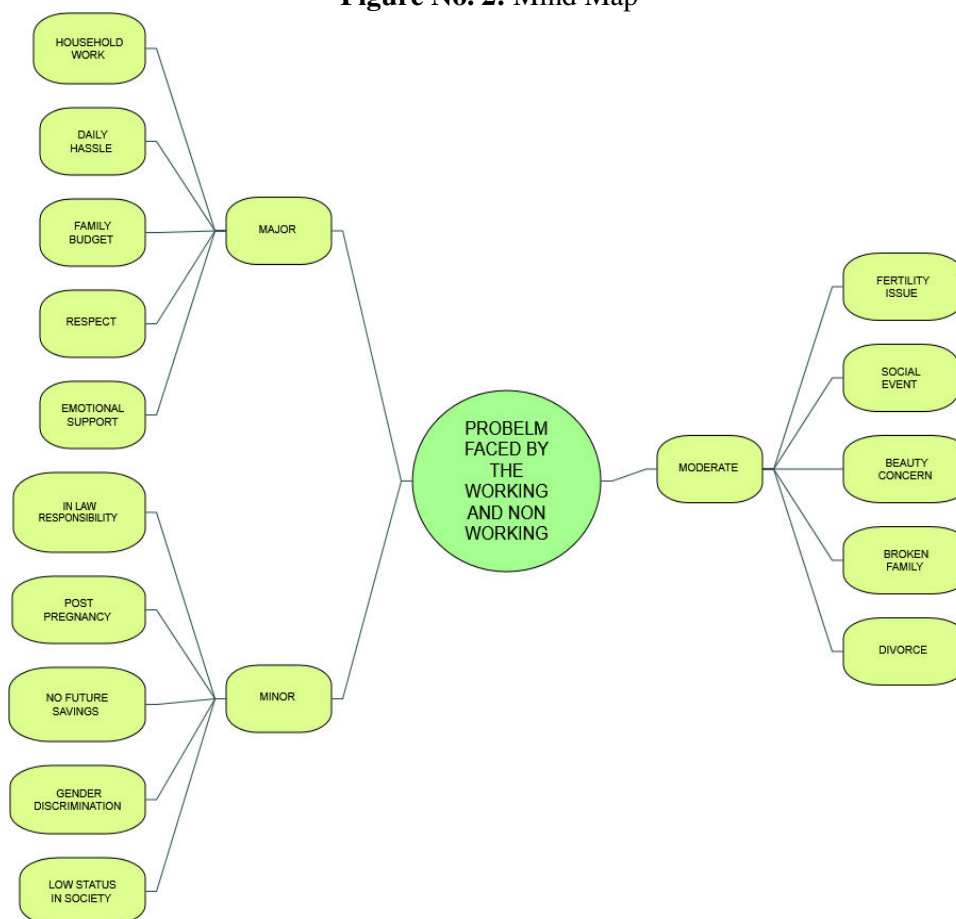
As per figure No.2 It is seen that major problem faced by working and non-working women are no support for household work, daily hassle, family budget , respect , emotional support. Moderate problem are fertility issue, social event, beauty concern, broken family and divorce. Minor problem are in law responsibility, post pregnancy, no future saving, gender discrimination and low status in society.

CONCLUSION

The study has tried understanding the major reasons for personal stress faced by working and non-working women. The results of the study revealed the primary challenges faced by both categories of women were managing household work with no support; fulfilling all the needs within the family budget; lack of respect and emotional support from family; failure to give proper time to kids and managing the daily work easily. The study also highlighted the other reasons for personal stress as not allowing women in the decision-making, early marriage, and pressure to take care of parents and sometimes leading a life where they get no attention and love. Few women also stated that remaining fit and healthy along with maintaining their beauty is also as one of the reasons for personal stress. Women have time immemorial expected to fulfill all the desires of the family members. Now the situation has changed and life has indeed become stressful and a little support and care can help women lead their lives easily and reduce their stress.

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Understanding Cyber Safety and Security With Respect to SocialMedia

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ABSTRACT
This paper mainly focuses on the concepts of cybercrimes, social networking sites and the victims. The problems of cybercrime have been discussed in detail and the paper tries to providethe best possible solution to the problem. We have used a quantitative method of analysis to study the awareness of cybercrime. Today's world is facing a common issue of cyber-attacks on social media, especially by the teens. They are unknowingly becoming the victim of cybercrime.

Keywords : Cyber safety, Cyber security, Social media, Cyber-attacks, Online stalking, Cyberbullying, Sexting, Privacy concern, Digital footprints, Cyber investigating cells, cyberpolice, Cyber lawyers.

1. INTRODUCTION
"We're all going to have to change how we think about data protection."Chris Van Daele (2017)

"Privacy – like eating and breathing – is one of life's basic requirements." Katherine Neville (1992), (A Calculated Risk: A Novel)

"If you put a key under the mat for the cops, a burglar can find it, too. Criminals are using everytechnology tool at their disposal to hack into people's accounts. If they know there's a key hidden somewhere, they won't stop until they find it."

Tim Cook (2015), One of the favourite platforms of communication of today's generation is social media. It isused for receiving and sending information, entertainment and to connect with people.

The Social community group is known as social media such as Instagram, Facebook, Twitterand many others. It is the number one choice among the children. Although this media is very useful it has some cons. Lack of cyber security is the biggest cons of social media. So it is the responsibility of the parents to see to it that there is no misuse of their children's information. Even the information can be used for cyberbullying. As teenagers spend most of their time in chatting with their friends on social media, there is a rising risk of cyberbullying, cyber fraud, sexting, online harassment, etc.

The children face many other problems such as depression, sleep deprivation, anxiety, etc. However, on the other part, the parents find it difficult to cope up with technology and the digitalmedia. They are unaware of the digital world which is there inside social media. This results in a lack of connection between children and their parents. Hackers take this situation as an advantageand it leads to cybercrimes.

Social media addiction has been a serious issue which has been faced by children and adolescents. Many of them are also been exposed to contents which are viral and inappropriate atthe same time.

Threat to youngsters from social media Adolescents are being trapped by hackers as they are unaware of the fact that their footprintsare being traceable.

1. Online stalking
Online stalking is one of the most common threat to social media users. The stalker stalks the profile, their data, photos and other personal information through online mode. They can be easily traced the online footprints of the user with the help of advanced technology and this hampers the privacy of the user's data.

2. Cyberbullying
Cyberbullying is a form of online harassment where the user's data is stolen for personaland unethical gain. Most of the adolescents are prone to this type of threat. When it comes to online harassment, it is less risky as compared to physical harassment.

3. Sexting
Sexting is considered as highest form of threat especially to young girls. The victim also to suffer from mental trauma. The sexually banned messages, nude photos and semi- nude photos are being sent or received. The adolescents who are being part of this, has to face serious consequences under cyber and IT laws.

4. Privacy concern – Digital Footprint

Since the youngsters are unaware of the fact that their data may be misused, they do not pay attention to privacy issues. Their each and every activity on social media is been traced and thus it is known as the **'Digital Footprint'**. Privacy hazard is a major concern for adolescents.

Apart from these cyber threats, there are several other threats to adolescents with respect to social media. To Overcome this threats, government has introduced the need for the security requirements.

Crimes that take place online through electronic devices are known as cybercrime. It is mostly a virtual crime. It affect individual mentally, emotionally, psychologically and economically. It is also done to spoil one's name in the society through online mode. Cybercrime includes harassment, stalking and spread of sexual context. It violates laws which are made to regulate internet based activities

Cyber law is formed to look after the regulation of information technology. It is concerned with legal aspect of data in online form. It is concerned with privacy of data, protection of privacy and misuse of data, security of data, circulation of information, etc.

Cyber laws are protecting people by preventing cyberbullying which takes place in inter- gender as well as in all age demographics. To enforce cyber laws that deal with cybercrimes, the information technology act was passed by the Indian parliament on **17th October 2000**. It was signed by the then Minister of Information Technology, **'Pramod Mahajan'**. Many amendments were made after the act in cyber laws. Punishable actions were imposed on offensive messages, child porn and cyber terrorism.

To create a healthy environment on social media we must spread awareness in order to secure our online data. To trace cybercriminals, there are many cybercrimes investigation cells and cybercrime police stations. These cells are situated in various parts of the country. A victim of cybercrime can register or file their complaint. There are many cybercrime complaints filed with respect to social media. The number of social media cybercrimes are increasing day by day in India.

Also the concept of cyber lawyer is becoming more and more popular. They are cyber professionals who helps people in taking care of their data online as per the cyber laws. Even many companies have started taking help of cyber lawyers to prevent their data from cybercrime.

2. LITERATURE REVIEW

Li and Berno (2008) state that it is necessary to know how relationships are developed in social media. Technology has evolved but its influence on personal interactions has been more profound.

Rajagopal (2013) claims that consumers are becoming more engaged in co-creating marketing material with companies and brands. As a result, businesses are looking at virtual social media programmes and campaigns to better reach their customers who live online as well. The creation of social media method on YouTube, Facebook and Twitter looks separate event rather than being a segment of a non – segregated advertising process.

Hanna et al (2011) also discuss with this development and say that the buyers aren't any more passive within the selling exchange technique. He believes that some firms produce social media platforms and operate it severally, not as associate integrated strategy that brings consumer's experiences first. Social media doesn't replace conventional media, however it will enlarge marketing's capacity to have interaction with customers and acquire consideration and influence.

F. B. Schneider (2013) displayed a paper on the need for legitimate implementation of cyber security instruction in educative institutions or colleges. He expressed that the necessity of cyber security instruction in colleges advance expansion of non-formal ponder centres in cyber security formation. The deficiency of well-trained labour in cyber security makes the work of cybercriminals simple. They encourage submitted that there was the requirement for standardized preparation of cyber security experts such/ that they get all the desired preparation to empower them to protect against cyber dangers. The gadgets utilized by an individual that are associated with the web are troublesome to hacking the event that h/e/she has essential knowledge of cyber security. So, cyber security is preparing moreover diminishes the number of cyberattacks episodes to form the work of cybercriminals more difficult.

3. OBJECTIVES OF RESEARCH
The Review of Literature was conducted to study the following objectives:-

➢ To understand about Cyber Safety in India.

➢ To check the knowledge level of Cyber Safety in India.

➢ To suggest the security measures to social media users.

4. RESEARCH METHODOLGY

4.1 DATA COLLECTION

The study is based upon primary data collected from 100 respondents through a structured questionnaire covering different group of peoples of different age groups engaged in various types of occupation. The secondary data has been collected through various research papers and from information available on web links.

4.2 DATA ANALYSIS

Analysis of data was done with the help of Questionnaire. The percentage analysis method wasused for finding out the results of the survey.

5. ANALYSIS AND INTERPRETATION

The analysis and the interpretation of the survey are as follows:

Figure 5.1
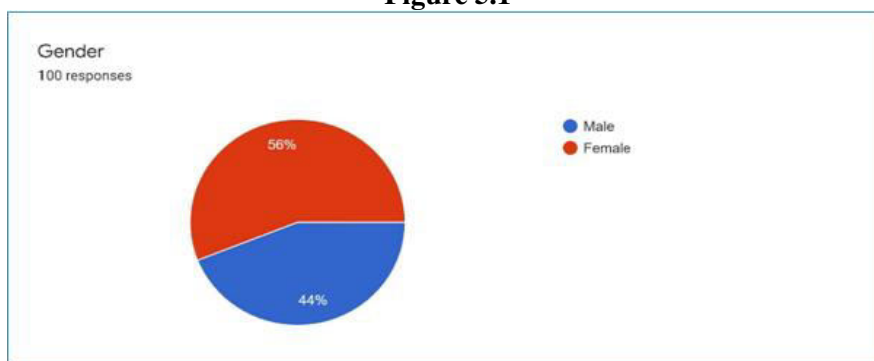
According to the pie chart (5.1), 56% are male and the remaining 44% are females.

Figure 5.2
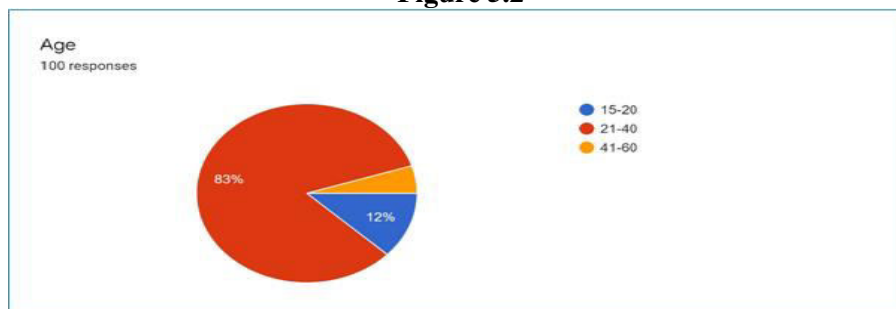
According to the pie chart (5.2), there are three different categories of age, of which highest responses are received from categories 21-40 that is 81.3% followed by 15-20 age group that is 12% and the least being from the category of 41-60

Figure 5.3
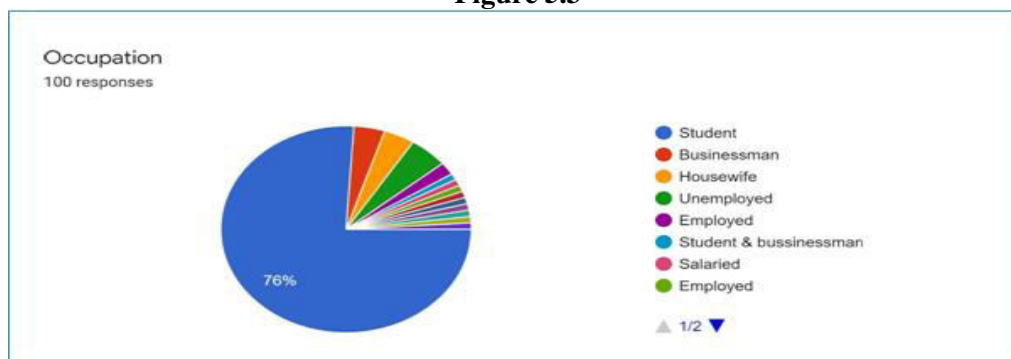
According to the pie diagram, the majority of the respondents are from the category of students and the remaining respondents are from various other categories such as employed, unemployed, self-employed and housewife.

Figure 5.4
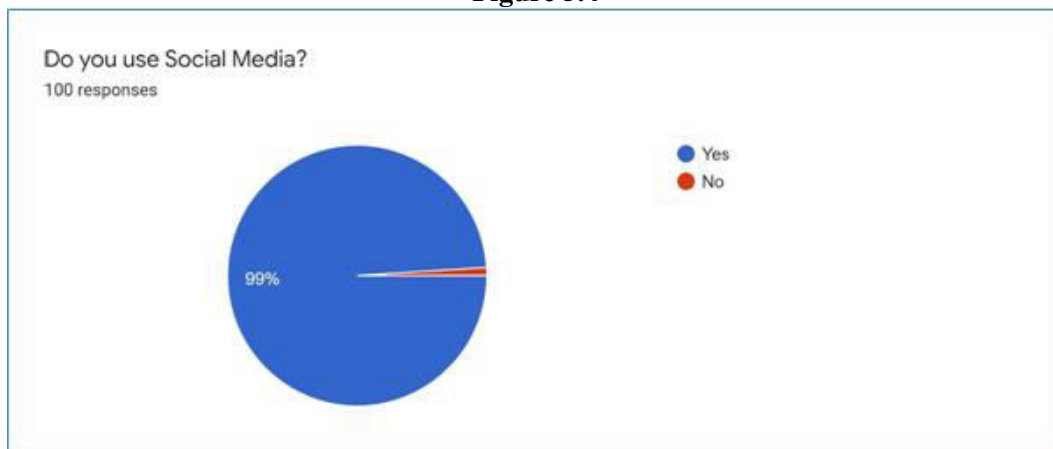
According to the survey, 99% of respondents use social media that who don't use social media is 1%

Figure 5.5
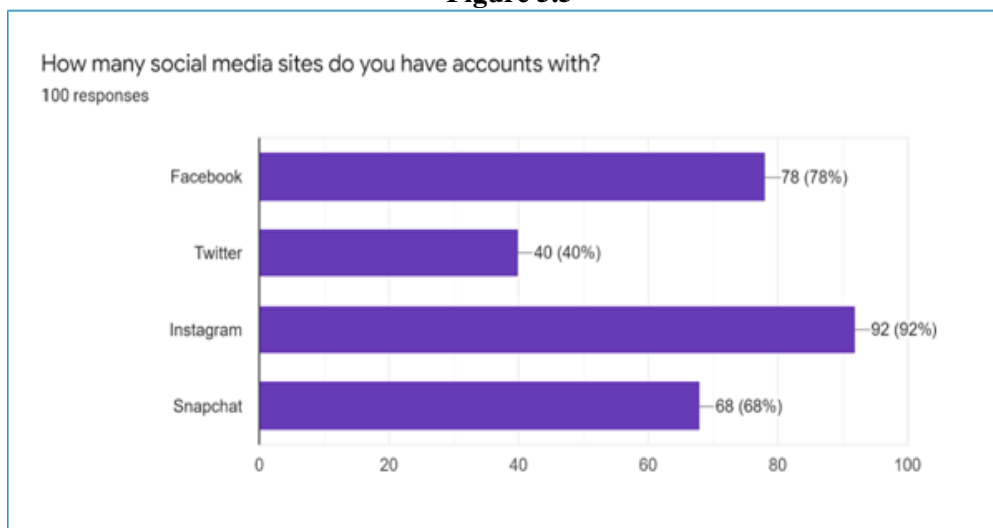
The pie diagram represents that the respondents addicted more to Instagram is 78% followed by Facebook 78%, twitter 40% and snap chat 68%

Figure 5.6
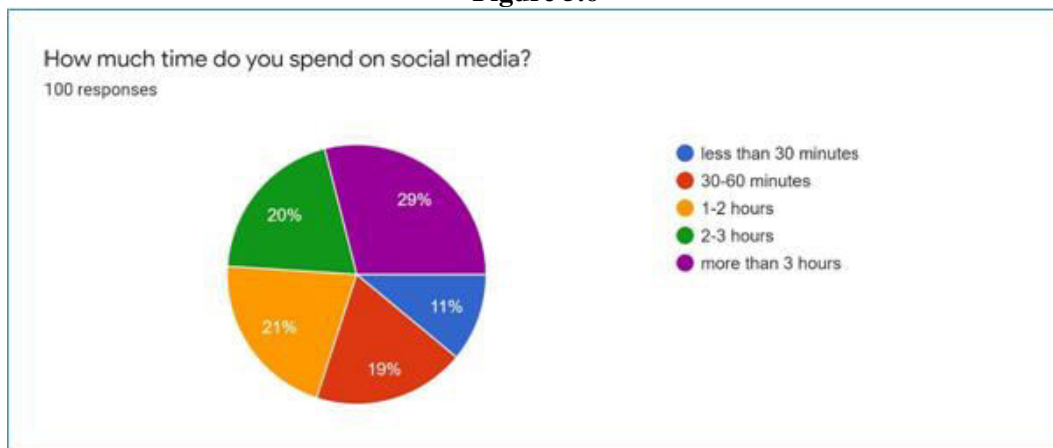
The pie diagram, states that the maximum amount of time spend by the respondents is more than 3 hours 29%, 1-2 hours is 21%, 2-3 hours is 20% 30-60 minutes is 19% and less than 30 minutes is 11%

Figure 5.7
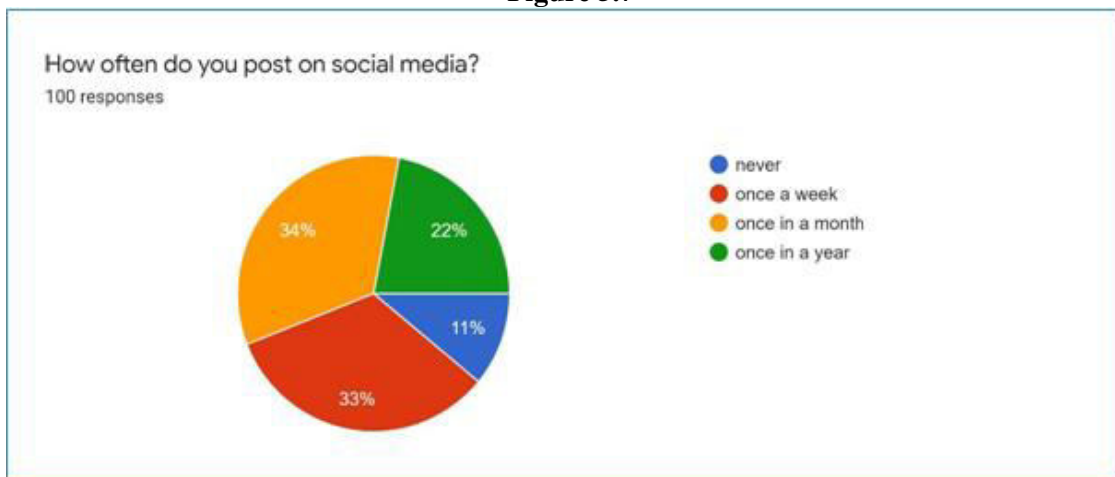
The above pie diagram represents that the frequency of posts posted by the respondents once aweek is 33%, once a month is 34%, once a year is 22% and those who never posts is 11%

Figure 5.8
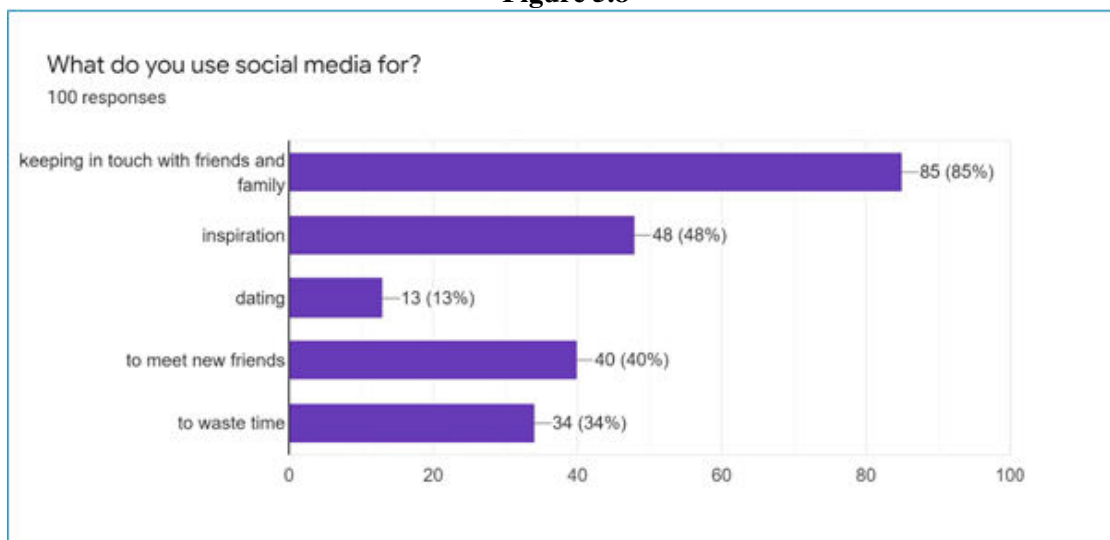
The pie diagram indicates that the respondents using social media for keeping in touch with their friends and family are 85%, for motivation and inspiration is 48%, dating purpose is 13%, to get introduced with new friends is 40% and for leisure is 34%

Figure 5.9
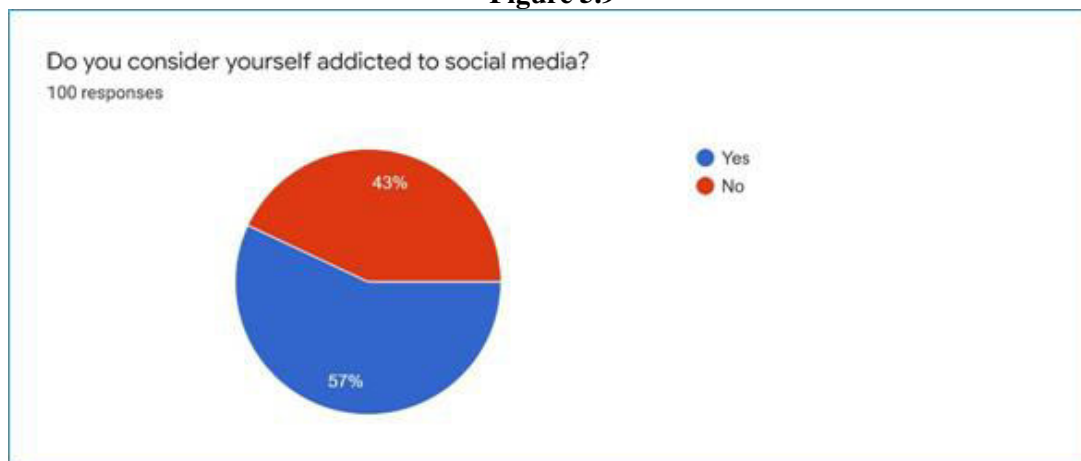
The pie diagram indicates that the number of respondents addicted to social media is mammoth which is 57% and those who are not addicted to social media is very few that is 43%

Figure 5.10
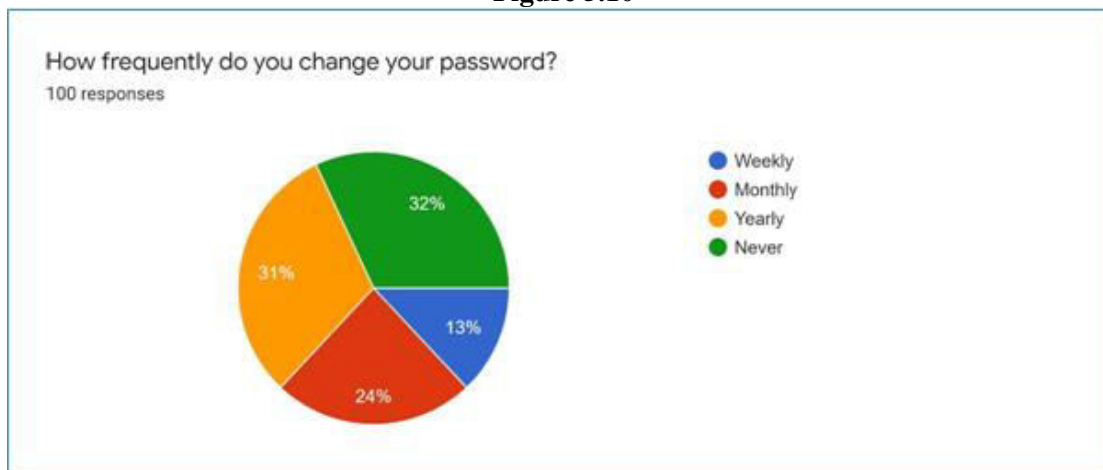
The pie diagram represents the respondents who change their password on weekly basis is 13%, changing on monthly basis is 24%, yearly basis is 31% and those who never change their password or try to avoid changing their password is 32%

Figure 5.11
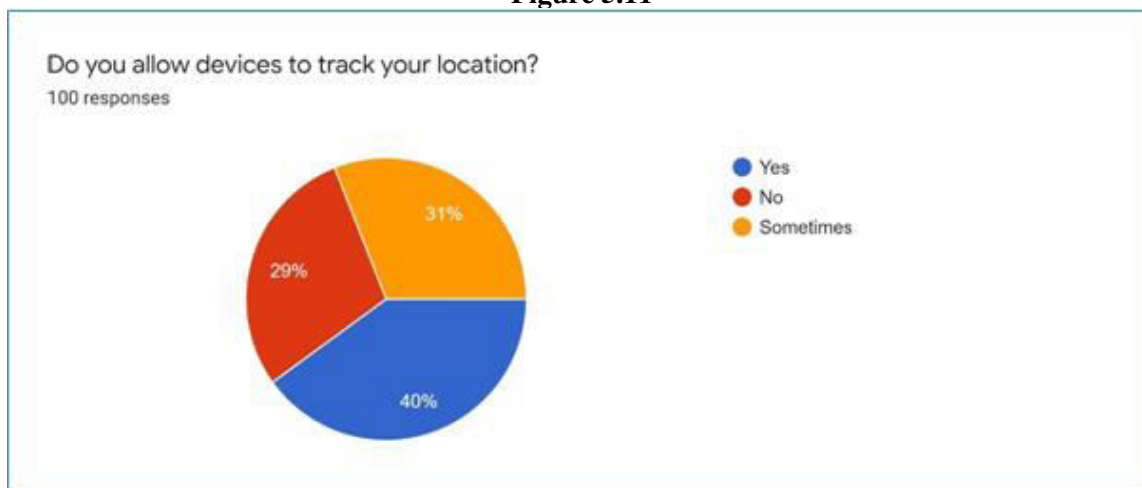
The above diagram states that the respondents allowing the devices to track their location is 40% The respondents not allowing the devices to track the location is 29% and the respondents which allows the devices to track the location depending upon the situation is 31%

Figure 5.12
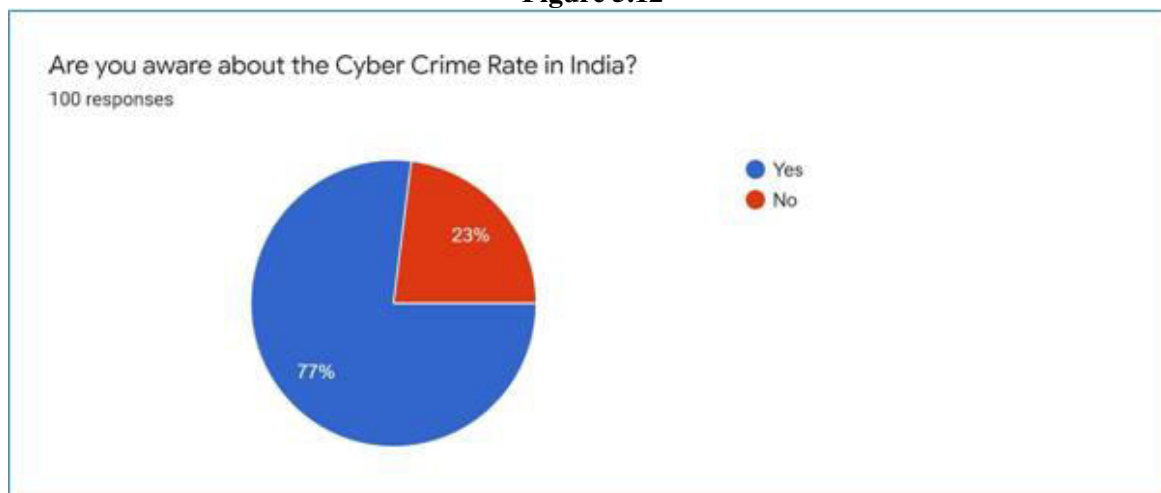
The above diagram indicates the no. of awareness among the respondents is quite favourable which is 77% and very few are not aware that is 23%

Figure 5.13

Have you approached anyone when you encountered such a cyber crime?
100 responses

- Yes
- No

63%
37%
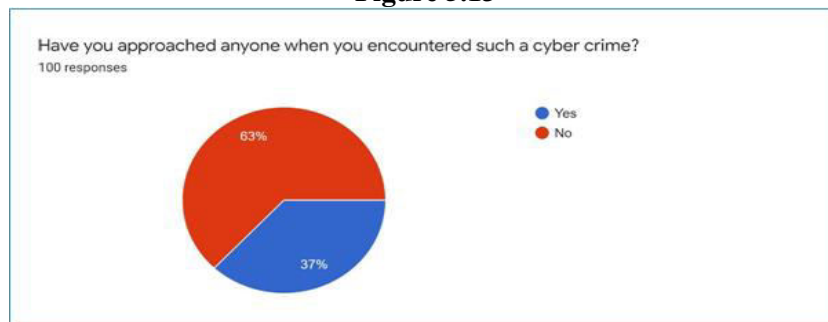
The above pie diagram states that the respondents approaching the grievance cell or any other respective body is very low 63% and the respondents approaching is 37%

Figure 5.14

Have you ever felt that you are being stalked?
100 responses

- Yes
- No

54%
46%
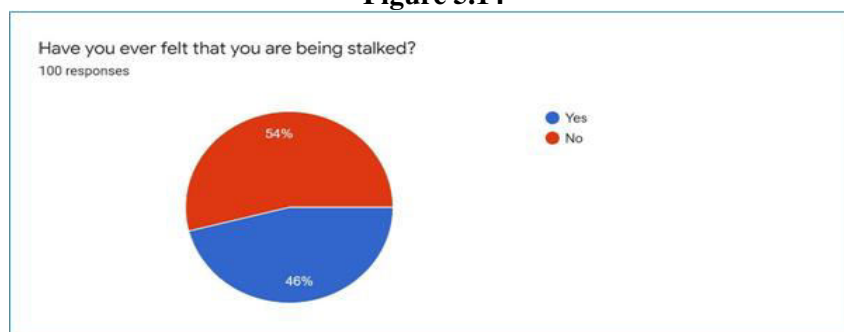
The above diagram indicates that the respondents that have being stalked are less as compared to the respondents who are not stalked.

Figure 5.15

Of whom do you accept friend request?
100 responses

Known — 81 (81%)
Friends of mutual friends — 53 (53%)
Unknown — 20 (20%)

0   20   40   60   80   100
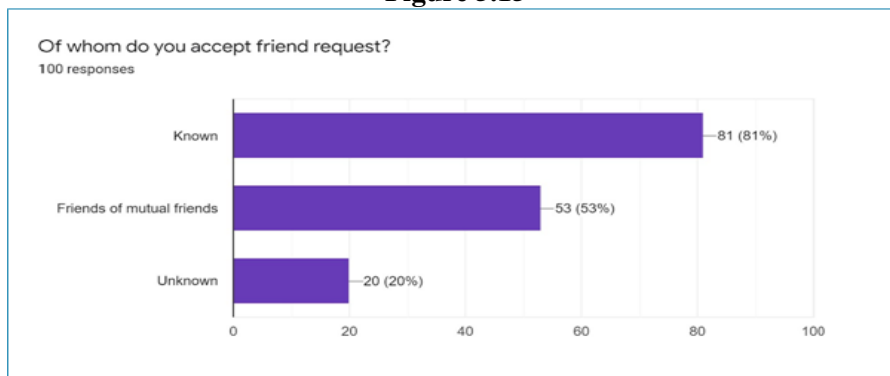
The above pie chart, shows that the respondents that tends to accept the friend requests of their friends, family and relatives are high which 81% The respondents accepting friend requests from unknown people and stranger is 20% which is a good sign as long as the safety is concern.

6. CONCLUSION

There are many people in the society who are becoming the victim of cybercrime in India. There have been many laws introduced by the government of India in order to prevent the cybercrime. A common mode of cyber-attack is from social media and majority of the victims are none other than children, adolescents and teens.

The research indicates the electronic devices are the major factors which indicates the use of Social Media and its influence on these generation. It can be said that around 1.16 million cyber security cases and presently a 3x spike from the past. Talking about the cyber safety in India, the country has been receiving hundreds of planned and executed cyber-attacks. Modern hackers have learned to utilize thousands of different techniques and methods for collecting information and money from various organizations. Any organization that possesses sensitive data is a potential target of cyber-attacks. The primary reason of these cyber-attacks is cyber illiteracy. We were not taught about how to use internet. Our cyber education started from cyber cafes, where we only learnt how to use sites like Google, Yahoo and Facebook. We were never taught important things like the guidelines to use the internet and digital safety. Many parents overshare pictures of their children online and

destroy their right to privacy which can further lead to embarrassment, bullying and may damage online reputation.

Sometimes not only strangers but also known people build an emotional connection with children and young people online to gain their trust for the purpose of sexual abuse or exploitation. After a point of time when they come to know that they are convinced by their talks they start building sexual intimacy, which then leads to blackmailing, bribing, and threats. This thus can be avoided by protecting personal information for examples not sharing your birth date, address, and phone number on social media or any other online platforms. Make usernames that never uncover genuine character. Ignore companion requests from cloud people on social media stages. Be alert when your chat partner starts complimenting you about your appearance within a short span of time. Do not talk to people who ask for your sexually explicit photos or videos. Learn to block. Talk to your elders or parents if your chat partner suggested to keep your conversations with them secret. You can also report the same to helpline numbers. Share location to apps for which it is actually required. Also, Facebook policy doesn't allow a child less than 14 years of age to create an account. Surprisingly, Netflix, YouTube and Amazon Prime instructs 'Kids Mode' for all children underneath the age of 14.

To conclude, the cyber security cells, cyber police, government and we as the citizen of India should focus more on educating the young as well as the elder population of the country regarding the rising risk of cybercrime in India. Also there is a need of spreading the awareness about the prevention measures to be taken and most importantly how to deal with the cybercrime.

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Awareness among Disadvantaged towards Social Insurances Offered by Government of India

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ABSTRACT
The underprivileged or disadvantaged citizens are the one who require support from respective governments for their wellbeing in the form of social insurances so as to live worry free land respectful life. Illnesses, accidents, unemployment and lack of retirement benefits such as pension, gratuity, provident fund etc. make their lives miserable which even affects upbringing of children in such families. People in this group who retire after years of hardship left with uncertainties about their future in many ways. Social insurances under such circumstances helps individuals to tackle difficult situations that might occur due to unforeseen conditions.

Government of India for has offered several social insurances for well-being of the citizens that covers variety of benefits such as accidental life insurance, health insurance, business loans for poor, pension schemes for lower strata of the society and girl child education.

This study is an effort to find out the awareness level and acceptance of people related to social security schemes such as Atal Pension Yojana, Mudra Yojana, PM Jeevan Jyoti Bima Yojana, PM Suraksha Bima Yojana and Sukanya Samruddhi Bima Yojana in particular

Keywords: Awareness, Disadvantaged, Social Insurances

1. INTRODUCTION TO SOCIAL INSURANCES

1.1 OBJECTIVES
a) Security and stability of living: Authorities try to safeguard the entire population and provide them trouble free living by executing certain social schemes which are useful in survival during unforeseen emergency situations

These social security schemes offer great help which provide relief to sufferers. Social insurance system acts as means of inhibiting poverty. Today social security system has widen its role and offer benefits which are not only helpful in case of mishap but also making provisions for relatively better quality of life for underprivileged population . Thus social security schemes help in improved standard of living. These schemes not only offer stable life even in situations which are beyond the control of an individual but also achieve objective of social commonality.

b) Support to individuals for independence: It's about living an independent life without getting supports by others. This helps the survival of individuals in spite of physical inabilities. The mentally independent life can be secured in unforeseen conditions of accidents, sickness, or in case of old age which may deter the preservation of non-dependent living. One more objective of these schemes is to help people with deformities live decent life

c) **Support of household functions**: Other benefits of these schemes include care of children with disabilities, educating children and supporting aging parents, these benefits are beyond the routine social security offerings. One more objective here is giving required provision to families suffering from varied issues as it helps in preventing the disintegration of family lives and will lead to the steadying the living of emotional links among family members.

1.2: Roles of Social Insurances.

a) As safety device: These schemes are targeted at safeguarding sound and worry-free living for citizens while planning against problems which threaten the balance of living arising out of unforeseen conditions.

b) Redistribution of income: Due to inheritance as well as rewards for productive efforts, there may be unfair dispersal of income or possession of assets which creates inequality among various classes of people in the country. To redistribute the income between diverse income classes, authorities try to tax the rich or high income people and allocate this money to low income groups in the form of social insurances. Also money is transferred from earning citizens to non- earning citizens through some of these schemes.

c) Diversification of risks: People come across unexpected incidences while performing their day to day activities and become incapable to deal with these incidences (like sickness, accidents and redundancy). Social security acts here a device for the whole population to deal with such uncertain risks. Thus social security schemes are instrumental in successfully promoting the diversification of risks and the redistribution of income.

d) Socio economic solidity and development: When people are unable to live or survive due to economic conditions, social security schemes steady society and the government by giving a sense of security to people. Social security also lessens economic variations for economic steadiness and supports the growth of economy.

1.3 Some of the Government Social Security Schemes

	Atal Pension Yojana	Sukanya Samrudhi Yojana	PM Jivan Jyoti Bima yojana	PM Suraksha Bima yojana	Mudra Yojana
Age	18 To 40 Yrs	Any Girl child	18 To 50 Yrs	18 To 70 Yrs	>18 yrs
Investment Amount	1000 To 5000 PM	250 PM to 1.5 Lakh PA	330 PA	Rs 12 .PA	
Life Cover			2 lakh	2 lakh	
Returns	60 Years or post retirement	Girl's Age of 21 yrs. or 18yrs for premature withdrawal	On death of insured	Upon incidence	
Purpose	Workers save money for their old age	Higher education of account holder	Death benefit	Accidental Death and permanent disability	Commercial vehicle, plant & machine working capital
Shishu Loan (Rs)					50,000
Kishore Loan(Rs)					50 K to 500K
Tarun Loan(Rs)					500K to 1000K

2. OBJECTIVES

➢ To study various social security schemes introduced by the Government of India

➢ To find awareness among people about social security schemes

➢ To identify reasons for not availing the benefits of social security schemes by people

➢ To find out whether there in any difference in awareness among people with different demographics

3. RESEARCH METHODOLOGY:

➢ **Primary Data collection:** Structured questionnaire was used for the purpose of collecting primary data. Selected respondents especially from underprivileged group were requested to submit their responses. .

➢ **Secondary Data Collection**: Various websites, newspapers and published articles were referred for the collection of secondary data.

➢ **Sample Design:** Convenience sampling method was used for the purpose of this study

➢ **Sampling Area**: The respondents were selected from citizens living in central suburbs of Mumbai especially from slum area

➢ **Sample Size:** Only hundred respondents were selected for the purpose of this study due to time constraint.

➢ **Data Analysis:** The data collected was analysed using MS-Excel and SPSS

➢ **Data Analysis Tools**: The data was analysed for frequency analysis, and hypothesis testing was done with the help of Chi-square test

4. LIMITATIONS

The study was undertaken in a very small geographical area of Mumbai with only 100 respondents and therefore results are suggestive in nature. Study is required to be undertaken on large scale with more respondents across various geographical locations for conclusive results

The results are presented on the basis of information provided by respondents. Possibility of incorrect information on the part of respondents cannot be eliminated.

5. DATA ANALYSIS

5.1 Demographics

5.1.1 Age in Years		Frequency	Percent
Valid	Below 30	15	15.0
	30 to 40	59	59.0
	40 to 50	24	24.0
	50 & Above	2	2.0
	Total	100	100.0
5.1.2 Gender		Frequency	Percent
	Male	65	65.0
	Female	35	35.0
	Total	100	100.0

5.1.3 Educational Qualification		Frequency	Percent
	Up to SSC	70	70.0
	Up to HSC	24	24.0
	Graduate	6	6.0
	Total	100	100.0
5.1.4 Monthly Income in Rs.		Frequency	Percent
Valid	Up to 10,000	19	19.0
	10,000 to 20,000	46	46.0
	20,000 to 30,000	31	31.0
	30,000 to 50,000	4	4.0
	Total	100	100.0

5.2 Reasons for not availing following social security schemes

Type of Schemes	Not Aware	Investment Barrier	Inadequate Documents	Not Eligible	Not Interested	Already Availed
Atal Pension Yojna	61	10	2	1	7	19
PM Vaya Vandana Yojna	89	0	0	0	10	1
Mudra Yojna	60	0	9	3	13	15
Jeevan Jyoti Bima Yojna	94	0	1	0	5	0
PM Jandhan Yojna	7	0	0	2	14	77
PM Suraksha Bima Yojna	95	0	1	0	4	0
Sukanya Samrudhi Yojna	49	1	0	1	23	26
Ayushman Bharat	100	0	0	0	0	0
PM Shram Yogi Pension Yojna	100	0	0	0	0	0

FINDINGS

Ayushman Bharat, Pradhan Mantri Shrama Yogi Pension Yojana, Jeevan Jyoti Bima Yojana and Pradhan Mantri Viya Vandana Yojana are some of the social security schemes have very poor awareness among

respondents while Jana Dhan Yojana is most popular among respondents followed by Sukanya Samruddhi Yojana and Atal Pension Yojana.

5.3 Mean score for awareness about various social security schemes

Descriptive Statistics				
	N	Min.	Max	**Mean**
Awareness about Atal Pension Yojana	100	20	100	**42.04**
Awareness about Mudra Yojana	100	20	100	**38.84**
Awareness about Jeevan Jyoti Bima Yojana	100	20	75	**23.10**
Awareness about Suraksha Bima Yojana	100	20	85	**22.30**
Awareness about Sukanya Samruddhi Bima Yojana	100	20	100	**52.44**
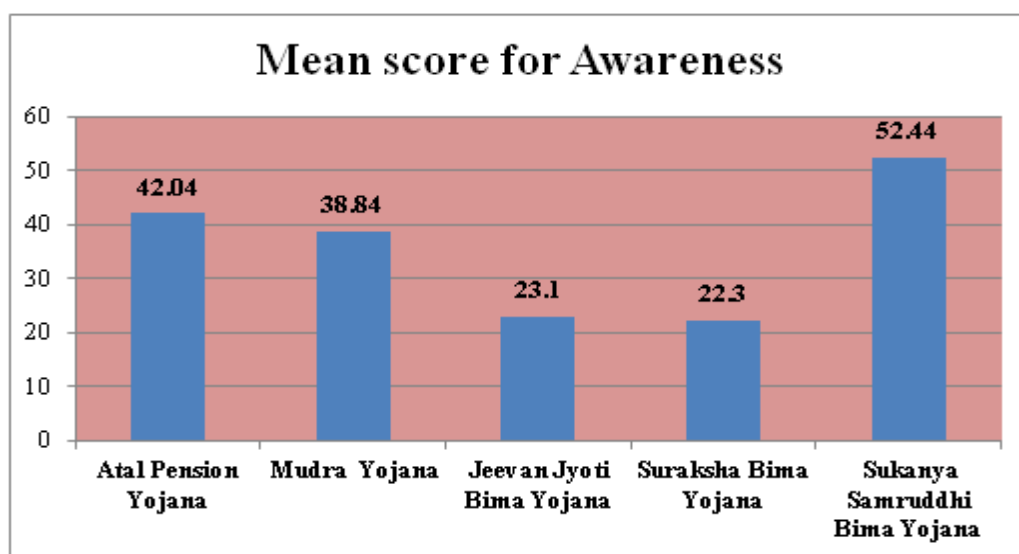
Findings: It can be observed from the above table that while none of the schemes are having great awareness, Atal Pension Yojana and Sukanya Samruddhi Yojana are the schemes which are having better awareness compare to Jeevan Jyoti Bima Yojana and Suraksha Bima Yojana.

6. HYPOTHESIS TESTING

Null Hypotheses H01: There is no association between Age and Level of awareness about Govt. social Security Schemes

Alternate Hypotheses H11: There is an association between Age and Level of awareness about Govt. social Security Schemes

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Mean score for overall awareness about Soc. Sec. Schemes	100	20.00	73.75	34.9700	14.06570
Valid N (list wise)	100				

		Level of awareness about Social Security schemes			Total
		Less Awareness	Medium Awareness	High Awareness	
Age in Years	Below 30	0	8	7	15
	30 to 40	20	29	10	59
	40 to 50	15	8	1	24
	50 and above	2	0	0	2
Total		37	45	18	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	23.946[a]	6	.001

Calculated value is less than table value (0.05) shows that the null hypothesis is rejected and alternate hypothesis is accepted. Thus there is an association between age and level of awareness towards Government social security schemes.

Null Hypotheses H02: There is no association between Gender and Level of awareness about Government Social Security Schemes

Alternate Hypotheses H12: There is an association between Gender and Level of awareness about Government Social Security Schemes

Case Processing Summary

	Cases					
	Valid		Missing	Total		
	N	Percent	Percent	N	Percent	
Gender * Level of awareness towards Social Security schemes	100	100.0%	0.0%	100	100.0%	

		Level of awareness about Social Security schemes			Total
		Less Awareness	Medium Awareness	High Awareness	
Gender	Male	23	29	13	65
	Female	14	16	5	35
Total		37	45	18	100

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.550[a]	2	.760

Since the calculated value is more than table value (0.05), the null hypothesis is accepted. Thus there is no association between gender and level of awareness towards Government social security schemes.

Null Hypotheses H03: There is no association between Educational Qualification and Level of awareness about Government Social Security Schemes

Alternate Hypotheses H13: There is an association between Educational qualification and Level of awareness about Government Social Security Schemes

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Qualification * Level of awareness towards Social Security schemes	100	100.0%	0	0.0%	100	100.0%

	Level of awareness about Social Security schemes	Total

		Less Awareness	Medium Awareness	High Awareness	
Qualification	Below SSC	32	28	10	70
	HSC	4	15	5	24
	Graduate	1	2	3	6
Total		37	45	18	100

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	11.050[a]	4	.026

Since the calculated value is less than table value (0.05), the null hypothesis is rejected and alternate hypothesis is accepted. Thus is an association between educational qualification and level of awareness towards Government Social security schemes.

Null Hypotheses H04: There is no association between Income and Level of awareness towards Government Social Security Schemes

Alternate Hypotheses H14: There is an association between Income and Level of awareness towards Government Social Security Schemes.

Case Processing Summary							
		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Income in Thousand * Level of awareness about Social Security schemes		100	100.0%	0	0.0%	100	100.0%

		Level of awareness about Social Security schemes			Total
		Less Awareness	Medium Awareness	High Awareness	
Income in Thousand	Below 10	6	12	1	19
	10 to 20	20	19	7	46
	20 to 30	10	12	9	31
	30 to 50	1	2	1	4
Total		37	45	18	100

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.959[a]	6	.325

Since the calculated value is more than table value (0.05), the null hypothesis is accepted. Thus there is no association between income level and level of awareness towards Government Social security schemes.

7. SUGGESTIONS

Current method of promotion or information sharing about social security schemes has limited retention among people whereas in today's context social media seems to be having not only very good penetration level among all strata of society but also can retain detailed messages which may be referred during leisure. Detailed messages in regional languages can help people understand the scheme benefits better.

The camps may be held in certain locations to crate awareness about social security schemes and also to support people in completing formalities.

There are several social security schemes and benefits in some of these schemes are overlapping. There should be one scheme for one purpose and bundle of such basic social security schemes may be offered through Janadhan accounts.

8. CONCLUSION

Government has coined out several social security schemes with the objective of uplifting the standard of living of underprivileged people, the information about these schemes seems to have not penetrated enough. Government has been taking efforts to reach out to people through various platforms such as outdoor media, print media, banks & post offices still there seems to be lack of awareness among underprivileged.

Ayushman Bharat, Pradhan Mantri Shrama-Yogi Pension Yojana, Jeevan Jyoti Bima Yojana and Pradhan Mantri Viya Vandana Yojana are some of the social security schemes which have relatively poor awareness among respondents while Jana Dhan Yojana is more popular among respondents followed by Sukanya Samruddhi Yojana and Atal Pension Yojana.

The association was seen between age and level of awareness about social security schemes as well as qualification and awareness about social security schemes. People with younger age and higher qualification have greater level of awareness compare to others. Demographic factors like income, gender and occupation are having any impact on the awareness level of social security schemes introduced by Government of India

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A Study on Behavioural Finance

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ABSTRACT

Behavioral finance refers to the study of how thought process can affect and influence the decision making of investors. It explains occurrence of bad decision-making and still people think that they made the right choice. It gained prominence when traditional finance theories failed to explain many economic events like stock market bubbles. There are hundreds of behavioral biases that affect the decision making of investors. But by studying these biases one can overcome them. Thus, by learning the theory of behavioral finance investors can make better decisions and thereby improve their profit.

Keywords: Behavioral finance, behavioral biases, decision making, investment patterns.

INTRODUCTION

Behavioural finance is a fragment of Behavioural economics. It is the study of how psychology affects the behavior of investors or consumers, financial markets and financial analyst. It is based on the assumption that the investors cannot be always rational but sometimes they are influenced by their own biases. Traditionally, economics and finance have focused on models that assume rationality. It attempts to find out reasoning patterns of investors decision making. It tries to identify why market participants make irrational choices. Because such errors create market inefficiency.

Behavioural finance uses experiment and research that demonstrates how humans make irrational choices and many times their decision making is flawed. It tries to measure the misguided moves & miscalculations that people make with their money. Behavioural finance help the investors to understand how the financial decisions like the investments, payments, risk, and personal debt, are highly influenced by the factors like human emotions, biases, and rational limitations of processing of mind as well as responding to information. Behavioural finance provides mechanisms for identifying and managing unwelcome behaviors. Hence, after studying Behavioural finance anyone can overcome their biases and make better, logical and safe investment decisions.

OBJECTIVES

- To understand the evolution of Behavioural finance.

- To identify the biases of investors.

- To find out how to overcome the biases faced by the investors

LITERATURE REVIEW

Bachar Fakhry says that humans interpret the given information in a different way. The financial crises is about the information which is increasingly irregular and news has a larger impact than that of the fundamentals. Behavioural finance theory and market hypothesis explain different parts of asset pricing. In order to understand asset pricing there is still a requirement to use both fundamental theories. But he concluded that the efficient market hypothesis is theoretically superior theory of asset pricing.

Dr Reema Sharma gives a theoretical model which can be used to predict the investment decision of investors. Investors choose different investment alternatives based on various factors such as income, age, gender, occupation. But financial literacy and risk tolerance plays a major role in investment decision. Her research is also helpful for the investors in understanding financial literacy in dealing with risky investment.

Yadav Devi Prasad Behera, Sudhansu Sekhar Nanda and Tushar Ranjan Sahoo find out that failure in the past and domestic economic crisis because of international economic break down has scared investors away from investing in capital market. For "Atmanirbhar Bharat" giving confidence to domestic investors is very important. Strategy makers should use different dimension of cognition to become knowledgeable about the sources of information that investors can use and make better investments.

Neven Erfan, Sanjeevni Gangwani, Samira Ben Belgacem, suggested guidelines to help women investors to make better decision while investing. Disposition effect is essential to understand how the various factors impact the investors. If the portfolio is diversified, there is less inclination towards disposition effect. Results highlighted that female investors realize fewer capital losses with higher disposition effects and are more loss

averse than men. Disposition effect in women investor can be improved by maximizing the utility (current and expected) of their lifetime consumption.

Mohd. Shamim Ansari, Mohd. Adil have attempted to investigate impact of demographic factors like age, gender, investment experience and behavior bias (overconfidence and risk averse) on investment decision making of individual in Aligarh District of Uttar Pradesh. The paper suggests that age, gender and investment experience have huge impact on overconfidence of the investors. The findings of this study can be utilized by portfolio managers or any financial experts.

Bryan Fong proposed an original "behavioral finance representative agent model", which elucidated how the fake news' empirical price impacts can continue in finance in spite of challenging the efficient-market hypothesis. They found that modern fake news phenomena are increasing very rapidly because of social media. Recent studies have shown that fake news can impact security markets and the financial system. Still the amount of information or research available on this topic is very limited. And that limited research is mostly focused on political and social aspects of the fake news rather than on financial aspect.

Ioannis Branikas and Gabriel Buchbinder studied advertising acquaintance and investor consideration from super bowl commercials. They found that after Monday's game attention of investors in areas with high viewership increases significantly for both local and non-local companies that air advertisements. Non-local firms with high advertising exposure in a region attract more interest than local firms with low exposure, suggesting that marketing has a stronger impact on investor attention than the local bias.

Hema Neelam, Dr. P. Amaraveni In this research paper the findings show where do the women investors of Warangal district invest their money. A sample of 300 women were taken. It was found that women were investing mainly in gold, real estate, post office savings and life insurance corporation (LIC). Majority of the women didn't want to invest in risky options of investment. They wanted to play safe. It was concluded that age was a factor that impacted investment decision.

EVOLUTION OF BEHAVIOURAL FINANCE

The foundation of Behavioural finance can be outlined from almost 200 years ago. Some of the original books written in 1800's and 1900's marked the beginning of Behavioural finance school. In 1841, Charles Mackay wrote the book "Extraordinary Popular Delusions and the Madness of Crowds". This book is often cited as the best book on market psychology. The incidents covered in this book confirm that greed and fear have always been a driving forces of the financial market. Gustave Le Bon's work in "The Crowd: A study of the popular mind" written in 1895 is considered as most influential works in social psychology. George Selden wrote "Psychology of The Stock Market" in 1912. This was one of the first books to talk about the use of psychology in the stock market. These three books and many other works forms the foundation of applying psychology and sociology in the field of Behavioural finance.

Behavioural finance is an inter disciplinary subject. Hence, to understand the topic from all different perspective there are many books and works of other scholars. The works of the experts of other fields like sociology, psychology, anthropology, economics, etc. are also important to understand the subject completely. These books of some of the scholars cover a wide range of subject matter including: group behavior, financial mistrust, individual behaviour panics, crashes, speculative behaviour, crowd psychology, investor psychology, trader psychology, bubbles, investment strategies and theories, and investor personality.

In the early 1980s, known as the first generation of Behavioural finance, mainly focused on people's shortcuts and errors as they make choices. The second generation of Behavioural finance accepts people's wants and distinguishes wants from errors, thereby providing a truer portrait of normal people.

BEHAVIOURAL BIASES

There are a lot of self-defeating or counter-productive behaviours which bring human beings down. Financial behaviourists call these biases.

1. **Anchoring bias:** It occurs when people depend too much on the pre-existing information available and make the financial decisions based on that basis. It is a tendency of people to estimate worth or value of anything based on certain numbers that they have. For e.g., if you see a shirt that is more expensive and then you see a relatively cheaper shirt and you buy the latter.

2. **Disposition effect:** It is a tendency to sell profit making investment too early and then sticking to investment that have their value dropped down. Even experienced investors mistime their investment moves.

3. **Mental accounting:** It is a tendency to assign our funds into separate 'accounts' which affects the way we spend. Because of this tendency to we don't think carefully about buying something. We may end up buying something which may not be important and this leads to not saving up the money for bigger things. It leads to overspending.

4. **Herd behavior bias:** It is a tendency to copy and follow others. It is also known as bandwagon effect. It is a psychological phenomenon where people justify a course of action that is correct because everyone is doing it. It may result in panic buying and selling. It leads to investment bubble which are not good. For example, the dotcom boom of late 1990's. At that time everyone was investing in internet companies despite the fact that some companies were not financially sound.

5. **Overconfidence bias:** Here people overestimate their abilities. It may lead people to think they are better than expert or even average investors. It leads to risky investment.

6. **Confirmation bias:** It is a type of cognitive bias that involves preferring something that supports your previous beliefs or values. It makes people less likely to engage with different information or viewpoints which challenges their beliefs. This bias may lead investors to think that their investment is absolutely right even if the information they used to make that investment maybe flawed.

7. **Experiential bias:** It occurs when investor's think that the events which occurred recently may happen again. For example, the financial crises of 2008 led many investors to think that in the future also the market would be seeing economic hardships. In the future the markets recovered but many investors had exited the stock market. For this reason, it is also known as recency or availability bias.

8. **Loss aversion bias:** It is a phenomenon where a potential loss is apparently more severe than an equivalent gain. For example, If a person losses Rs.1000, the pain of that loss will be more than the happiness gained in finding the same amount of money.

9. **Familiarity bias:** It is a tendency to invest in what they know and prefer to stay in their comfort zone. It is a bias that stops us from investing in other assets or investments that we are not familiar with. There is not much diversification which can reduce risks.

SOLUTIONS TO OVERCOME BIASES

Biases are the major obstacles to investment success. Even the most logical and rational investor make poor decision based on erroneous conclusion and emotional reaction to a news.

Investors need to manage and control their emotions. In order to understand emotions, we need to fully understand them. When things don't go our way, we shouldn't get angry or make hasty decisions. We need to know things or situation that trigger our negative emotions. Once we know our triggers, we can use them to our advantage. Sometimes investors develop unhealthy attachment towards a stock. They might think that it is a great stock but it may turn out to be an average stock or even loss-making investment. For this an investor needs to do proper stock research before investing. Loss aversion bias should be tackled with strong emotion and not by letting emotions overpower the mind.

Confirmation bias leads to narrow minded viewpoints. And the investment patterns tend to be the same which may not be highly profitable. So, investors need to seek contrary opinions. Different viewpoints and values may broaden the mind. So, the investor may get some new ideas or pattern that can turn out to be successful.

To overcome anchoring bias, one should practice critical thinking. Which means not depending on the first information that is available. One should do a thorough research and find out the negatives.

CONCLUSIONS

Many of the Behavioural biases are strongly set into the ways investors process, think, and feel. Investors can try to overcome these biases. Investors can improve the way make their decisions by crafting a system of accountability, reframing the wins and losses, and trying to stay away from the herd mentality. Investors who have a tendency to avoid the Behavioural biases are more likely to earn the investment success.

Every person at one time or another has made a mistake or behaved irrationally in terms of over confidence or loss aversion or simply following whatever we have heard. Although policy makers, researchers, investment professionals, and investors may continue to debate whether markets are efficient and investors are rational, Behavioural finance has made great strides in understanding observed behavior.

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Predicament of the Indian Tourism Sector during Covid – 19 and Revival Measures

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ABSTRACT
Tourism is largest and growing service industry in India. It is growing rapidly and giving handsome contribution to country's economy. Indian tourism sector provided 31.8 million jobs in 2020, which accounts for 7.3% of total employment in the country. As per the estimates, there would be 53 million jobs in next five years. Even the international tourist would reach the mark of 30.5 billion by 2028. At the start of 2020, the tourism industry was at its peak and was constantly growing. But in 2020, COVID has drastically affected more than 150 countries and also affected millions of lives globally. As a result of this there was decline in share of GDP and also suffers a heavy loss in terms of revenue generation, which directly results in retrenchment. It also affected 50 million jobs globally. It has also affected livelihood for millions of people directly and indirectly. To cope up with the COVID 19 and to revive the situation, the government has launched multiple schemes through various ministries from 2020-21.

Keywords: Tourism, COVID 19, Revival, Government measures

INTRODUCTION

Tourism is largest and growing service industry in India. It is growing rapidly and giving handsome contribution to country's economy. Indian tourism sector provided 31.8 million jobs in 2020, which accounts for 7.3% of total employment in the country. As per the estimates, there would be 53 million jobs in next five years. Even the international tourist would reach the mark of 30.5 billion by 2028. In the last two decades the Indian tourism is known for its superspeciality types i.e. adventure tourism, beach tourism, cultural tourism, eco-tourism, medical tourism, wildlife tourism, etc. Tourism is one of the key element of trade and is beyond imagination. It is also promoting national integration and also provide handsome support to local people and their occupation e.g. handicrafts and cultural aspects. It also promotes local products internationally. The Indian tourism is expected to grow by 6.7% to 32.05 lakh crore by 2028. Due to COVID 19 outbreak, the entire tourism sector has become fragile and raises serious questions about the survival of tourism sector.

LITERATURE REVIEW

At the start of 2020 the tourism industry was at its peak and was constantly growing. But in 2020, COVID has drastically affected more than 150 countries and also affected millions of lives globally. In March 2020, a 21 days' lockdown was announced by our Hon. Prime Minister which directly affected airline industry, hotel industry and tourism industry. These industries are highly perishable which cannot be stored and sold later. Due to which it suffers a heavy loss in terms of revenue generation, which directly results in retrenchment. It also affected 50 million jobs globally. Indian tourism is a livelihood for millions of people directly and indirectly. To cope up with this difficult situation government intervention is of utmost importance.

Impact on travel agency and tour operators

Hotel booking and the packages sold by the tour operators were cancelled for all type of segments, i.e. inbound, outbound and domestic. All the scheduled meetings, events and conferences were cancelled / postponed (Business Today, 2020). The tourism companies like Make My Trip, Trivago, etc. has cut down 50% salary of their staff including top brass due to financial crunch. Airlines also face similar situations due to which the revenue of Airlines industry has declined by 44% with respect to 2009 (IATA, 2020) and the similar situation was there globally. To balance the economy, there was a need of interference by the government to overcome with the above crisis, otherwise it would have impact on the GDP of the country.

Chart 1: Tourism Sector Contribution to GDP
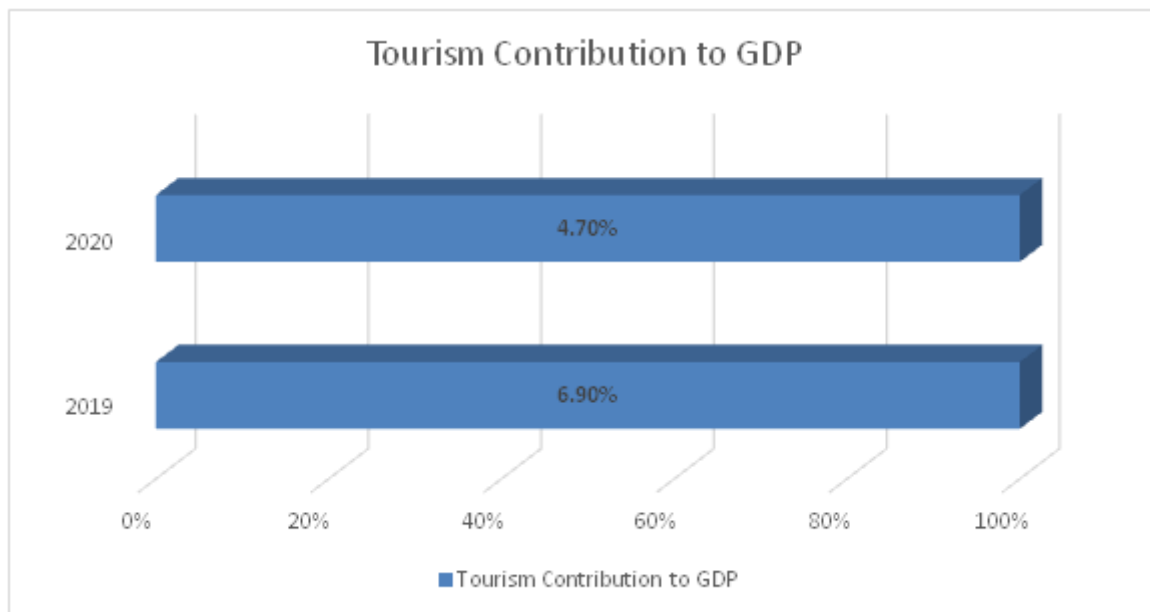
Table 1: Tourism sector contribution to GDP

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Share in GDP (in %)	5.68	5.81	5.09	5.04	5.00	5.00
Direct (in %)	3.06	3.14	2.65	2.62	2.6	2.6
Indirect (in %)	2.62	2.67	2.44	2.42	2.4	2.4

Source: (Annual Report - 2020-21, Ministry of Tourism)

The main reason for this dip in the year 2020 was the restrictions levied upon international and domestic travels, social distancing etc. The overall spending of the visitors was sharply declined specially in international visitor segment – the total decline was 61%. Whereas in domestic visitor the decline was 37%. (Annual report, Ministry of Tourism, Govt. of India).

Table 2: Share in Employment

	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Share in employment (in %)	11.37	12.25	12.38	12.2	12.13	12.75
Direct (in %)	4.96	5.34	5.40	5.32	5.29	5.56
Indirect (in %)	6.41	6.91	6.98	6.88	6.84	7.19
Employment (million)	67.21	69.75	72.26	75.34	80.63	87.50

Source: (Annual Report - 2019-20, Ministry of Tourism)

OBJECTIVES
1. To understand the tourism sector.

2. To study the challenges faced by the tourism sector during COVID-19.

3. To view the measures taken by the government to revive the situation.

RESEARCH METHODOLOGY
Research is systematic investigation undertaken in order to increase knowledge, understanding and to establish facts and principles. It should have the potential to produce results that are sufficiently relevant to increase knowledge. The main purpose of any research is to discover answers to questions through the application of scientific procedures and find out the truth which is hidden and yet to be covered. This research was conducted in order to to know the predicament of tourism sector during COVID 19.

Considering the scope and vastness of this research study, a mixture of various types of research is getting reflected in this study such as analytical, applied, fundamental and quantitative, etc. This study is purely based on secondary source of information.

Government measures to support Tourism Sector –
New policies –

To cope up with the COVID, the government has launched multiple schemes through various ministries from 2020-21. The government has started development and promotion of Caravans and Caravan camping parks. Government has developed international level infrastructure in Kargil to promote adventure tourism and water sports. Road and transport ministry have started providing All India Tourist Authorization / Permit online within 30 days after submission of application. The government has also started giving e-Visa facility to 170 countries.

FINANCIAL SUPPORT

On June 28, 2021 a relief package was assigned to Tourism industry for revival and sustainability by the Union Finance Minister, Smt. Nirmala Sitharaman. Under the scheme of National Credit Guarantee Trustee Company Ltd. (NCGTC) the registered tourist guides and other stakeholders will receive financial support in forms of loans from nationalized and private banks. To restart the tourism business and to minimize their liabilities. The key benefit is that there are no processing fees, no pre-payment charges and no requirement of additional co-laterals. Till 31st March 2022, the Government has announced free VISA's to 5 lakh tourists, there is a big incentive for those tourists who come for short visits. Even the ministry has announced incentives to service providers with transferable duty credit scrips with reference to net foreign exchange earnings. To create awareness about the tourism destination and products, government has launched Dekho Apna Desh initiative and other promotional activities like webinars, online pledge and quiz programmes.

Other initiatives of Government to support tourism industries –

- Relief from various regulatory compliances under Company Act, GST Act and Income – Tax Act.

- RBI extended moratorium to term loans

- Deferment of TCS upto October 2020

- Introduction of Emergency credit line guarantee scheme (ECLGS) to protect and support eligible micro, small and medium enterprises.

- Provision of loan guarantee scheme for COVID affected tourism service sector.

- Government has issued guidelines for COVID safety and hygiene for restaurants, B and B's, home stays, hotels and tourism sector to gain confidence among the visitors.

FINDINGS OF THE STUDY

It has been observed that entire tourism and allied industry had suffered drastically during the COVID 19, which directly affected airline industry, hotel industry and transport industry. These industries are highly perishable which cannot be stored and sold later. It also affected more than 150 countries worldwide. As a result of this there was decline in share of GDP in year 2020 and also suffers a heavy loss in terms of revenue generation, which directly results in retrenchment. It also affected 50 million jobs globally. It also affected livelihood for millions of people directly and indirectly.

The main reason for this dip in GDP in the year 2020 was the restrictions levied upon international and domestic travels, social distancing etc. The overall spending of the visitors was sharply declined specially in international visitor segment – the total decline was 61%. Whereas in domestic visitor the decline was 37%. (Annual report, Ministry of Tourism, Govt. of India). To overcome with the above crises, Govt. of India and local authorities has announced various measures to support the tourism and allied industry.

CONCLUSION & SUGGESTIONS

Share of tourism in overall GDP and employment is remarkable, looking at this, the tourism industry is desirable to have in sustainable position. But due to COVID 19 it badly affected. To revive the situation, the Govt. of India has announced different policies and schemes for this particular sector. Under the scheme of National Credit Guarantee Trustee Company Ltd. (NCGTC) the registered tourist guides and other stakeholders will receive financial support in forms of loans from nationalized and private banks. To restart the tourism business and to minimize their liabilities. Government has also taken other various initiatives as mentioned above to revive the situation. As a result, the tourism industry is getting stable.

Apart from this the state government and local authorities should take more initiatives for the betterment of the tourism. Also at every district level the local administrators should facilitate the tourist operators to know the schemes and policies floated by the central and state government for the tourism industry. Several taxes and other charges levied upon tourism industry should be reduce or relax for at least a year. This will give a

sufficient time to for the tourism industry to bounce back. Even we the citizens should give utmost priority to the domestic destinations, which would help the Indian tourism industry to regain its glory.

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Reviving Real Estate Financing Post Pandemic and Challenges Ahead

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ABSTRACT

In 2021 KPMG reported that the loss faced by the real estate industry due to Covid-19 pandemic is over Rs. 1 lakh crore. Pandemic resulted in job losses across all sectors, led to serious liquidity crunch which in turn created a huge credit shortage for industries requiring heavy capital investments. States took measures by stamp duty reduction which improved the situation by bringing in new launches in the first two quarters of 2021-22. But the demand for commercial and retail real estate in India could not be revived on account of work from home concept, low credit availability and uncertainty of future earnings. The study has examined various parties involved in the financing of real estate projects and has come out with observations and suggestions that lays a foundation to the process of reviving real estate funding and tackling the challenges ahead.

Keywords: real estate financing, real estate investment, covid pandemic, real estate sector

1. INTRODUCTION

The basic needs of our existence include food, clothing and shelter. A permanent shelter had been the dream of the middle class populace for decades and from centuries, our ruling systems had always tried to have one for all. Real estate industry started booming post liberalization and be it for self-residence or for real investment, property transactions have never lost their shine in the financial markets. With sufficient liquidity in markets, increased earnings and leverage opportunities available in the capital markets, real estate investment has been the popular mode of attracting more savings than other avenues. Real estate financing includes various techniques of securing capital from different sources for new purchases and for renovating old properties.

The impact of covid-19 on real estate has been unprecedented with the property transactions brought to near halt when the nation went into complete lockdown during both waves and the omicron led third wave effects is still to be watched with a lot of confusion around it being virulent as the delta variant. Real estate being a capital-dependent industry is always in need of constant monetary support which is significant to its growth and development. The capital bottleneck is becoming a significant question to real estate financing during covid times as excessive dependence on commercial banks has resulted in low financing activities in the last two years. The real estate industry that comprises two major parts of commercial housing and residential housing had suffered a lot for credit shortage and low economic activities during lockdown affecting the demand for both housings. The study has highlighted the various dimensions of real estate financing through various parties and has made a theoretical discussion on the challenges faced for funding the projects and possible solution to these challenges in the post covid times. The second part of the work deals with literature review which sets a clear path for the progress of the study. The third part of the study talks about the research methodology applied to serve the purpose which is followed by theoretical analysis and interpretation. At the end findings are presented along with concluding remarks.

2. REVIEW OF LITERATURE

Existing literature was reviewed to find the research gaps and provide a scope to carry out the current study. Some of the existing studies that are reviewed are listed below.

Few studies done on real estate during the covid times have found that market value of real estate decreased in the last two years. (Sanchaniya, 2021). The pandemic not only claimed thousands of lives but also affected the spending of many families. As the housing supply decreased, home values dropped but people couldn't afford on account of lack of credibility and earnings. The decrease in demand and the short supply in the real estate market has increased the negotiating power of buyers and buyers have already started looking for better investment gateways.

Sinha et al (2020) studied Indian real estate and found that the sector was much stressed in the last 5 years. The lack of effective regulating and monitoring bodies have always prevented investors from investing in the real estate sector. Different government policies and reports were studied to explore more about the developmental issues in the real estate field. Much stress was laid on the regulating authorities like SEBI that should notify about the final regulations that will govern the Real Estate Investment Trust (REIT's). More R&D should be promoted in this sector to contribute to the technologies to create residential and commercial properties that are within budget and environmentally viable.

Kishore and Marfatia (2017) studied the dynamic relationship between interest rates and housing prices in 15 OECD countries. Housing prices are hugely affected by the policy rates throughout the year and low interest rates are instrumental in reviving housing demand. The study focused on the short term and long term relationship between housing prices, income and interest rates. It was observed that any fluctuation in the short-run in house prices are not the effects of any movements in the income level and rate of interest. The results also suggested that only the long run movement in property prices, income level and interest rates are related to each other.

A similar study was carried by Adam and Fuss (2010) where they examined the impact in the long and short run of various macroeconomic variables on housing prices globally. Empirical findings indicated linkages between house prices and economic activity in the long run.

The financing of real estate projects was studied by Hancock (1997) and it was observed that if the real estate projects are financed by more equity and less of debt, financial risk can be brought down to a larger extent but equity financing is heavy on end profits. Because of the stated reasons, real estate companies are not keen on attracting funds through equity financing.

As per Keqiang (2011) one of the finest ways to acquire equity capital is to offer Initial Public Offer (IPO), which is helpful in raising large amounts of capital in a short span of time. But the enterprises face a lot of problems while listing in domestic markets, so overseas markets are more preferred. Many of the enterprises also look for back-door listing as an alternative but face problems to obtain easy shell resources. Real estate funds don't substantially depend on listing for fundraising.

Edison (2017) studied the interrelationship between investment in the real estate sector and GDP and analyzed the various financial parameters of the Indian real estate industry. It was observed that the real estate industry suffered heavily during the recession. Profits went down, return on equity funds decreased considerably and return on investment suffered overall. The study analyzed the data using regression analysis to test the relationship between various variables.

Gill et al. (2012) examined the factors that positively affect the Indian investors to invest in the real estate market. The study was conducted to research on the thought process of investors when they decide to invest in real estate. Through a survey method it was found that factors like research expertise, extent of market knowledge, influence of advisors and family support were few of the points that positively influence the investor's decisions to invest in the real estate sector.

RESEARCH GAP

It is observed that the real estate sector has been studied both empirically and qualitatively. A basic study is conducted to understand the various dimensions of the real estate industry, housing prices are studied in relation to various other variables of macro significance and also the financing of real estate industry is understood with various possibilities. The investors in real estate are also studied with respect to the factors affecting their investment decisions. But not sufficient studies were found that have taken care of the firsthand information from the major parties involved in the real estate sector. Post covid it is of utmost importance that we analyze the parties that suffered on account of recurring lockdowns, loss of jobs and low credit availability in the market. The current paper is an attempt to present this information which can be strategically used to mitigate the loss and revive real estate financing.

3. RESEARCH METHODOLOGY

OBJECTIVE

To study the various dimensions of real estate financing through parties involved in real estate transactions and list out the challenges faced and possible solutions to overcome them in the post covid times.

Database and source: The present study is descriptive as well as prescriptive in nature and so the data required for the study is both primary and secondary type of data. Primary data is a type of data that is obtained directly from first-hand sources by means of surveys, observation or experimentation. It is data that has not been previously published and is acquired for a new or original research study. For the present study the primary data is collected through interviews. A personally administered questionnaire is presented to builders, real estate agents and investors. Secondary data is the data collected or accumulated by a person, other than the user who is utilizing it for the research purpose. It is often used in social and economic analysis where primary data is not required or is unavailable. For the present study the secondary data required for the review of literature is collected from various online and offline sources.

Sampling design: Two of the techniques adopted here are convenience sampling and judgmental techniques. Convenience sampling (also called haphazard or accidental sampling) refers to the sampling procedure of obtaining the people who are most conveniently available or obtaining the data which is expediently available. In case of secondary data, convenience sampling is applied. Judgment or purposive sampling is a technique in which an experienced individual selects the sample upon his or her judgment about some appropriate characteristic required of the sample members. In case of primary data, both convenience and judgment sampling is applied. Data is collected from 17 parties (builders, agents and investors) in total who have recently transacted in real estate.

DATA ANALYSIS
The data collected is presented descriptively diving through the various factors of concerns that are discussed by the various parties involved in real estate transactions.

LIMITATIONS
The study is limited to the discussion on the factors affecting financing of real estate business transactions for various parties. The study further gives scope to statistically examine the interplay of these factors discussed upon. The study is limited to parties

4. DATA ANALYSIS
The primary data collected from parties was analyzed under the following heads.
Builders: The various factors that influenced the builder's community in the real estate sector are studied and listed with respect to the severity in terms of impact on project financing and businesses. The sample taken to analyze this dimension consisted of 4 builders. Table 4.1 lists down the factors rated by the builders with respect to the post covid impact on the real estate/construction industry.

The parties were first allowed to brainstorm and list down the factors and then rate these factors for severity on a scale of 1 to 5 taking 5 for highly impactful and 1 for low degree of impact.

Sl No.	Inability to obtain funds	Inability to obtain labour	Cancellation/Revoke of projects	Slow recovery of funds
1	3	4	3	3
2	3	4	3	3
3	5	3	2	4
4	5	4	2	4

Table 4.1 Factors Rated by Builders

Real estate agents: The various factors that influenced the agents community in the real estate sector are studied and listed with respect to the severity in terms of impact on project financing and businesses. The sample taken to analyze this dimension consisted of 6 agents. Table 4.2 lists down the factors rated by the real estate agents with respect to the post covid impact on the real estate/construction industry.

The parties were first allowed to brainstorm and list down the factors and then rate these factors for severity on a scale of 1 to 5 taking 5 for highly impactful and 1 for low degree of impact.

Sl No.	Low inquiry	Cancellation/Revoke of project	Impacted commissions/registration income	Low affordability
1	4	4	5	4
2	3	4	5	4
3	3	3	5	3
4	4	4	4	2

5	5	5	3	4
6	5	3	5	3

Table 4.2 Factors Rated byReal Estate Agents

Investors/Buyers: The various factors that influenced the investors community in the real estate sector are studied and listed with respect to the severity in terms of impact on project financing and businesses. The sample taken to analyze this dimension consisted of 7 investors. Table 4.3 lists down the factors rated by the real estate buyers with respect to the post covid impact on the real estate/construction industry.

The parties were first allowed to brainstorm and list down the factors and then rate these factors for severity on a scale of 1 to 5 taking 5 for highly impactful and 1 for low degree of impact.

Sl No.	Financial Uncertainty	Low Resale Value	Cancellation/Revoke of projects	Low affordability
1	4	5	5	4
2	5	4	2	4
3	5	3	2	5
4	4	4	2	2
5	5	5	3	4
6	5	3	5	3
7	5	5	2	5

Table 4.3 Factors Rated by Investors/Buyers

5. FINDINGS AND CONCLUSION

● In the midst of the coronavirus outbreak the builders faced problems with respect to funding of the projects, lack of funding opportunities, low availability of labour on account of lockdowns, cancellation of projects on lack of sales and funding and slow recovery of funds. The key factors as per rating of severity were lack of availability of funds to kick start their projects and labour shortage.

● The agents in the real estate sector listed out factors like low inquiry for sales and purchases, affect on their income in the form of low commissions and registrations, cancellation of projects and low affordability in buyers on account of job losses and future uncertainty. The key factors that impacted the agent businesses financially were low inquiry coupled with lack of new registration and sales that resulted in low income.

● Investors or buyers in the real estate sectors listed out the factors like financial uncertainty, low resale value for any sales to be made, cancellation of residential projects and low affordability on account of job losses and future uncertainty. The key factors that affected the funding transactions were financial uncertainty in the long run and low resale value for the property that resulted in lower economic activity in the sector.

CONCLUSION

The road to recovery for the real estate sector should involve a combine efforts from all the stakeholders considering the fact that the real estate sector is a significant contributor to India's overall economic growth. Government initiatives have come up to further attract homebuyers from the middle-income group like the Goods and Services Tax (GST) was reduced. The Pradhan Mantri Awas Yojana (PMAY), launched under the Housing for All Mission, aimed to provide adequate housing for the urban poor with a credit-linked subsidy scheme (CLSS), offering an interest subsidy to applicants of a home loan under PMAY.

With the rising of work from anywhere or work from home (WFH) culture and flourishing of remote working across the country, builders can come up with designing and implementing such projects that will go with the working trend. Also the lending agencies should implement the reforms to boost consumers' confidence for investing in real estate projects.

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Role of E -Pharmacy in Pharmaceutical Marketing

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ABSTRACT
The channels of communications in the field of medicine have remained largely unchanged for past century. Though traditional forms of communications such as field visits, education pamphlets or posters are considered effective till now its prohibitive costs of execution and penetrations imposes challenges especially for small players in the market. With acceleration in the usage of information technology pharmaceutical companies have stepped digital marketing activities to engage patients on disease education, through mobile applications, Chabot, Facebook, You Tube and other social medias platforms. E-pharmacy helped pharma industry to improve visibility and penetration. Prolonged pandemic triggered change in pharma consumer behavior resulting phenomenal increase in E-pharmacy's market potential. Current study is on basis of online survey conducted by the author through google forms with pharma marketers to evaluate the usefulness of E-pharmacy as effective digital marketing tool. This paper aims how E-pharmacies and pharmaceutical companies can have mutual benefit with an aim of empowering consumer with better medicine & disease knowledge.

Keywords: Pharma marketing, E-pharmacy, Consumer, Pharma marketer, Digital marketing, Value added services

INTRODUCTION
India is witnessing major growth in health & wellness space with Indian pharmaceutical market growing at compounded annual growth rate (CAGR) of 11%. Over a decade India is experiencing increasing burden of lifestyle disorder or so called non-Communicable disease like Hypertension, Type 2 Diabetes, chronic respiratory disease like asthma leading to COPD, Cancer and depression *which* is a major cause of concern since it accounts 60% of total deaths as per the data of FICCI of 2015[2].

Today availability, cost effectiveness and lack of awareness are the major challenges for last mile access to medicines[3]. With the support of technology, healthcare is anticipated to transform into a system where the consumer would be well informed and empowered.

Traditionally, pharmaceutical companies focus majorly revolves around HCP (healthcare provider) where patient connect is limited but with the advent of technology and increase in chronic disease burden focus is shifting from HCP to consumer(patient). Lately, pharma companies are actively engaging with patients through digital platforms. So far pharmaceutical companies' drugs were available only with retail chemists (till 2015) and with birth of E-pharmacies its reach now can be extended directly to consumer's doorstep.

Today, E-pharmacy is just not a portal to buy medicines online, it also offers value added services to consumers such as online/offline health services, medicine information, disease awareness program/blogs, digital health records etc[4]. All these services are creating strong connect with millions of consumers. Hence, in future E-pharmacy may be a good platform to reach out to consumers especially chronic medicine buyers & may attract pharmaceutical marketer to create better connect with consumer & enhance their brand visibility on E-pharmacy portal. This Paper attempts to propose suitable recommendations based on the current utilization of E-pharmacies platform by the pharma marketer.

OBJECTIVE
1. To analyze trends in the usage of E-pharmacy platform by pharma marketers in India
2. To understand future use of E-pharmacy platform & value-added services in pharma marketing

METHODOLOGY
This study comprises of descriptive design where data collected both from primary & secondary source. Primary data collected through online survey of Pharma Marketing Managers. A questionnaire is being developed, validated, and administered to pharma marketing managers ranging from middle level to senior manager to get their viewpoint on use of E-pharmacy portal for promoting their products & to reach their customer on the product awareness and benefits. This survey comprising of sixty respondents based out of four cities namely Mumbai, Hyderabad, Ahmedabad, and Chennai. Out of total respondents 69% marketers managing chronic therapy portfolio whereas 31% managing acute therapy portfolio. Respondents are further categorized in three groups based on their age – 25-30 years, 30-40 years, 40 years & above. Respondent's responses are collected through google form.
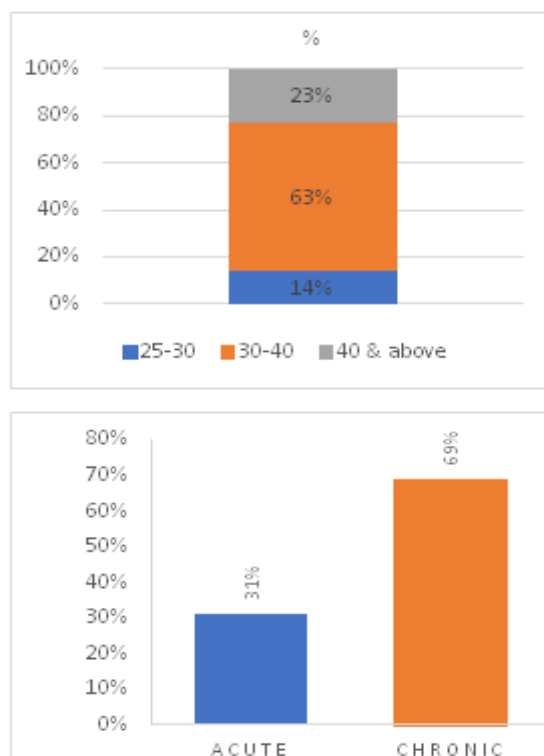
The relevant secondary data will be collected from the research journals, books & internet as a source of data.

Statistical Analysis of the study findings:

1. Current use of E-pharmacy by pharma marketing:

a) Current use of E-pharmacy as digital marketing tool

E-pharmacy is a new digital platform for pharma marketers. During pandemic couple of OTC brands & diagnostic device companies have explored this platform to enhance brand visibility at consumers. As per survey, **61%** pharma marketers from Chronic therapy responded positively for use of E-pharmacy as digital marketing tool Vs **24%** of acute therapy marketers. This survey primarily indicates E-pharmacy platform has not been much explored by Acute therapy marketers. Amongst three age groups, **63%** marketers between 25-30 years shown highest positive response for using E-pharmacy as digital marketing tool. Young pharma marketers are inclined towards using E-pharmacy platform.

b) Current usage of E-Pharmacy platform in pharma marketing
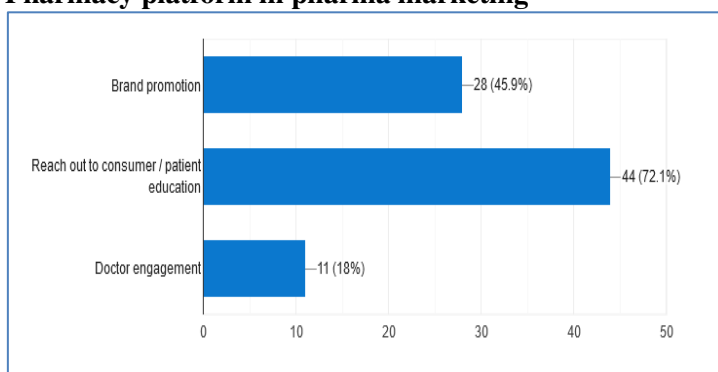
E-pharmacy platform offering various value-added services to their consumers such as departing medicine & disease information, online doctor consultations, diagnostic lab service, reminder for refilling medicines etc. this can be good opportunity for pharma marketers to avail E-pharmacy platform for enhancing their product visibility, creating awareness about disease & medicine as well as engaging HCPs. As per 72% respondents, current use of E-pharmacy can be majorly used to reach out to consumer for drug or disease awareness. 46% respondents feel E-pharmacy is good platform for advertising their brand especially over-the-counter products & diagnostic devices. Less respondents 18% feel E-pharmacy can be used for doctor engagement by publishing their blogs on this platform. Across all the age groups, marketers responded E-pharmacy platform can be used to reach out to consumer & patient education.

c) **Preference of E-pharmacy services to reach out to consumer** (1-5 rating on basis of importance, 1-least important, 5-High important)
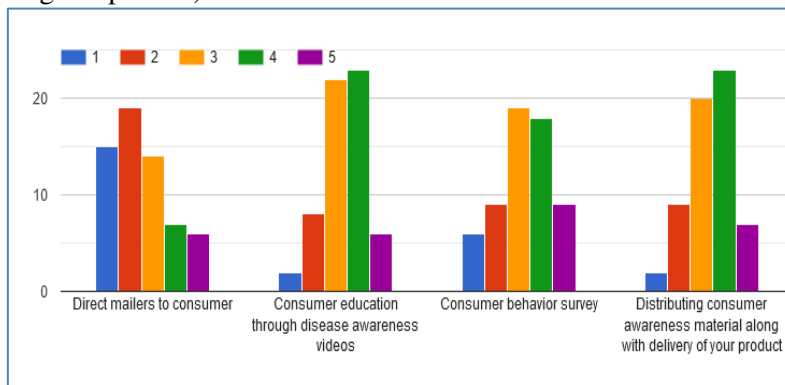
As we have seen E-pharmacy offers various value-added services to reach out to consumer. Both Chronic and Acute therapy marketers prefer distributing consumer awareness material along with delivery of product as the most prefer way to connect with consumers. In chronic therapy, marketers with age above 30 years prefer E-pharmacy platform for creating disease awareness through videos & conducting online consumer survey. Currently, direct mailer to consumer is least preferred by all age group pharma marketers.

2. **Opinion on Future use of E-pharmacy platform for pharma marketing**

a) **Usefulness of E-pharmacy as a marketing channel to reach out to consumers**
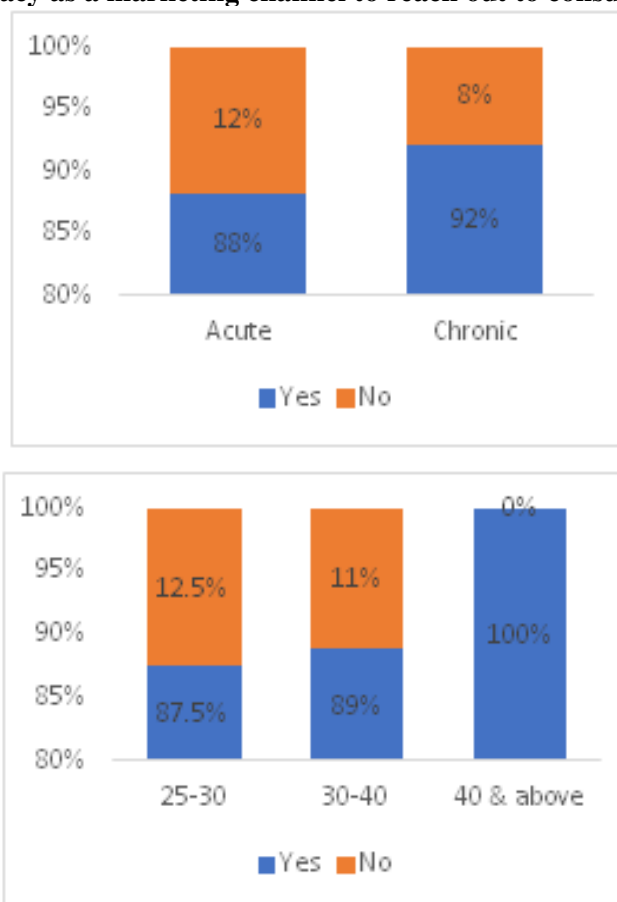
The pharma marketer has stepped up for digital marketing activities for the past few years and can align their digital marketing strategies to the E -Pharmacy Platform to enhance brand visibility & reach out to consumer. Pharma marketer can also reach out to their consumers on disease awareness brochures, their product information, pamphlets on wellness products discounts. Almost 90% respondents believe E-pharmacy can be good marketing channel to reach out to their consumers.

b) **Usage of E-Pharmacy platform to connect with consumer during COVID-1**
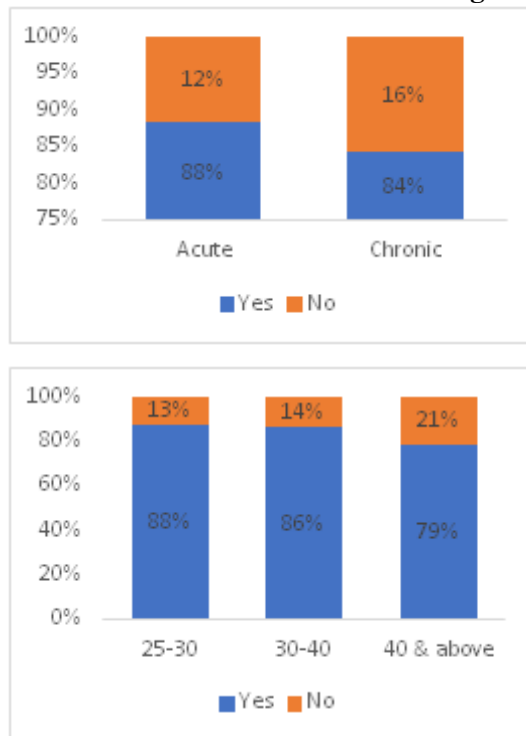
During pandemic demand increase in acceptance of E-pharmacy platform has been seen, as per FCCI white paper on E-pharmacies - Aug 2020, E-pharmacy market size shown ~2.5x growth & consumer reach enhanced to ~8.8 million household by June 2020[5]. During COVID 19 pandemic many pharmaceutical companies started exploring E-pharmacy platform for enhancing brand visibility of their products & connecting with consumers. Most of the age group respondents feel the usage of E-Pharmacy platform for consumer has been increased during COVID 19 pandemic.

c) **Use of E-pharmacy platform as important marketing tool during product life cycle**
Overall, all respondents feel E-pharmacy is important marketing tool at all phases of product life cycle but can be leverage more during growth phase of product life cycle to enhance brand visibility & create consumer connect.

75 % of marketers in age group 25-30 years feel E-pharmacy platform is good marketing tool for product growth phase. **Sixty-seven percent** of marketers in age group 30-40 years also the same. **Eighty-five percent** of 40 years & above age group feel E-pharmacy can be good marketing tool at mature phase of product life cycle.

This can be further evaluated and to have more insights larger number of participant's is needed since the preference is remarkably close to Launch phase as well in Maturity Phase.

CONCLUSION
With the birth of E-pharmacy pharma marketing companies' products availability increased and with the COVID 19 situation the E-pharmacy market potential amplified phenomenally. Online survey conducted by the author through google forms to Pharma marketing managers to check their inclinations towards E-pharmacy for their brand communication and marketing at various stages of product life cycle.

Though overall usage was found to be 51% budding marketers in the age group of 25 to 30 are rapidly exploring platform for better visibility of their products & reach to consumer. This group would be focused targeted audience of E-pharmacy companies for chronic therapy to enhance the use of this platform.

Marketers from acute & chronic therapy feels E-pharmacy is good platform to reach out to consumers with disease awareness & brand promotion. Good consumer connect can be done through consumer awareness videos, Blogs, medicine pamphlets, brochures along with delivery of medicines. Whereas direct mailer to consumer is preferred least by all age group marketers.

Majority of the respondents concur on importance of E-pharmacy as effective marketing tool at all phases of product life cycle. Interestingly the age group of 25-40 years feels it is useful tool at growth phase of product whereas 40 years & above inclined its use at maturity phase of product life cycle.

By 2025, E-pharmacy platform planning to tap approximately 70 million, estimated by FICCI in the white paper titled 'E-pharmacies at COVID-19 Frontline: Fighting the Odds, Serving the Nation'[3]. Considering increasing acceptance of this platform Pharma marketers can plan effective strategies to reach larger population of consumers regarding the disease information and have a higher online shelf space to enhance their brand productivity and this may ensure consumer adherence to medicines. The scope of the paper doesn't include consumer feedback on value added services offered by E-pharmacy, which would have given broad perspective. Proposing a separate study to understand consumer perception on services availed by E-pharmacy platforms.

To conclude, E-pharmacies & Pharma marketers must align to develop quality content on disease & medicine awareness which will empower consumers & improve drug adherence.

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Click and Mortar Banking at SBI – Yono the Game Changer

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ABSTRACT

India's digital financial services is transforming radically. From digital wallets to payment gateways, today's tech well informed millennial youth have a wide range of options for fulfilling their financial services. The digital payments industry globally, observed a paradigm shift over the past decades, especially with artificial intelligence, cloud banking solutions and analytics to create a better client engagement and experience. (Dokania, 2020)

The brick and mortar traditional models of banking has been disrupted with hybrid model emerging along with traditional approach of banking. In this hybrid-banking model, besides the traditional banking activities, the use of digital banking services, online deposits, mobile wallets, e bill payments have increased. These advancements are predominantly followed by the growth of fintech enterprises including the neo-banks. Neo Banks, are making the entire banking process more convenient, enhancing the customer experience, that is hassle-free.(Unnithan, & Swatman (2002).

SBI India's largest PSU bank, State Bank of India (SBI), had launched YONO, 2017, which had three components. First, it offers digital banking services, secondly it offers integrated financial services of SBI Card, SBI Mutual Fund, SBI Life and General Insurance, SBI securities and as such is a One Stop Financial Supermarket, with a customer centric approach. Third and most important is a market place for its merchant partners. YONO, the app from SBI, which aggregates 14 applications, covering various categories, is focused on enabling customer delight experience. Hence the acronym YONO - 'You Only Need One' is appropriate. During the pandemic, YONO had doubled its user base from 17 million to 32 million as of December 2020 and further went up to 64 Million active users as of December 2021. (Business Standard, Feb,22). Further, according to this article, it makes YONO, the number one neo bank globally and make SBI is planning to broaden the user base of YONO, to penetrate its total customer base of 450 million. YONO has scaled up itself, positioning itself as an open banking platform, which can be used by other banks on pay per use model. YONO can radically transform the bottom line of SBI and is a hidden asset. The paper documents the transition of the SBI's traditional Brick and Mortar Model to Click and Mortar Model.

Keywords: Neo Banks, SBI, YONO, Fintech, open banking platform, Digital Payments, Payment Banks, Fintech Ecosystem, AI and Cloud Banking Solutions

INTRODUCTION

Neobanking is a contemporary banking model that's revolutionising both the financial and Fintech sectors. Neo-banks are Fintech companies, where the finance domain and technology converge to create an innovative financial services ecosystem globally. These companies, leverage technologies like cloud banking, artificial intelligence and machine learning to offer customised financial services to their customers which is more engaging, customer friendly and convenient. (Kothari, 2021)

After the global financial crisis of 2008, 'Neobank' emerged as a challenger to the traditional banking sector, which was focused on brick and mortar. Neo Banks, used technology to curate customer engagement, customer delight with faster connectivity. Neobanks were the fintech companies that offered apps, software and other technologies to streamline mobile and online banking. (Dokania,2020). Dokania (2020) postulates that these Neobanks specialize in specific banking services like checking and savings accounts, digital payments etc. Neobanks are fintech companies that offer apps, software and other technologies to streamline mobile and online banking. They are agile, quickly adapt to the new technology, and are cost effective as compared to the brick and mortar traditional banking solutions.

Neobanks are serving retail customers and MSMEs. The traditional banking model provided banking services like deposits and loans and advances, however their geographical area was limited. Neobanks, however did not have any such geographical restriction regarding their location. They could reach the untapped customer base across geographic regions and time zones. As a Hybrid Banking model, they converge with traditional model and open a sea of opportunity, to serve the untapped segment of the banking industry. Neobanking model are able to command a bigger market share in digital payment, after Covid 19 pandemic, where the need was felt for contactless transactions from anywhere at any time. (IBM Report, 2021)

Different types of Neobanks: According to RBI Guidelines, of 2015, RBI granted two types of Banking license - Universal Bank Licences, Universal banking license is like a One Stop Financial Supermarket, which caters to apart from traditional banking functions like accepting deposits and giving loans and advances, many other extensive financial services. These include, investment banking, commercial banking, wealth management and financial planning for customers; marketing of insurance,mutual funds.

The second category according to the RBI Guidelines of 2015 include, Differentiated Bank Licences (for niche banks). Differentiated Banks (niche banks) are banks that serve the needs of a certain demographic segment of the population. NABARD **is** focussed on Agricultural sector and empowering the farmers. NABARD brings about equitable financial inclusion across India.

These differentiated offering according to the customer base was targeted and positioned as per the financial needs of the different customer segments and demographic segmentation. Small Finance Banks (SFB) and Payment Banks (PBs) are examples of such banks.

RBI created 1. Payments Bank. (PB)The segment that Payment Bank catered to were small entrepreneurs, traders and businessperson and migrant workers. Payment Banks provide banking services like savings deposit account, current accounts and debit cards. It can, however, accept demand deposits (up to Rs 1 lakh), offer remittance services, mobile payments and digital /transactions like net banking and third-party fund transfers However, according to the guidelines, they are prohibited from issuing credit cards and loans to the customers. (Money Control, December 2019)

2. Small Finance Banks: (SFB) According to Money Control, December 2019, Small Finance Bank's customer segment is the small and marginal farmers, micro and small scale industries. The key difference between SFBs and regular banks is their gamut of their operation. They focus on serving small and marginal farmers, micro and small industries that would offer digital financial services that are propelled by high technology coupled with low-cost operations. The RBI regulations for these banks is lending 75% of their credit to priority sector borrowers. (Money Control, December 2019)

3. Payment Gateways: (PG) According to Money Control, December,2019, Payment Gateways**,** is a technological application, a mechanism that reads and transfers payment information from a customer to a merchant's bank account. Payment Gateway, capture the data, ensure funds and makes the payment to the merchant. A cloud-based software connects a customer to the merchant. UPI – Unified Payment Interface is a Payment Gateway. (Money Control, December 2019)

4. Digital Wallets: A mobile wallet is a way to carry cash in digital format. One can link one's credit card or debit card to one's mobile device and in turn to a mobile wallet. Unified Payment Interface is a simple bank-to-bank transfer network. .Digital Wallet are secure storage system for user information for various payment medhtods and platforms. Bhim Pay, Paytm, Phone Pe Paytm, PhonePe or Google Pay are all forms of PG. (Money Control, December 2019)

Evolution of the global neobanking landscape: Over 40% of the global market share of Neobank is for Europe region. They had the first mover advantage, due to the ease of Bank regulations for the European Economic Union (EEC), which eased the licensing process and gave customers a seamless, transparent and engaging banking experience at an effective cost. The regulators created more competition, which increased the number of neobanks with different financial service offerings. (PWC, 2020; Hashim & Field, 2020).

After the Global Financial Crisis of 2007-2009, many fintech companies, in United Kingdom, emerged which used API (Application Programming Interface), to develop an open banking platforms for their client banks to cater to their niche customers. API facilitated the banks to open their system to a third party, to provide banking services, through a robust inbuilt infrastructure. (IBM Report, 2021, Hopkins et al; 2019) . (IBM Report, 2021). According to the said IBM Report, 2021, Neo Banks who had partnership with a licensed traditional bank only could use API. The UK had a head start in introducing and driving the growth of Neo Banks hence they were called as Challenger Bank.

Start-up neo-banks have been growing exponentially in Indian banking sector. RBI has not allowed any regulatory approval and hence Neobanks collaborate with established Banks, Insurance Companies and NBFC to offer various digital financial services. The RBI's Outsourcing Regulations, Business Correspondent Guidelines and Master Directions on Digital Payment Security Controls, applicable to the partnering regulated entities (RBI website), govern these partnerships

Neobanks in India, are able to offer customised services to well informed millennials, small businessmen. Neobanks have a robust information security, architecture and complying with the data security norms of their bank partners. As per the RBI guidelines, Neobanks cannot function independently. They collaborate with a banking partner. API help neo bank in receiving a database of customers/ users whom they can approach and expand their base. Neo bank is platform centric rather than product centric. (IBM Report, 2021)

Further, according to Mckinsey Report, 2020, India, banks flaunted their digital propositions, integrating bill payment, e-commerce links, and Unified Payments Interface (UPI). UPI is India's real-time payment system into mobile banking apps and present three digital options in the customer interface. UPI spending increased, after the lockdown by 70 % untill the end of December 2020. RBI had an easy monetary policy leading to lower interest rates, affecting the net interest margins. Further, according to the same report, consumer's behavior radically changed due to the pandemic and they accepted digital payments, online banking and e-commerce. (Mckinsey Reoort,2020). This is evidenced in the below mentioned figure 1, which gives the decline in the percentage of cash usage globally.

Exhibit 2

COVID-19 will likely lead to a further decline in cash usage.

Cash usage by country
Percent of cash used in total transactions by volume, %

Emerging markets	2010	2020E
Argentina	95	87
Brazil	86	74
China	99	41
India	100	89
Indonesia	100	96
Malaysia	93	72
Mexico	97	86

Mature markets	2010	2020E
Japan	79	54
Korea	66	34
Singapore	59	39
United States	51	28
United Kingdom	55	23
Finland	53	24
Sweden	56	9
Netherlands	52	14
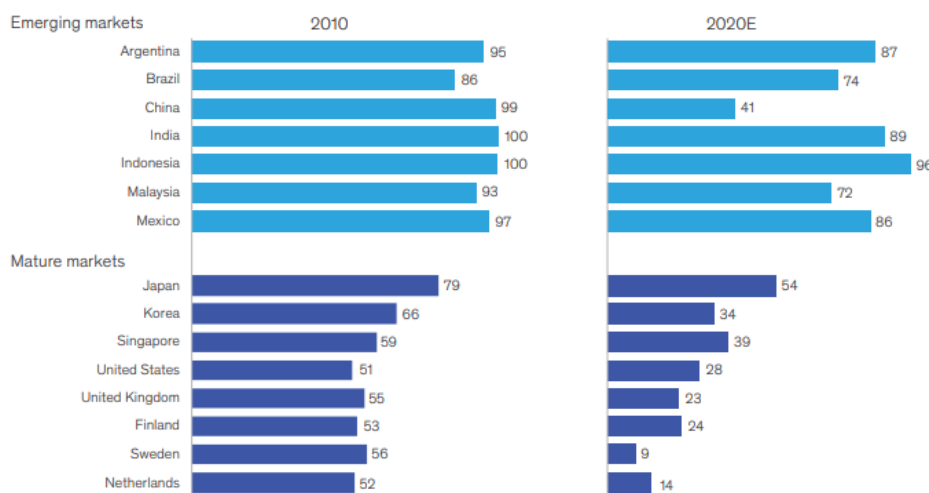
Source: McKinsey Global Payments Map

Figure 1: Cash Usage – International Comparative Analysis Source : Mckinsey Report, 2020

Further, according to the PWC Report, 2020, Neobanks are poised to be the major payment interface providers, who would control the financial needs of the consumers and the merchants, as the traditional banks would handle the underlying payments infrastructure. In India, in the banking sector, banks are increasingly entering into the partnerships with Fintech companies and Technology Service Provider (TSP). Banks use expertise of the TSP and give cloud based solutions and automation using robotics. Thus banks offer, settlement solutions, fraud prevention solutions, analytical solutions, at a reduced operational cost.

YONO – The Super App of State Bank of India.
State Bank of India has had a rich legacy of over 200 years serving the nation from the British Raj and one of the pillars of the Indian banking sector, especially the Public Sector Banks. As of December 2021, SBI has over 491 million account holders, over 2.5 lakh employees and more than 22,500 branches worldwide having a global presence in over 36 countries with around 200 plus branch offices abroad. After three decades of liberalization and privatization, there were new income generation opportunities in India, which led to new financial freedom for the common Indian. SBI wanted to focus on the tech well-informed millennials.

According to ILO Report, 2012, India has the largest youth population in the world; around 66 per cent of the total population (more than 808 million) is below the age of 35, According to International Labour Organization website. India is a young country, with the second largest working class and a dynamic work force, which will fuel India to be economic superpower by 2040. India has what is coined as "demographic dividend" (Rao and

Verghese,2009) with the second largest working class and a dynamic work force which will fuel GDP making India a super power by 2040. (Ghosh et al.2010,).

SBI has positioned YONO to focus on this millennial, who were tech savvy. YONO also created a comprehensive online platform that is customer centric. SBI wanted to go beyond becoming a digital bank and created a financial supermarket offering customized financial services and an online marketplace with lifestyle products and service and enhancing the customer engagement and making banking a seamless experience.

Unravelling the customer date and comprehend and connect with the customer lifecycles processes so as to personalize their experiences is challenge faced during digital transformation. Further, market disruptions have augmented the need for focusing on customer engagement. SBI and IBM have collaborated to build a resilient digital platform, which is customer centric. INM has built an excellent dynamic system of security and stability to support the banking solutions. IBM has used latest technology like AI, automation, block chain, 5G, advanced analytics and cloud to transform the operations at SBI, making it more transparent, analytics that is based on real time data to giving real time, so as to mitigate problems across multiple business function. (IBM Report, 2021)

SBI emphasised e-commerce through YONO, and has positioned YONO as a "lifestyle and banking" application. During the pandemic, for the period ended December 2020, SBI sold products worth INR 46.2 crore on its YONO marketplace. YONO is following a BaaS—or a 'Banking as a Service'—strategy. RBI is running on Infosys platform for overseas customers and has a separate platform for domestic customers. YONO is thus running seamlessly across different platform provides using APIs. They are also targeting to extend the reach of YONO to co-operative and small and rural banks to use the underlying technology and thus this investment would be a money spinner for SBI. Thus YONO will also get a fee from SBI and other banks, for the financial services it renders. As can be seen from Figure 2, SBI leads for YONO downloads in the Banking Sector.(IBM Report,2021)

Total Downloads Of Leading Bank And Payment Apps
In Crore

App	Downloads (Crore)
Google Pay	28.36
Paytm	26.06
PhonePe	20.86
BHIM UPI	6.07
SBI Yono	5.88
MobiKwik	5.13
Freecharge	4.31
ICICI Bank	2.63
Kotak Mahindra Bank	2.57
HDFC Bank	2.32
Axis Bank	2.22
Bank of Baroda	1.42

Based on MaxInstall data available through a Google Android Play Store Scrapper and does not reflect active user base

Source: Compiled By BloombergQuint

Bloomberg | Quint

Figure 2: Payment Apps Downloads in India Source : Bloomburg Quint October 2019

The future success of YONO would be guaranteed by the people's usage. The digital transformation has been subscribed by over 64million mobile app downloads; YONO has over 9 million logins per day. YONO has supported SBI, to open over seven million bank accounts, at a click of a button. YONO has also been used by over 10 million card less withdrawals from ATM and purchase of over 6,50,000 mutual fund transactions. (IBM Report,2021)

As per the article of Business Standard, February 2022, No one had predicted that YONO would be the hidden asset of SBI, which would be worth over US $ 50 Million in less than three years of its launch. SBI could enter into an technology start up space, through collaboration with IBM to move beyond core banking and engage with customer's lifestyle choices. Business Standard, 2022 further quotes that, within just three years, YONO

has achieved phenomenal success – over 3.70 crore registrations, disbursements of loans and advacnes to the tune of INR 21,000 crore-plus; YONO has over 77,671 daily card less transactions and has also given leads for over INR 10,000 crore home and car loans. YONO as a standalone app has been valued at INR 3.67 lakh crore, which is more than SBI's present market capitalization as of February, 2022. Though there has been no formal valuation, the number has been derived based on lending book, banking transactions, profitability and potential. Many fintechs are valued at billion dollars-plus despite their much smaller loan books and far fewer payment transactions. One of the major element of YONO's valuation is the pre-approved personal loan segment that it has grown to INR 24,000 crores. YONO is encashing on the 480 million customers and tracking their savings and spending data and is approving the loans of the average size of INR 2,50,000. (Business Standard, 2022)

SBI is planning to offer YONO as a neutral platform, without the SBI brand, so that it can be a marketplace for other banks to offer their services.. Given that SBI is the largest bank in the country and the PSB space is undergoing consolidation, this has opened many new opportunities. Many private sector and cooperative banks are keen to join YONO by connecting via YONO API (application programming interface), which would give them an opportunity to segment, target and positon to the tech savvy customers. The marketplace model will help SBI earn a risk-free fee.

CONCLUSION
SBI, one of the biggest PSU Bank in India, which has made a successful foray into digital transformation, through their standalone App – YONO. YONO has effectively created new revenue streams, by leveraging technology to create a seamless banking experience at a lower operational cost, leading to customer delight. This is an effective click and mortar model

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A Study of the Role of Leadership in the Development of Higher Educational Institutions

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ABSTRACT
The indisputable impact of education on economic development also adds to the importance of success in higher education. The success of a higher education institution depends not only on the success of the teachers / researchers, but also on its Leaders. These leaders in higher education are called "academic leaders." Academic leaders are leaders who motivate university, faculty, and undergraduate scholars, provide rewarding opportunities, and create an appropriate academic environment for scholars to improve. Academic leaders have more responsibilities than corporate leaders. The purpose of this paper is to emphasize the importance of leadership in higher education using leadership insights from other authors.

Keywords: Higher Education, Academic Leader, Autonomy

INTRODUCTION
A study of the role of importance of Leadership in higher educational institutions in assessment and accreditation in India has been reviewed slight, hence the review of literature has been taken into consideration at international level higher education institutions for this paper. It elaborates on what other researchers have researched and written concerning Leadership in Higher education.   The purpose of this paper is to emphasize the importance of leadership in higher education using leadership insights from other authors.

These seem to be the main tasks in this article.

1. Confirm the concept of academic leadership.

2. Emphasize the key functions of leadership.

LEADERSHIP
Leadership plays a key role in quality assurance efforts. Higher education institution desires to be run by a leader who can apply his leadership effectively. Leaders of higher education have a responsibility to assuring the quality of their higher education institutions. However, quality guarantee effort will merely be achieved if there is hard work of all units in a higher educational institution. Still, the role of leaders of a higher education institution is essential because leaders look for the generous participation of their subordinates to achieve the goals of an organization.

The articulation of the concept of leadership, as entrenched in the three key aspects above leads to Bush's (2011) theory of distinguishing between educational leadership and management. Careful attention has been given to the terminology used in the description of the organisation of educational bodies. The activities of the school principals and senior staff members have evolved from the administration.

Some of the detail reviews of Literature are as follows:

LITERATURE REVIEW
(Puaca, Goran. 2020). This article describes the definition and design of areas of professional autonomy in Swedish universities (universities). Swedish universities are increasingly characterized by competing principles of management and professional autonomy. It examines aspects of the relationship between education and leadership ideas and the negotiation of professional habits through practice. The research methods used in this study were interviews with university management, strategic human resource management (HRM) representatives, and research and education staff at three universities with different forms of influence and leadership. The results show that expert negotiations are under pressure to transform as part of the governance implemented by New Public Management (NPM), but expert identity is a core academic value. Deeply rooted in. Therefore, it is relatively tolerant of NPM pressure and interference. In conclusion, teachers' professional identity and judgment are based on a central motivation to care for students and provide appropriate training. This shows the potential for adaptation by overcoming the paradox without jeopardizing the expert's "academic self." But at the same time, this is a collective dilemma with the risk that professionals are obsessed with the game and its prioritization requirements. However, the professional spirit is central to the commitment of

university members and a central aspect of academic institutions. Responsibility "outside" and professional responsibility for the student's overall training, regardless of management level, is central to their professional identity.

(Kok, C. McDonald, 2017) The modifications in authorities investment along outside pressures of elevated worldwide and countrywide opposition have intended that better schooling establishments want to excel in a turbulent environment. The leadership, governance and management (LGM) of instructional departments are key concerns. This observe investigates the correlation among behaviours, attitudes and skills at a branch stage and average departmental overall performance in phrases of tough statistics measures. The studies question this paper seeks to deal with is: what are the LGM behaviours which can be related to excessive overall performance in instructional departments? More than six hundred human beings throughout 50 instructional departments in five UK universities have been surveyed thru the usage of 3 studies levels such as open-ended questionnaires, important case sampled semi-established interviews and a fixed-reaction survey. Synthesising the statistics and findings of the observe discovered a thematic framework of eight large subject matters that make a contribution to excellence in instructional departments. These have been with inside the regions of good management, studies and teaching, communication, approach and shared values, leadership, departmental culture, rewards and staffing. The behaviours related to every of those subject matters have been used to assemble the Underpinning Excellence model.

(Gedminiene & Kaminskiene, 2016.) The main purpose of this article was to highlight and analyze the literature on educational leadership in higher education. It is stated that there is no right answer because the path to becoming a good leader is the path to becoming a leader. However, certain skills can characterize a good leader and certain behaviours can determine the type of leadership style. There are many leadership styles used in different countries. The different leadership styles are mainly based on the history of countries such as Lithuania. Lithuania was said to have been part of the USSR in 1990. Currently, most Lithuanian leaders/teachers still adhere to the old leadership style (transactional) where everyone wants to follow one best practice with little room for creativity. However, as noted above, educational institutions are demanding more now than they needed ten years ago. Globalization and the globalization of knowledge have changed the way many businesses operate, how they succeed in life, and what they need to know to adapt to today's world/economy. This is why academic leaders need to understand that things are changing and be able to communicate this new understanding of the world to their fellow students and peers. The main purpose of this study is to understand and analyze the two leadership styles. It was stated that the transactional leadership style is that the leader follows one best practice and continues to supervise others. Transformational leaders are very different in that they must encourage others to set high expectations or goals and motivate others to achieve them. It's interesting to see how the two styles differ from each other, but both are highly needed within the same educational organization. Students claim both leadership styles, but at different levels. Early learners accustomed to school-style teaching can help shape the future, but can still be more confident with business leaders who "hold hands". Later in the educational journey, transformational leaders must help and motivate students to shape their future careers. In conclusion, universities are now very important organizations in most countries. Globalization exists and does not happen anytime soon, so well-trained and trained education leaders are key to shaping the future careers of not only students, but the population of the country as a whole.

(Maranata Setiawati, 2016) Leadership performs a key function in best warranty efforts. Higher training organization desires to be led via way of means of a pacesetter who can observe his management effectively. This paper presents the significance of best warranty for better training and the powerful management function in assuring the best of better training establishments primarily based totally on a qualitative method with literature examine method. It then introduces preceding research of best warranty and powerful management with its attributes for better training that may be applied via way of means of leaders of better training. The author derived the literature guides from many nations particularly USA and UK. As an end result of the evaluation of the research decided on is the identity of powerful management attributes in assuring the best of better training. The findings are ten attributes of powerful management in best warranty for better training. (1) Having interpersonal intelligence: Leaders of better training need to be capable of construct an awesome expert dating each with contributors of an organisation and numerous events which could broaden better training establishments. In this case, there need to be awareness, involvement, compliance and energetic listening. Furthermore, leaders of better training are demanded to create new leaders. There is a management application layout referred to as "leaders broaden leaders" (2) Being creative: Leaders of better training establishments need to be capable of assume creatively and make use of others` creativity to discover progressive methods for alternate. In different words, leaders of better training need to be transformative; (3) Being visionary: Leaders of

better training need to have visionary capabilities to are expecting the desires of an organisation and set the fulfilments in their organization with inside the future. Besides that, leaders additionally offer steering and cognizance to reap their organization`s imaginative and prescient and mission; (4) Being a function model: In this case, leaders of better training need to be capable of encourage their contributors via way of means of expertise international surroundings complexity and using generation sophistication. In different words, leaders guide alternate which could impact their organization undoubtedly. In addition, leaders of better training need to additionally convey values encompass integrity. Besides that, leaders may be referred to as function fashions if they convey about and observe their values of their management together with excellence, integrity, compassion, wholeheartedness, courage, godliness, servanthood, and so on. Furthermore, to be referred to as function fashions, leaders need to display consistency of their actions. So, they want to be authentic; (5) Having making plans capabilities: Leaders of better training establishments need to have made plans capabilities that allows you to plan their organization`s motion in pursuing the organization`s desires; (6) Having assessing capabilities: Leaders of better training establishments need to have assessed capabilities to evaluate their organization`s situation; (7) Having comparing ability: Leaders of better training establishments need to need to examine ability to assess organization`s movement whether or not it's miles following establishments` making plans and the desires of training or not; (8) Being informed: Leaders of better training establishments need to be informed in works associated with better training; (9) Being proactive in pursuing the organization`s imaginative and prescient, mission. Its manner preserve questioning undoubtedly even in a hard situation; (10) Being bendy in making use of their management method to their contributors of better training establishments. It talks almost situational management.

(Intan Fadzaliana Ahmad, 2015) The role of universities is no longer to produce good people, but to become a factory that produces talents that meet the needs of the industry. Universities have lost their status as centres of learning and have become more practical. This article discusses the relationship between leadership style and higher education leaders' understanding of the university's role. The corporate governance of such leaders has made the university a mainstream generic supplier to a profit-driven, materialistic industrial market. The university's focus has shifted from improving student quality to enrolment, making students the most profitable customers. The governance structure is based on the Code and Conduct as well as guiding constraints (SOPs, KPIs, etc.). This is in contrast to management, which prioritizes the intrinsic qualities of a madman at all levels of the organization, from academia to administrative staff to students (people-centric). The aim of the university should be to form a "Tadibi" that combines spiritual strength, inner qualities, and common sense. The management structure of Insan Leadership is based on Insan's inner values and the potential of Insan as a unique individual with more original principles in organizational management. The information in this article is based on literature reviews and the researcher's educator and student experiences. Universities should not make material gains (medals, status, money, rank) their top priority. This paper presents a preliminary study on the need for additional research on educational management in relation to the understanding and goals of universities among higher education administrators. Leaders of Islamic higher education institutions must have a clear understanding of the true meaning and role of universities in order to apply human governance to the management of higher education institutions. This article also discusses the lack of confidence among university leaders in implementing corporate governance, human governance, or crazy leadership styles in running higher education institutions.

(Parker & Baporikar, 2013) India's higher education faces many quality issues as India aims to become a major player in the post-globalization knowledge economy. Higher Education Insitution (HEI) need to urgently enhance the effectiveness of individuals and organizations in providing higher education that meets global quality requirements. In these circumstances, academic leaders who are the gatekeepers of higher education quality standards, imagination and creativity need to urgently address higher education illnesses and deficiencies in order to make higher education more professional and global. In addition, training, practice, and competence-based choices for academic executives from universities are essential and relevant to maintain global quality standards. In addition, academic leaders need to explore how the concept of globalization, the meaningful integration of local and global forces, can help inform and improve education and practice. The study concluded that it was time for India to awaken to improving the quality of higher education in order to maintain global competition. To do this, they need to develop and transform good academic leaders. Leadership positions need to be assigned to leadership skills, insights, vision tests, and the ability to develop, delegate, and process the potential of faculty and staff for the structure of the higher education system. Academic leaders need to scrutinize the emotions of the workforce and develop human skills and art in which they are committed to the institute, students, and stakeholders as a whole. Academic leaders need to consistently motivate them in order for them to be able to do this. Only if the Academic Director, along with faculty, staff, students, parents and

other stakeholders, follows a top-bottom and bottom-up approach to set goals and plan the qualitative growth of the institute. They can achieve global change. Existing results will lead to higher education scenarios in India, eliminating bad practices inherent in the system.

SUMMARY AND CONCLUSION

Leaders who can successfully utilise their leadership characteristics are sought by higher education institutions. The findings of the above researches on leadership in higher education are as follows:

➢ The significance of institutional autonomy and academic autonomy.

➢ Institutes must also foster information exchange amongst themselves.

➢ To increase the effectiveness of their university's human resource management, universities could consider employing visionary leadership drivers.

➢ After combining the data and findings from the study, a thematic framework of eight major subject areas that contribute to educational success was established. These were in the areas of good management, education, communication, approach, and shared values, leadership, departmental culture, rewards, and staffing.

➢ To increase the level of responsibilities assigned to each member in higher education institution.

➢ The transformational leaders must help and motivate students to shape their future careers.

➢ The study proposes that there is no single model of "Leadership" in higher education because the external and internal environments are not the same.

➢ Academic leaders need to scrutinize the emotions of the workforce and develop human skills and art in which they are committed to the institute, students, and stakeholders as a whole. Academic leaders need to consistently motivate them in order for them to be able to do this.

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A Study of Reasons behind the Increase in Emigration from Assam

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ABSTRACT

People's out-migration is the most widespread phenomenon in all countries around the world, and it has gotten a lot of attention from policymakers. India, like many other developing countries throughout the world, has seen a surge in out-migration in recent years, particularly in the northeastern section of the country. In Assam, out-migration is a recent problem. Because of the scarcity of livelihood options, Assam has historically been a migrant-receiving state. However, in terms of Assam's development, the rate of employment generation is extremely low. As a result, many leave their own state or country in pursuit of work in other states or countries. Out-migration has been shown to play a substantial role in reducing economic gaps between regions. Different factors have influence upon an individual decision to out-migration. So out-migration is not determined by a single, a host of different factors together determines whether a person will out-migrate or not. Therefore, only economic development and reduction of the development gaps between regions and areas of residence coupled with improving information on employment opportunities will increase internal migration to the detriment of external one.

Keywords: Out migration, Assam, Factors

BACKGROUND OF THE STUDY

The geographical movement of an individual or a group is referred to as migration. It is defined as a move from one migration defining region to another, frequently crossing administrative boundaries, conducted during a specific migration interval, and involving a change of residency. A change in residence might be permanent, semi-permanent, or transitory. However, migration can be defined simply as "any residential movement that occurs between administrative units or boundaries over a particular period of time." The neoclassical migration theory sees migrants as independent, rational actors who make decisions based on a cost-benefit analysis. The theory of wage differentials, on the other hand, assumes negative relationship between outmigration and area earnings and a positive relationship between outmigration and area earnings. Aside from the desire for individual economic gain, there are additional factors that impact migration decisions and, more importantly, shape the decision to continue movement across time and location. The network theory of migration emphasised the importance of social networks in driving migration. In this context, networks can be characterized as groups of interpersonal links that connect migrants, former migrants, and non-migrants in origin and destination places through kinship, friendship, and shared community origin. Migration systems theory, on the other hand, assumed that migration alters the social, cultural, economic, and institutional conditions in both sending and receiving places, i.e. the entire developmental space in which migration processes occur. In other words, it caused structural changes in both the origin and destination societies.

The cost-benefit method of neoclassical economics is strongly related with the classical theory of international migration, which emphasises on the joint "push" from places of origin and "pull" from immigrant destinations. Both theories are rational and individualistic, forecasting migration based on benefit differentials in receiving countries. The push-pull approach was widely used in early transatlantic migration studies, such as economist Brinley Thomas's classic study. More recently, economist George Borjas proposed an elaborate cost-benefit approach to labour migration based on the wage disparity between sending and receiving places, multiplied by the probability of finding work upon arrival, minus travel costs. To Escape Conflict Zones is one of the oldest and most popular reasons for immigration; people feel compelled to leave their home country in order to avoid conflict and feel safe. Individuals living in war-torn countries, such as some parts of the Middle East, feel compelled to immigrate in order to escape the fighting and danger. Between 2000 and 2020, the number of people who fled conflict, crises, persecution, violence, or human rights violations more than doubled, from 17 to 34 million.

LITERATURE REVIEW

Mayda& Maria, A. (2005) in the paper "International migration: a panel data analysis of economic and non-economic determinants" tried to investigate the economic and non-economic determinants of migration inflows into fourteen OECD countries by country of origin during the period 0f 1980 to 1985. The source of this data is

the International Migration Statistics for OECD countries (OECD 1997), based on the OECD's Continuous Reporting System on Migration (SOPEMI). This model focused on both supply and demand determinants of immigration patterns. The main economic determinants of migration to another country are mean income opportunities in the source and destination country, their relative income inequality, the distance and common boarders between the two countries, destination countries relationship with the colonial countries, migration policies. Among the non-economic factors, the impact on emigration rates on geographical, cultural, and demographic factors as well as the role played by changes in destination countries migration policies.

Rosario, P. M., Carolina, P. R., Montserrat, N. C., & Elena, M. M. (2021) in the paper "Determinant factors of individuals' decision to emigrate in rural Spain: The role of ICT-based public policies". The current study uses data from a survey of rural residents to examine the factors that influence people's decisions to relocate to larger cities, with a particular focus on the impact of ICT-based public policies. The data suggest that the size of the municipality, age, and level of education have an impact on the desire to leave. It is found that the digital divide in terms of quality of ICT access has not, in many cases, been overcome, having an effect on citizen satisfaction.

Parida, J. K., & Madheswaran, S. (2015) in the paper " Determinants of seasonal migration in India" Using the most recent (2007-08) National Sample Survey (NSS) data, this report seeks to investigate the phenomena of seasonal migration in India and its determinants. The utility maximisation concept proposed by Stark and Fan is the theoretical model used to investigate the factors of seasonal migration (2007). The empirical conclusion backs up the theoretical claim that in India, increased incomes and the cost of separation have a major impact on seasonal migration. It is concluded that seasonal migration in India is mainly driven by poverty, employment and higher wages.

Patnaik, B. C. M., Satpathy, I., & Mandal, A. (2014) in the paper " Determinants of Migration-A review of literature" explain that economic reasons, better education, health care facilities, and entertainment, better employment opportunity, expected increase in income, existence of surplus work force in rural areas, nature of employment sometimes temporary or seasonal, reduce the risk of income loss, individual migration because of less land holding and family migration because of marriage and less land holding were discovered to be among the various factors that induce/ compel migration.

Hassan, T., & Khan, J. (2012) in the paper "Determinants of rural out-migration in India" investigates the geographical patterns of socio-economic causes of rural out-migration among the states and union territories of India. The present research work is entirely based on the secondary sources of data collected from Census of India 2001.The majority of rural migrants relocated from rural areas to other states and UTs of the country owing to social factors such as moving with home, marriage, education, moving after birth, and other special factors, according to the report. The rural migratory population, migration with household, marriage, and education are the primary social drivers. The other societal elements, such as post-natal migration and several other factors, are of lesser consequence. Work/employment, on the other hand, is the leading cause of rural out-migration.

Beine, M., & Parsons, C. (2015) in the paper "Climatic factors as determinants of international migration" mentioned that the process of urbanisation differs greatly between industrialised and underdeveloped countries. This is unsurprising considering the importance of factors like money and industrial progress. There are also some substantial disparities in terms of sensitivities to internal migration (as proxied by urbanisation). Climatic considerations appear to play minimal effect at the global level, i.e. when developed and developing countries are combined. Long-run temperature and rainfall volatility, as well as the occurrence of natural disasters, do not appear to be strong predictors of rural-urban migration. Natural disasters, on the other hand, appear to enhance urbanisation in developing nations, even when traditional correlates are taken into consideration. The fact that people from rural areas impacted by natural disasters prefer to migrate primarily to their country's cities explains the positive elasticity of urbanisation to the number of natural catastrophes. This is consistent with the fact that potential migrants from developing countries prefer domestic destinations with lower migration costs, meaning that liquidity limitations may bind a considerable number of potential movers.

OBJECTIVES
1. To study the reasons behind migration from Assam to different countries of the world.

METHODOLOGY
The study is based on primary data, which has been collected through telephonic interview with 100 labourers from different district of Assam. Since it is not possible to collect data from each and every migrant labourers,

therefore to collect the primary data convenient sampling method was used. To collect the data a self structured questionnaire was made and accordingly interview was conducted

REASONS OF MIGRATION FROM ASSAM

1. Better Employment Opportunities
The most prominent motivations for Assam' migrants are a lack of income and a lack of employment. The majority of migrants departed the country because they did not have enough money to live on or to have a decent life. Furthermore, more than 20% of migrants claim that a lack of accessible jobs drove them to migrate. In fact, people relocating to cities are looking for higher-paying jobs, whilst those migrating to rural areas are looking for any type of job.

2. Mean Income Differences
According to a new International Labour Organization (ILO) research, migrants earn approximately 13% less than national workers in high-income nations.The pay difference in hourly wages is bigger in some countries, such as Cyprus, Italy, and Austria, where it is 42 percent, 30%, and 25%, respectively. Finland has a lower rate than the rest of Europe, at 11%, and the European Union as a whole has a rate of roughly 9%.

3. Marriage
According to 2011 census 46 percent of overall migrants moved because of marriage, with 97 percent of them being women. According to the report, 20.58 crore Indian women migrated for marriage. According to the Census, the total population of married women was 29.3 crore, implying that 70% of married women were forced to relocate.

4. Education
The demand for foreign education is influenced by a variety of factors. Many Asian and African countries' lack of access to higher education has been a major motivator of most of the student flow that has occurred in the second half of the twentieth century. Historical or colonial ties between host and home nations have influenced the direction of much of the international student flow. Other criteria influencing the choice of a country study destination include linguistic similarity, the availability of science or technology-based programmes, and the physical proximity of the home and host nations. Furthermore, assessments of the quality of the home country's tertiary education system; the relative wealth of the home country

5. Environmental Factors
Climate change is also a factor in immigration, with the constant use of force to exert control over nature. Nature can be cruel at times, leaving man destitute and helpless. People are forced to evacuate and seek asylum in another somewhat safer environment as a result of severe storms, floods, and tsunamis, among other natural catastrophes.

6. Better life style
You are seeking a greater level of living by relocating to another country. Not just in terms of money, but also in terms of a cleaner, healthier, and higher quality of life. Nearly two-thirds of all foreign migrants live in nations with a good standard of living.

7. Personal needs
Some people are convinced that they belong in another country. Minorities (religious or sexual) have frequently found the need to relocate from their home country to a more tolerant country in order to establish the life they have always desired.

TABLE 1

Reasons of migration	Number of respondents
Better employment opportunities	28
Mean income differences	30
Climatic factors	7
Marriage	9
Better lifestyle	7
Personal needs	11
Education	5
Others	3

Source: Primary data, January 2022.

In the above table-1 it is seen that there are two big reasons behind the emigration from Assam one is the mean income difference between the home land and the foreign countries (which is the biggest reason of emigration from Assam), another is better employment opportunities they are getting in the foreign countries. Due to these two reasons 58% of sample respondents migrated from Assam.

CONCLUSION

People's out-migration is the most widespread phenomenon in all countries around the world, and it has gotten a lot of attention from policymakers. India, like many other developing countries throughout the world, has seen a surge in out-migration in recent years, particularly in the northeastern section of the country. In Assam, out-migration is a recent problem. Because of the scarcity of livelihood options, Assam has historically been a migrant-receiving state. However, in terms of Assam's development, the rate of job creation is extremely low. As a result, many leave their own state or country in pursuit of work in other states or countries. Out-migration has been shown to play a substantial role in reducing economic gaps between regions. The concerns and challenges of rural-urban out-migration, as well as its economic and social consequences, have a significant impact on Assam's socioeconomic situation, necessitating policy interventions by concerned authorities. According to the findings of the survey, the majority of individuals in Assam's rural sector move in quest of work. However, the number of out-migrants in urban areas is far lower than in rural ones. As a result, suitable educational facilities in rural areas should be provided. Aside from that, vocational education should be included to the curriculum, particularly at rural colleges, to provide rural students with practical experience in earning a living. Therefore, only economic development and reduction of the development gaps between regions and areas of residence coupled with improving information on employment opportunities will increase internal migration to the detriment of external one.

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Effect of Urban Air Pollution on the Lichen Pyxine Cocoes Nyl. In Mysore City

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ABSTRACT

In the present study, the lichen Pyxine cocoes were collected from different places of Mysore city, Mahadevapura and studied their effect of urban air pollutants on the morphology, anatomy and chlorophyll pigments were examined. Morphological study was carried out by observing the thallus using a stereomicroscope. The changes like discolouration of thallus, deposition of soot, dust and other particles were observed in the thallus and photographs were taken. Significant differences were between the thallus of different areas were observed from the thallus which were collected from the traffic area and industrial area when compared to the thallus of residential area and control area. Free hand sections were also taken to study the differences in the internal structure of the lichen thallus. The transverse sections showed no significant variation in the thickness of the algal layers, cortex, and hyphal layers. The photographs of the sections were taken at 10x and 40x magnifications. In the thallus which was collected from Mahadevapura showed clear algal cells (40x), in any plants if pollution is more, then the effects can be made out clearly by estimating the amount of chlorophyll pigments, because the pollutants affects primarily on chlorophyll pigments. It is the cheap and best method which is done all over the world to study the effects of urban air pollutants like SO_2 and NO_2 on plants along with other parameters. Hence, in the present study chlorophyll pigment estimation was done, The result which was drawn clearly suggests that there is a slight influence of air pollutants like SO_2 and NO_2 on the chlorophyll pigment death, because least chlorophyll amount was recorded in the thalli which were collected from traffic area i.e., Metropole Circle followed by industrial area and residential area. Highest amount of chlorophyll was recorded in the thalli collected from the control area.

Keywords: Biomonitoring, Ambient air quality, chlorophyll amount

1. INTRODUCTION

Lichens are the types of plants which are made up of two different organisms, they are algae and fungi. They are slow growing plants hence they are used widely as pollution indicators. Air pollution is one of the most dangerous and common kind of environmental pollution that is reported in most industrial towns and metropolitans cities of India and abroad (Verma and Agarwal, 2009). Environmental pollution can be defined as "any undesirable change in the physical, chemical and biological characteristics of any component of the environment which can cause harmful effects on various forms of life or property" (Kaushik and Kaushik, 2006). Sulphur dioxide (SO_2), Nitrous Oxide (NO_2), Carbon dioxide (CO_2) and Carbon monoxide (CO) are the major air pollutants present in the air, which are emitted by industries and vehicles. The sulphur compounds are hazardous to health. Sulphur dioxide attacks the lungs and other parts of respiratory system in man, although the various sulphur dioxides are corrosive to other organs of the human body. The SO_2 and Hydrogen sulphide (H_2S) damage many plants in the form of necrotic lesions on the leaves (Arora, 2004).

Plant injury is common near large cities, industrial area, traffic area etc. Urban air pollutants affect plants by entering through stomata, destroys chlorophyll and effect photosynthesis. Pollutants also erode waxy coating of the leaves called cuticle. Cuticle prevents excessive transpiration, damage from pests and diseases, drought and frost. Damage to leaf causes necrosis, chlorosis or epinasty and abscission. Particulates deposited on the leaves can form encrustations and plug the stomata. The damage can result in the death of the plant (Kaushik and Kaushik, 2006). In the urban environment not only avenue trees, shrubs and herbs even some of the epiphytic lichens are also exposed and affected by urban air pollutants.

The Mysore has a rapid development in urban area in demography, migration, transportation, or industrial sector. The Mysore is the second metropolitan city in Karnataka in which it has 10,48,510 of population as per 2011 census and 43 villages will be amalgamated to corporation. The traffic congestion contributes greater to deteriorating environment in urban communities. In the last few years, about 70% of ambient - air quality degradation in Mysore is affected by transportation activities. Based on the statistics of department of regional transport offices (RTO) in Mysore (2011) the increasing of motor vehicle in Mysore has gone to 4, 38,003 (31st March 2011) till this year. While transportation activities could effect on positive impact like the increasing

economic activity, or negative impact on increasing of street capacity could effect in decreasing ambient air quality and also decreasing on public health quality (Harish, 2012).

The Karnataka State Pollution Control Board (KSPCB, Mysore) conducts the monitoring of ambient air in city every month for 24 hours twice a week. There are two conventional ambient air quality monitoring centers in Mysore - one located at Krishna Raja (K.R) Circle and the other at Metagalli, and Nanjanagud an industrial area. The K.R. Circle unit measures the pollution level caused by vehicular traffic while Metagalli unit measures residential pollution and the Kallahalli near Nanjanagud (next to M/s Jublient Organosys.) measure the pollution of Industrial region (Harish, 2012).

Lichens are non-vascular plants, which are made up of two different living organisms i.e. algae (phycobionts) and fungi (mycobionts). Lichens are extremely slow growing organisms, many increasing in size no more than one cm per year. Lichens are distributed all over the world. Lichens which colonize on rocks are called as saxicolous, on the barks of tree trunks as corticolous and those growing on soil are called as terricolous lichens (Mehrotra and Aneja, 2008). Lichens grow on a wide range of substrates, both on natural and man-made, and obtain their required nutrients and water directly from the atmosphere. This uptake of nutrients from the atmosphere means lichens are good indicators of environmental disturbance as they bio-accumulate airborne pollutants (Meijer and Dorihoe, 2006).

In the last few decades usage of lichens in urban areas as an indicator of air quality has been increased tremendously (Rani *et al*, 2013, Bajpai *et al,* 2011and Rout *et al*, 2010). The ability of lichens to accumulate levels of elements in the excess of physiological requirements in the close correlation with atmospheric elemental levels has led to their wide application as practical biomonitors of atmospheric contamination (Hussan. *et al,* 2013). Biomonitoring techniques help us to assess the effects of pollution and other environmental changes on the biotic components of ecosystems. In general, a biomonitor is an organism that provides quantitative information on the quality of the environment, while bioindicator is an organism that indicates the presence of pollutants by qualitative responses changing physiologically or chemically (Conti and Cecchetti, 2001). The lichens and trees can form networks of plant bioindicators of air pollution, the use appears to be simple, flexible, and economical and efficient to build good to map the pollution. The identification of pollution within the sensitive organisms can also detect the degradation of air quality before it severely affects the biota or humans (Maatoung et al, 2012).

One of the most important uses of lichens is that they are important reliable indicators and useful biological measuring devices of atmospheric pollution, because of their physiological sensitivity. A numbers of parameters are used to estimate the effect of air pollution on lichens (Das *et al*, 2013). Chlorophyll content and chlorophyll degradation are the parameters which are commonly used to assess the impact of air pollution on lichens (Rout *et al*, 2010). The most obvious sign of pollution damage to lichens is caused by decomposition of chlorophyll (Danesh. *et al,* 2013).The algae in lichen are particularly sensitive to pollutants such as SO_2 which disturbs membrane leading to chlorophyll breakdown (Garty, 1993). Pollutants like SO_2 and NO_x affects the growth of lichens and its colony. Sometimes the lichens which are sensitive to pollution will die or they shifts there colony. This shows the presence of air pollutants in the air (Gupta and Singh, 2011). Lichens are the most sensitive organisms known to SO_2 and, therefore, lichens can be used to monitor air quality (Niewiadomska, 1998 and Tiwary, 2008). Fruticose lichens are known to be the most sensitive to air pollution, followed by foliose and crustose lichens (Hazarika *et al*, 2011, Begum and Harikrishna, 2010). Among all the lichen species used in India, *Pyxine cocoes* is found to be more toxitolerant and suitable for biomonitoring studies (Shukla and Upreti, 2007, 2008; Bajpai *et al*, 2010; Danesh *et al*, 2013).

In the present study, the one of the most commonly growing lichen *Pyxine cocoes* Nyl. was used to study the effects of air pollutants on the morphology, anatomy and chlorophyll pigmentation at different traffic intersections and control area. Hence this investigation was planned to conduct with these objectives, 1. To compare the morphological changes in the lichen thallus growing at selected studies areas with respect to the lichen thallus growing at control area. 2. To compare the anatomical differences in the lichen thallus growing at study areas and compared with the lichens growing at control area. 3. To compare the chlorophyll a, chlorophyll b and total chlorophyll content in the lichen thallus growing at study areas and compared with the lichens growing at control area.

2. MATERIALS AND METHODS
Botanical name: *Pyxine cocoes*. Nyl

Family: Physciaceae

The genus *Pyxine* was established by Elias Fries in 1825 with Lecidea sorediata Ach. as its type species. By 1885 Nylander had recognized four species in the genus *Pyxine*. It is a foliose lichen with black apothecia, usually without algae in the margin; spores thick walled, brown and two celled. The thallus is normally composed of neatly radiating sub dichotomous to linear lobes, although irregular substrates and age disturb this pattern. They are commonly more or less flat.

Thallus foliose, appressed, corticated on both surfaces, heteromerous, photobiont a green alga, apothecia laminal with or without a thalline margin, Sorolia laminal, linear or conflict, medulla white, spores 16-20 × 6-8 μm; distributed in subtropical regions of India (Awasthi, 1988). To evaluate the effect of air pollutants on lichen present on different trees at three different areas of Mysore city and control area.

Mysore city is the second cleanest city in India after Chandigarh. Though Bangalore is the capital city of Karnataka, Mysore is known as cultural capital of Karnataka, because of its calm and clean environment. But in recent days due increased industrialization and urbanization the city is becoming polluted day by day. In the present study, the effect of urban air pollutants on the lichen was studied in three different locations of the city and results were compared with the control area chosen. The selected areas were Metropole circle or General. K.M. Kaariyappa circle selected as heavy traffic area, Saraswathipuram as residential area and Metagalli as industrial area. Mahadevapura, a village which is 29 kms away from the Mysore city was chosen as a control area (Fig. 1).

The lichen samples were removed carefully using the knife and scalpel. In Metropole circle the sample was collected which were growing on *Delonix regia* trees, which are located along the road sides of JLB Road. In Mahadevapura village, Saraswathipuram and Metagalli area the samples were collected which were growing on *Pongamia pinnata* and *Cocos nucifera* trees (Fig. 2). In Metagalli the samples were collected near a rubber factory and a bag manufacturing factory. The collected samples were cleaned by using forceps and needle and preserved in a polythene bag.

The thallus was observed under a stereomicroscope and the differences were noted down between the lichen grown at polluted area and controlled area (Fig. 3). The free hand sectioning was done, mounted on the clean slides and observed under the light microscope to study the differences in the thallus growing at polluted areas and control area The lichen sample was collected and the chlorophyll pigment analysis was carried out by following the Arnon (1949) method.

3. RESULTS

MORPHOLOGICAL STUDY

In the present study the morphology of *Pyxine cocoes* Nyl. was observed under stereomicroscope. The morphological differences or changes were observed and compared with the thallus which was collected from four different areas. The lichen thallus which was collected from the avenue trees of Metropole circle and industrial area showed some differences when compared to the thallus collected from residential area and control area. The health of the thallus was affected by the urban air pollutants emitted by the vehicles. The thallus showed reduced apothecia number. The thallus colour was decreased or the thallus discolouration was seen. When it was observed under the stereomicroscope the dust particles and soot deposition was clearly noted (Fig. 3).

The morphological result of the thallus collected from industrial area was also similar to that of the thallus collected from commercial area, but the thallus discolouration was not more and it is also not so disturbed when compared to the thallus collected from commercial area. The thallus which is collected from residential area and control area was almost similar in appearance with normal branching and also good number of apothecium was noticed. No discolouration was observed but only few debris and deposition of sand particles were seen. But cleaner thallus was the thallus collected from control area. This result was due to the less vehicular emission. Overall the health of the thallus was good when compared to the thallus collected from commercial area and industrial area (Fig. 3).

Free hand sections of the thalli were taken transversely. The sections were compared to make out the anatomical differences in the thallus collected from four different areas (Fig. 4 & 5). No big differences in the thickness of the thalli were noticed, but the algal cells can be clearly seen in the T. S. of thallus of control area at 40x (Fig. 5b). The thickness of the algal layer was good in all the thallus collected (Table 4).

The chlorophyll pigments were estimated by following Arnon (1949) method. The chlorophyll a, chlorophyll b and total chlorophyll contents were recorded highest in control area, followed by residential area, industrial area and commercial area (Table 3 & Fig. 6).

4. DISCUSSION

All the study areas which were selected in and around Mysore city have the concentrations of air pollutants within the permissible limits as standardized by KSPCB, Mysore. But in comparison the concentrations of the air pollutants was more at K. R. Circle when compared to Metagalli (Table 1 & 2).

Bad air quality in an area can negatively impact on lichen morphology (Wakefield and Bhattacharjee, 2011). The morphological features and differences in the thallus of *Pyxine cocoes* did not reveal any efficient results regarding the pollution and urban air pollutants. The morphology of the *Pyxine cocoes* showed little deposition of soot and dust in thallus which is collected from Metropole circle and Industrial area when compared to residential area and control area. The thallus which was collected from residential area and control area was good, with no such depositions. Morphological variables did not present a clear pattern in response to assumed pollution level differences among the sites (Wakefield and Bhattacharjee, 2011). Similar studies and results were noticed by Wakefield and Bhattacharjee, 2011 and Estrabou *et al*., 2004.

The anatomical study did not show any significant differences in the thickness of algal and fungal zone. The anatomical study by Estrabou et al., (2004) observed thicker cortex in urban area in *Physcia endochrysea* and *Ramalina celastri*. They also noticed more thickness in the algal layer in rural area and fewer in the polluted area. Increase in the algal density was seen in *Canomaculina pilosa* species. *Physcia endochrysea* showed little changes and *Physcia undulata* showed reduction in algal quantity. Wakefield and Bhattacharjee (2011) noticed thicker algal layer and cortical layers in different sites. Hence they were not able obtain a clear results in *Physcia sorediosa, Parmotrema perforatum and Ramalina stenospora.*

The amount of chlorophyll in the lichen thalli is often related to the levels of environmental stress (Wakefield and Bhattacharjee, 2011). The status of chlorophyll primarily indicates that the lichen pigment concentration is highly affected by air pollutants. The concentration of chlorophyll and pollutant concentration indicate that the lower concentration of chlorophyll was mainly due to pollution stress (Das *et al*, 2011). In this study the chlorophyll a, b and total chlorophyll content was recorded highest in control area, followed by residential area, and the reduced amount of chlorophyll was observed in traffic area and industrial area, because of the deposition of soot and dust particles (Table 3 & Fig. 6). Presence of dust will also influence the chlorophyll degradation (Das *et al*, 2011). It suggests that the concentration of chlorophyll was affected by the traffic level (Sujetoviene and Sliumpaite, 2013). The increase in the pollution results in the decrease in the chlorophyll (Rani *et al*, 2013). The variations in response could be directly attributed to the emissions from the industries and vehicular population at the study areas (Danesh *et al*, 2013).

Distinct variations in chlorophyll contents of *Pyxine cocoes* were also observed by Das *et al*., 2011, Rout *et al*.,2010, Danesh *et al*., 2013 and Rani *et al*., 2013. The chlorophyll pigment analysis was also carried out in different species of lichens like *Ramalina duriaei* (Kardish *et al*., 1987, Garty *et al*., 1993. etc.), *Pyrenula introducta, Leptogium denticulatum, Acanthothecis* species (Rout *et al*., 2010), *Physcia* species, *Xanthoria parietina* (Hussan *et al*., 2013) etc.

5. CONCLUSION

The present study provides the information about the effects of air pollutants on the lichen *Pyxine cocoes,* in selected areas of Mysore city. The morphological study and anatomical study shows that it is not much affected by the air pollutants but little decrease in the amount of chlorophyll pigment was noticed. Too much variation in the results is not seen because of less pollution level in the city when compared to other cities in India. The significant changes in any pollution related studies using lichens can be viewed in future days, because Mysore city is expanding due to increased urbanization and industrialization.

Further studies can be done by transplanting the lichen for longer duration from unpolluted or less polluted areas to traffic areas and industrial areas. By lichen transplantation method best results can be achieved. *Pyxine cocoes* has an efficient accumulation potential of various pollutants; therefore it can be used as a model lichen species for pollution monitoring in urban and industrial area. Mapping the distribution of lichens, heavy metal analysis using lichens growing near the polluted areas as well as by transplanting them, pollution status as well as the effects of air pollutants on the lichens can be studied. Fumigation studies can also be carried out in controlled conditions to study the effect of particular pollutants on the lichen morphology, anatomy, and physiology and biochemical reactions.

The pollution level will increase if proper attention was not given towards the urban development planning. To overcome the effects of air pollution we have to use the resources judiciously and more importance has to be given towards planting the trees in the city. Environment protecting programmes like Vanamahotsav,

Afforestation, Eco-forestry and Social forestry etc. have to be increased and also by educating the society, environment is protected and also pollution can be minimized. Environmental protection and ensuring healthy environment is an integrated effort which needs to be enforced, implemented and realized for future generations.

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Table 1: Ambient air quality monitoring data for the months of January, February and March of 2014 at K. R. Circle.

Sl. No.	Month (2013)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM 10 ($\mu g/m^3$)
1.	January	11.3	22.8	59
2.	February	12.0	23.0	68
3.	March	12.0	21.2	48
Average		**11.76**	**22.33**	**58.33**

Table 2: Ambient air quality monitoring data for the months of January, February and March of 2014 at K. S. P. C. B, Metagalli

Sl. No.	Month (2013)	SO_2 ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	PM 10 ($\mu g/m^3$)
1.	January	11.2	22.9	59
2.	February	10.9	22.4	71
3.	March	12.3	23.6	52
Average		**11.46**	**22.96**	**60.66**

Table 3: Thickness of algal layer of Pyxine cocoes

Sl. No.	Study areas	Thickness of Algal layer (μm).
1	Metropole circle	45
2	Metagalli	51
3	Saraswathipuram	66
4	Mahadevapura	66

Table 4: Chlorophyll pigment profile of *Pyxine cocoes* selected from different areas

SSl. No.	Areas selected	Remarks	Chl. a	Chl. b	T. Chl.
11	Metropole circle	Traffic area/ Commercial area	0.703	0.985	1.813
22	Metagalli	Industrial area	0.700	1.255	2.126
33	Saraswathipuram	Residential area	0.962	1.290	2.419
44	Mahadevapura	Village, Control area	1.105	1.843	3.173

Chl. a = chlorophyll a

Chl. b = chlorophyll b

T. Chl. = total chlorophyll content

Figure 6: Chlorophyll a, Chlorophyll b and Total chlorophyll of *Pyxine cocoes* recorded in study areas

Where, **MC**: Metropole circle (Traffic area), **MG**: Metagalli (Industrial area)
SW: Sarswathipuram (Residential area), **MH**: Mahadevapura (Control area)
Chl. a: Chlorophyll a, **Chl. b**: Chlorophyll b and **T. Chl.**: Total chlorophyll

Reduced Neighborhood Topological Indices and Rnm-Polynomial for Hyaluronic Acid-Paclitaxel Conjugates

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ABSTRACT

A large number of medical experiments have confirmed that the features of drugs have a close correlation with their molecular structure. Drug properties can be obtained by studying the molecular structure of corresponding drugs. The calculation of the topological index of a drug structure enables scientists to have a better understanding of the physical chemistry and biological characteristics of drugs. In this paper, we focus on Hyaluronic Acid-Paclitaxel conjugates which are widely used in the manufacture of anticancer drugs. Several topological indices are determined by virtue of the edge-partition method, and our results remedy the lack of medicine experiments, thus providing a theoretical basis for pharmaceutical engineering.

Keywords: Reduced Topological Indices; RNM-Polynomial; Hyaluronic Acid; Paclitaxel; Hyaluronic Acid-Paclitaxel conjugates

1. INTRODUCTION

With improvement in pharmaceutical technology in various countries in recent years a large proportion of newly emerging drugs are synthesized yearly from the laboratory and they are put on the market after clinical trials. At the initial stage a large number of experiments are required to test these new drugs to detect their biological activity, toxicity and degree of side effects on the human body. This results in a heavy workload in the laboratory, especially for countries and regions with low budgets and poor experimental conditions (e.g., Southeast Asia, Africa, and Latin America). In early chemical experiments, scientists compared a large amount of experimental data with the structure of compounds and concluded that the atomic arrangement of a compound had intrinsic relationships with the characteristics it exhibits ([1], [2]). Based on this fact, as a branch of theoretical chemistry, through the analysis of the topological index on the molecular structure diagram of compounds and the corresponding properties of the compounds have been welcomed by more and more scientists and gradually applied to materials science, nano-science, medicine, biology and pharmaceutical sciences ([3], [4], [5], [6], [7], [8], [9], [10] and [11]).

In computational modeling every atom is represented as a vertex and the covalent bond between atoms is expressed as an edge between two vertices. A graph obtained from a special chemical compound is called a molecular graph. Denote $G = (V(G), E(G))$ as a (molecular) graph and here $V(G)$ and $E(G)$ are vertex set and edge set respectively, which is corresponding to atom set and chemical bond set.

Topological indices can be regarded as a large number of parameters on a molecular graph which is important in theoretical physics and pharmacology science. There are some important indices based on the vertex degree, e.g., Randić index, harmonic index, Zagreb indices, connectivity index ([12], [13], [14], and [15]), etc.

Throughout this paper, the graph G is considered to be simple and connected with vertex set $V(G)$ and edge set $E(G)$, d_u is the degree of vertex $u \in V$, $d_{N'}(u)$ is the reduced neighborhood degree of a vertex.

Let $G = (V, E)$ be a simple graph, then for each vertex $v \in V$, the open neighborhood of v, $N(v)$, is the set of all vertices $u \neq v$ in $V(G)$ which are adjacent to v.

Let $G = (V, E)$ be a simple graph with $|V(G)| = n$ and $|E(G)| = m$. The N- degree of a vertex $u \in V$ is defined as the sum of the degree of the vertices in the open neighborhood of u. That is,

$$d_N(u) = \sum_{v \in N(u)} d(v)$$

The reduced neighborhood degree of a vertex u is defined as

$$d_{N'}(u) = \sum_{v \in N(u)} (d(v) - 1)$$

The maximum degree $\Delta'_N(G)$ is defined as $\Delta'_N = max\{d_{N'}(v): v \in V(G)\}$

The minimum degree $\delta'_N(G)$ is defined as $\delta'_N = min\{d_{N'}(v): v \in V(G)\}$.

Let $G = (V, E)$ be a simple graph with $|V(G)| = n$ and $|E(G)| = m$. Then the reduced neighborhood first Zagreb index and second Zagreb index denoted by $RNM_1(G)$ and $RNM_2(G)$ respectively, are defined as,

$$RNM_1(G) = \sum_{u \in v(G)} d_{N'}(u)^2$$

$$RNM_2(G) = \sum_{uv \in E(G)} d_{N'}(u) d_{N'}(v)$$

We define the modified, reduced neighborhood version of the first Zagreb index, denoted by $RNM_1^*(G)$, as follows:

$$RNM_1^*(G) = \sum_{uv \in E(G)} [d_{N'}(u) + d_{N'}(v)]$$

Let $G = (V, E)$ be a simple graph with $|V(G)| = n$ and $|E(G)| = m$. Then the forgotten reduced neighborhood index, denoted by $RNM_3(G)$ is defined as

$$RNM_3(G) = \sum_{u \in V(G)} d_{N'}(u)^3$$

We define the modified reduced neighborhood version of the forgotten topological index, denoted by $RNM_3^*(G)$ as follows:

$$RNM_3^*(G) = \sum_{uv \in E(G)} [d_{N'}(u)^2 + d_{N'}(v)^2]$$

Let $G = (V, E)$ be a simple graph with $|V(G)| = n$ and $|E(G)| = m$. Then the hyper reduced neighborhood index, denoted by $HRN(G)$ is defined as

$$HRN(G) = \sum_{uv \in E(G)} [d_{N'}(u) + d_{N'}(v)]^2$$

Let the edge partition of the graph G be defined as

$$R_{(i,j)}(G) = \{uv \in E(G): d_{N'}(u) = i \text{ and } d_{N'}(v) = j\}$$

Let G be a graph and let $R_{(i,j)}(G), i, j \geq 1$, be the edge partition as defined above and let $R'_{ij} = |R_{(i,j)}|$. We introduce the RNM-polynomial of a graph G as

$$RNM(G, x, y) = \sum_{\delta'_N \leq i \leq j \leq \Delta'_N} R'_{ij} x^i y^j$$

2. Hyaluronic Acid-Paclitaxel conjugates

Cancer is regarded as one of the major causes of death in the world and its death ratio continues to rise with the majority of deaths caused by breast, stomach, lung and colon cancers. Although there has been a great development in cancer biology and therapies to treat cancers, challenges still remain in primary and metastatic disease treatment. In addition, there are pitfalls in current anticancer drugs which induce low specificity and high toxicity thus severely limiting their efficacy. Certain advances have taken place in molecularly-targeted cancer treatment over recent years. Hyaluronic acid (HA) is a compound that occurs naturally. It is a glycosaminoglycan polymer composed of a linear structure of units of D-glucuronic acid and N-acetyl-Dglucosamine, which are linked via alternating β-1,3- and β-1,4-glycosidic bonds. Its primary structure, disaccharide, is energetically stable. HA is a promising cancer drug due to its unique, biodegradable, bio-compatible, nontoxic, hydrophilic, and non-immutable features; additionally, HA receptors demonstrated over-expression on many tumor cells. As a rapidly-growing platform for targeting CD44- overexpressing cells nowadays, HA aims to improve anticancer therapies. HA is an optimal drug carrier and drug targeting. Paclitaxel (PTX) is an effective drug, which is recommended for many types of cancers, including ovarian, breast, lung, bladder, prostate, and esophageal cancers, etc.
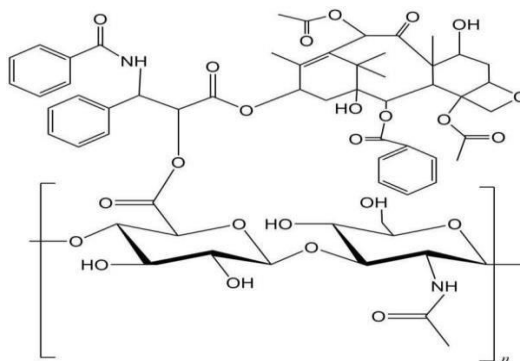
Figure 1: The molecular structure of Hyaluronic Acid-Paclitaxel conjugates.
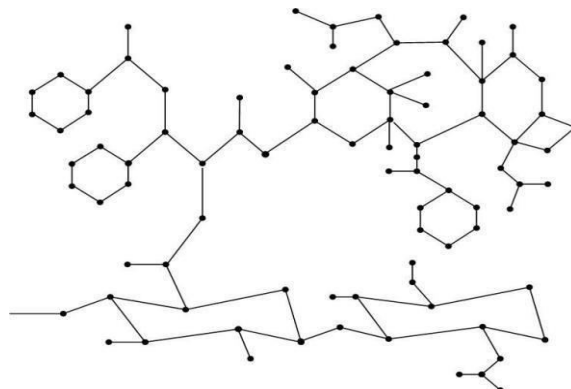
Figure 2: Corresponding molecular graph $G_1: n = 1$.
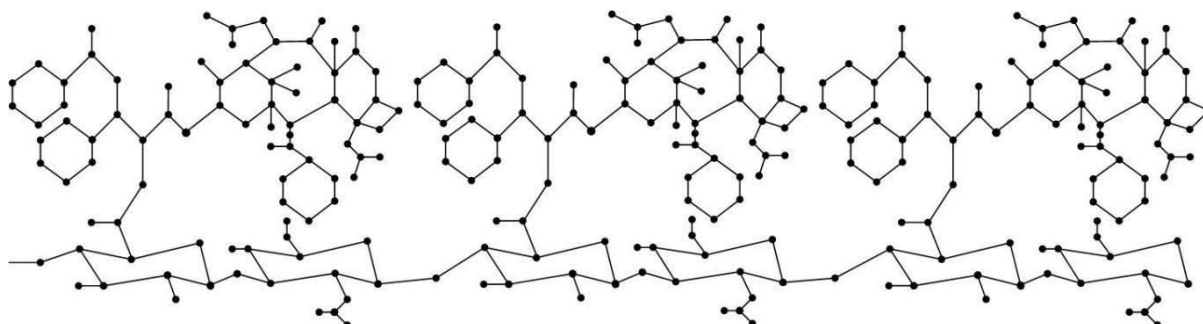
Figure 3: Corresponding molecular graph $G_3: n = 3$.

While PTX administration also encounters its own limitations, such as its poor solubility and relevant side effects, as well as the excipients typically used in its formulation. Ringsdorf firstly proposed the method of developing polymeric macromolecule-drug conjugates, which was designed to deliver small hydrophobic drug molecules to their sites of action. The main advantages of HA-PTX conjugates are the increase of its water solubility and the preservation of its activity, most importantly; it could be utilized as targeted drug delivery to reinforce anti-tumor efficacy. The structure of hyaluronic acid- paclitaxel conjugates is depicted in Figure 1.

4. MAIN RESULTS AND DISCUSSION

In this section, we discuss the silicate networks and give close formulae for certain reduced topological indices for Hyaluronic Acid-Paclitaxel conjugates.

This section aims to present several generalized degree- based indices of hyaluronic acid-paclitaxel conjugates. The main technique used here is to classify edges into some parts. In the following discussion, let Gn denote the molecular graph of HA-PTX conjugates with n units linear iteration. In figures 2 and 3, we depict their corresponding molecular graphs G1 and G3 when n = 1 and n = 3. By observing the graph structure and calculating, we get $|V(G_n)| = 87n$ and $|E(G_n)| = 96n$. If,

The maximum degree $\Delta'_N(G)$ is defined as $\Delta'_N = max\{d_{N'}(v) : v \in V(G)\}$

The minimum degree $\delta'_N(G)$ is defined as $\delta'_N = min\{d_{N'}(v) : v \in V(G)\}$.

4.1 The general reduced neighborhood topological indices and RNM -polynomial for Hyaluronic Acid-Paclitaxel conjugates G_n.

In this section, the general reduced neighborhood topological indices and RNM-polynomial for HA-PTX conjugates has been obtained.

Theorem 4.1.1: Let G be the molecular graph of Hyaluronic Acid-Paclitaxel conjugates G_n, then

$RNM(G, x, y) = (7n + 1)xy^2 + 10nx^2y^3 + 15nx^3y^4 + 6nx^2y^2 + 12nx^4y^5 + 3nx^5y^5 + 5nx^3y^5 + 3nx^2y^5 + (8n + 1)x^2y^4 + nx^4y^4 + 2nx^3y^3 + 6nxy^4 + 2nx^5y^6 + 2nx^3y^6 + nx^4y^6 + nx^6y^6 + 3nx^6y^6 + nxy^5 + 2nx^5y^7 + nx^4y^7$.

Proof: Let $R_{(i,j)}$ be the set of different types of edges as defined and let $R'_{ij} = |R_{(i,j)}|$.

These edge sets $R'_{ij} = |R_{(i,j)}|$ of G_n are divided into twenty edge groups and is denoted by $E_i(G_n)$, where $1 \leq i \leq 20$, which implies $R'_{ij} = |R_{(i,j)}| = |E_i(G_n)|$, based on the reduced neighborhood degrees of the end vertices. So, we write:

$$E(G_n) = \bigcup_{i=1}^{20} E_i(G_n), where$$

$E_1(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 1 \text{ and } d_{N'}(v) = 2\}$

$E_2(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 2 \text{ and } d_{N'}(v) = 3\}$

$E_3(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 3 \text{ and } d_{N'}(v) = 4\}$

$E_4(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 2 \text{ and } d_{N'}(v) = 2\}$

$E_5(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 4 \text{ and } d_{N'}(v) = 5\}$

$E_6(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 5 \text{ and } d_{N'}(v) = 5\}$

$E_7(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 3 \text{ and } d_{N'}(v) = 5\}$

$E_8(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 2 \text{ and } d_{N'}(v) = 5\}$

$E_9(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 2 \text{ and } d_{N'}(v) = 4\}$

$E_{10}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 4 \text{ and } d_{N'}(v) = 4\}$

$E_{11}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 3 \text{ and } d_{N'}(v) = 3\}$

$E_{12}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 1 \text{ and } d_{N'}(v) = 4\}$

$E_{13}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 5 \text{ and } d_{N'}(v) = 6\}$

$E_{14}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 3 \text{and } d_{N'}(v) = 6\}$

$E_{15}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 4 \text{ and } d_{N'}(v) = 6\}$

$E_{16}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 6 \text{ and } d_{N'}(v) = 6\}$

$E_{17}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 6 \text{ and } d_{N'}(v) = 8\}$

$E_{18}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 1 \text{ and } d_{N'}(v) = 5\}$

$E_{19}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 5 \text{ and } d_{N'}(v) = 7\}$

$E_{20}(G_n) = \{e = uv \in E(G_n): d_{N'}(u) = 4 \text{ and } d_{N'}(v) = 7\}$

Therefore, by the graph structure analysis and observation, we note that,

$|E_1(G_n)| = (7n + 1), |E_2(G_n)| = 10n, |E_3(G_n)| = 15n, |E_4(G_n)| = 6n, \quad |E_5(G_n)| = 12n, |E_6(G_n)| = 3n, |E_7(G_n)| = 5n, |E_8(G_n)| = 3n, |E_9(G_n)| = (8n + 1), \quad |E_{10}(G_n)| = n, |E_{11}(G_n)| = 2n, |E_{12}(G_n)| = 6n, |E_{12}(G_n)| = 2n, |E_{12}(G_n)| = 2n, |E_{12}(G_n)| = n, |E_{12}(G_n)| = n, |E_{12}(G_n)| = 3n, |E_{12}(G_n)| = n, |E_{12}(G_n)| = 2n, |E_{12}(G_n)| = n$.

From Figure 3, the RNM polynomial of G can be obtained as follows:

$$RNM(G, x, y) = \sum_{\delta'_N \leq i \leq j \leq \Delta'_N} R'_{ij} x^i y^j$$

$$= R'_{12}xy^2 + R'_{23}x^2y^3 + R'_{34}x^3y^4 + R'_{22}x^2y^2 + R'_{45}x^4y^5 + R'_{55}x^5y^5 + R'_{35}x^3y^5 + R'_{25}x^2y^5 + R'_{24}x^2y^4 + R'_{44}x^4y^4 + R'_{33}x^3y^3 + R'_{14}xy^4 + R'_{56}x^5y^6 + R'_{36}x^3y^6 + R'_{46}x^4y^6 + R'_{66}x^6y^6 + R'_{68}x^6y^6 + R'_{15}xy^5 + R'_{57}x^5y^7 + R'_{47}x^4y^7$$

$$= (7n + 1)xy^2 + 10nx^2y^3 + 15nx^3y^4 + 6nx^2y^2 + 12nx^4y^5 + 3nx^5y^5 + 5nx^3y^5 + 3nx^2y^5$$
$$+ (8n + 1)x^2y^4 + nx^4y^4 + 2nx^3y^3 + 6nxy^4 + 2nx^5y^6 + 2nx^3y^6 + nx^4y^6$$
$$+ nx^6y^6 + 3nx^6y^6 + nxy^5 + 2nx^5y^7 + nx^4y^7 .$$

Theorem 4.1.2: Let G_n be the molecular graph of Hyaluronic Acid-Paclitaxel conjugates G_n, then the general reduced topological indices can be given as,

$$RNM_1(G) = 1165n - 6, RNM_2(G) = 1430n + 18, RNM_3(G) = 5279n - 36,$$

$$HRN(G) = 5926n + 73, RNM_1^*(G) = 708n + 11, RNM_3^*(G) = 3066n + 37.$$

Proof: The vertex sets of G_n can be divided into eight vertex groups, based on the reduced neighborhood vertex degrees, which can be written as

$$V(G_n) = \bigcup_{i=1}^{8} V_i(G_n), \quad where$$

$$V_1(G_n) = \{u \in V(G_n): d_{N'}(u) = 1\}$$

$$V_2(G_n) = \{u \in V(G_n): d_{N'}(u) = 2\}$$

$$V_3(G_n) = \{u \in V(G_n): d_{N'}(u) = 3\}$$

$$V_4(G_n) = \{u \in V(G_n): d_{N'}(u) = 4\}$$

$$V_5(G_n) = \{u \in V(G_n): d_{N'}(u) = 5\}$$

$$V_6(G_n) = \{u \in V(G_n): d_{N'}(u) = 6\}$$

$$V_7(G_n) = \{u \in V(G_n): d_{N'}(u) = 7\}$$

$$V_8(G_n) = \{u \in V(G_n): d_{N'}(u) = 8\}$$

$d_{N'}(u)$	1	2	3	4	5	6	7	8
$|V_i(G_n)|$	(4n+1)	27n	(16n+1)	(22n-1)	12n	4n	n	n

Table 1: The reduced neighborhood vertex degree of G_n.

Now we apply the formula of $RNM_1(G)$, to compute this index for G_n. Since

$$RNM_1(G) = \sum_{u \in v(G)} d_{N'}(u)^2$$

$$= (4n + 1).1^2 + (27n).2^2 + (16n + 1).3^2 + (22n - 1).4^2 + (12n).5^2 + (4n).6^2 + n.7^2 + n.8^2.$$

$$= 4n + 1 + 108n + 144n + 9 + 352n - 16 + 300n + 144n + 49n + 64n. \quad = 1165n - 6.$$

$$RNM_3(G) = \sum_{u \in V(G)} d_{N'}(u)^3$$

$$= (4n + 1).1^3 + (27n).2^3 + (16n + 1).3^3 + (22n - 1).4^3 + (12n).5^3 + (4n).6^3 + n.7^3 + n.8^3.$$

$$= 4n + 1 + 216n + 432n + 27 + 1408n - 64 + 1500n + 864n + 343 + 512n.$$

$$= 5279n - 36.$$

Using the edge partition values of Theorem 4.1.1, we can calculate

$$RNM_2(G) = \sum_{uv \in E(G)} d_{N'}(u)d_{N'}(v)$$

$ss = |E1(Gn)|(1.2) + |E2(Gn)|(2.3) + |E3(Gn)|(3.4) + |E4(Gn)|(2.2) + |E5(Gn)|(4.5)$
$\quad + |E6(Gn)|(5.5) + |E7(Gn)|(3.5) + |E8(Gn)|(2.5) + |E9(Gn)|(2.4)$
$\quad + |E10(Gn)|(4.4) + |E11(Gn)|(3.3) + |E12(Gn)|(1.4) + |E13(Gn)|(5.6)$
$\quad + |E14(Gn)|(3.6) + |E15(Gn)|(4.6) + |E16(Gn)|(6.6) + |E17(Gn)|(6.8)$
$\quad + |E18(Gn)|(1.5) + |E19(Gn)|(5.7) + |E20(Gn)|(4.7)$

$= (7n+1)(1.2) + 10n(2.3) + 15n(3.4) + 6n(2.2) + 12n(4.5) + 3n(5.5) + 5n(3.5) + 3n(2.5) + 5n(2.4) + (8n+1)(4.4) + n(3.3) + 2n(1.4) + 6n(5.6) + 2n(3.6) + 2n(4.6) + n(6.6) + 3n(6.8) + n(1.5) + 2n(5.7) + n(4.7)$

$= 14n + 2 + 60n + 180n + 24n + 240n + 75n + 75n + 30n + 40n + \qquad 128n + 16 + 9n + 8n + 180n + 36n + 48n + 36n + 144n + 5n + \qquad 70n + 28n$

$= 1430n + 18.$

$$RNM_1^*(G) = \sum_{uv \in E(G)} [d_{N'}(u) + d_{N'}(v)]$$

$= |E1(Gn)|(1 + 2) + |E2(Gn)|(2 + 3) + |E3(Gn)|(3 + 4) + |E4(Gn)|(2 + 2) + |E5(Gn)|(4 + 5)$
$\quad + |E6(Gn)|(5 + 5) + |E7(Gn)|(3 + 5) + |E8(Gn)|(2 + 5) + |E9(Gn)|(2 + 4)$
$\quad + |E10(Gn)|(4 + 4) + |E11(Gn)|(3 + 3) + |E12(Gn)|(1 + 4) + |E13(Gn)|(5 + 6)$
$\quad + |E14(Gn)|(3 + 6) + |E15(Gn)|(4 + 6) + |E16(Gn)|(6 + 6) + |E17(Gn)|(6 + 8)$
$\quad + |E18(Gn)|(1 + 5) + |E19(Gn)|(5 + 7) + |E20(Gn)|(4 + 7)$

$= (7n+1)(1+2) + 10n(2+3) + 15n(3+4) + 6n(2+2) + \qquad 12n(4+5) + 3n(5+5) + 5n(3+5) + 3n(2+5) + 5n(2+4) + \qquad (8n+1)(4+4) + n(3+3) + 2n(1+4) + 6n(5+6) + 2n(3+6) + \qquad 2n(4+6) + n(6+6) + 3n(6+8) + n(1+5) + 2n(5+7) + n(4+7)$

$= 21n + 3 + 50n + 105n + 24n + 108n + 30n + 40n + 21n + \qquad 30n + 64n + 8 + 6n + 10n + 66n + 18n + 20n + 12n + 42n + \qquad 6n + 24n + 11n$

$= 708n + 11$

$$HRN(G) = \sum_{uv \in E(G)} [d_{N'}(u) + d_{N'}(v)]^2$$

$= |E1(Gn)|(1 + 2)^2 + |E2(Gn)|(2 + 3)^2 + |E3(Gn)|(3 + 4)^2 + |E4(Gn)|(2 + 2)^2$
$\quad + |E5(Gn)|(4 + 5)^2 + |E6(Gn)|(5 + 5)^2 + |E7(Gn)|(3 + 5)^2 + |E8(Gn)|(2 + 5)^2$
$\quad + |E9(Gn)|(2 + 4)^2 + |E10(Gn)|(4 + 4)^2 + |E11(Gn)|(3 + 3)^2$
$\quad + |E12(Gn)|(1 + 4)^2 + |E13(Gn)|(5 + 6)^2 + |E14(Gn)|(3 + 6)^2$
$\quad + |E15(Gn)|(4 + 6)^2 + |E16(Gn)|(6 + 6)^2 + |E17(Gn)|(6 + 8)^2$
$\quad + |E18(Gn)|(1 + 5)^2 + |E19(Gn)|(5 + 7)^2 + |E20(Gn)|(4 + 7)^2$

$= (7n+1)(1+2)^2 + 10n(2+3)^2 + 15n(3+4)^2 + 6n(2+2)^2$
$\quad + 12n(4+5)^2 + 3n(5+5)^2 + 5n(3+5)^2 + 3n(2+5)^2$
$\quad + 5n(2+4)^2 + (8n+1)(4+4)^2 + n(3+3)^2 + 2n(1+4)^2$
$\quad + 6n(5+6)^2 + 2n(3+6)^2 + 2n(4+6)^2 + n(6+6)^2$
$\quad + 3n(6+8)^2 + n(1+5)^2 + 2n(5+7)^2 + n(4+7)^2$

$= 63n + 9 + 250n + 735n + 96n + 972n + 300n + 320n + 147n + 180n$
$\quad + 512n + 64 + 36n + 50n + 726n + 162n + 200n + 144n$
$\quad + 588n + 36n + 288n + 121n$

$= 5926n + 73$

$$RNM_3^*(G) = \sum_{uv \in E(G)} [d_{N'}(u)^2 + d_{N'}(v)^2]$$

$$\begin{aligned}
= &|E1(Gn)|(1^2 + 2^2) + |E2(Gn)|(2^2 + 3^2) + |E3(Gn)|(3^2 + 4^2) + |E4(Gn)|(2^2 + 2^2) \\
&+ |E5(Gn)|(4^2 + 5^2) + |E6(Gn)|(5^2 + 5^2) + |E7(Gn)|(3^2 + 5^2) + |E8(Gn)|(2^2 \\
&+ 5^2) + |E9(Gn)|(2^2 + 4^2) + |E10(Gn)|(4^2 + 4^2) + |E11(Gn)|(3^2 + 3^2) \\
&+ |E12(Gn)|(1^2 + 4^2) + |E13(Gn)|(5^2 + 6^2) + |E14(Gn)|(3^2 + 6^2) \\
&+ |E15(Gn)|(4^2 + 6^2) + |E16(Gn)|(6^2 + 6^2) + |E17(Gn)|(6^2 + 8) \\
&+ |E18(Gn)|(1^2 + 5^2) + |E19(Gn)|(5^2 + 7^2) + |E20(Gn)|(4^2 + 7^2)
\end{aligned}$$

$$\begin{aligned}
= &(7n + 1)(1^2 + 2^2) + 10n(2^2 + 3^2) + 15n(3^2 + 4^2) + 6n(2^2 + 2^2) + \quad 12n(4^2 + 5^2) \\
&+ 3n(5^2 + 5^2) + 5n(3^2 + 5^2) + 3n(2^2 + 5^2) + \quad 5n(2^2 + 4^2) \\
&+ (8n + 1)(4^2 + 4^2) + n(3^2 + 3^2) + 2n(1^2 + 4^2) + \quad 6n(5^2 + 6^2) + 2n(3^2 + 6^2) \\
&+ 2n(4^2 + 6^2) + n(6^2 + 6^2) + 3n(6^2 + \quad 8^2) + n(1^2 + 5^2) + 2n(5^2 + 7^2) + n(4^2 \\
&+ 7^2)
\end{aligned}$$

$$\begin{aligned}
= &35n + 5 + 130n + 375n + 48n + 492n + 150n + 170n + 87n + 100n + \quad 256 + 32 + 18n \\
&+ 34n + 366n + 90n + 104n + 72n + 300n + 26n + \quad 148n + 65n
\end{aligned}$$

$$= 3066n + 37$$

4. CONCLUSION

This work mainly aims to present the degree-based index of Hyaluronic Acid in light of molecular structural analysis, degree computation and mathematical derivation. Reduced Topological Indices; RNM-Polynomial, generalized version of Zagreb index, first and second Zagreb polynomials of HA-PTX[n] are determined. The derived conclusions demonstrate the potential application prospects in pharmaceutical engineering in cancer treatment.

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Role of Social Media in Consumer Information Search: A Quantitative Investigation In Case of Consumer Electronics

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ABSTRACT

The objective of this paper is to research experimentally the role of Social Media in consumer's information search and also in the decision making process. Social media impacts significantly to interact more efficiently and effectively to exist in many contexts for the theory to have a strong balance. This investigation was conducted among the consumers to show how the social media influences customer settlements in the instant of quantitative investigation in case of consumer electronics on the road to the final purchase decision and in post-acquired evaluation. A quantitative investigation or research was done among the users of social media platforms like Whatsapp, Facebook, Twitter, Instagram, Youtube along with many others who possess a great influence on consumer's information search. The major finding of this investigation is to put into words why, when and how the social media has exerted influence on consumer resolution process. Therefore results show that these online platforms usage has engaged the purchasers as the Internet-based life has bewildered a noteworthy position as a specialized device. Sample of 200 online consumers were surveyed to know the role and impact of social media in consumer information search in which it is found that there is a significant influence of social media in consumer information search.

Keywords: Consumer, Social-Media, Information, Investigation, Quantitative

INTRODUCTION

In this paper, we are getting along to talk about how technical revolution throughout the preceding decades has extraordinarily revolutionized the social media with very large or enormous quantities of information as well as guidance each and every day. These social media platforms, smart-phones and other end user of electronic devices has empowered or lead the way to new strategies of striving and obtaining instruction on the large quantity of outcome and assistance obtainable in the market (Akter & Sultana, 2020). The role of social media has positioned the consumers of market back to the centre of the business world which allows billions of individuals around the globe in contributing towards the amount of big data available. Social media has become a versatile driven form of modern and innovative way to recognise development and have a stain in this new and uptight market (Gu, 2014). By looking at the immeasurable number of social media sites, social media campaigns, emails, and etc, it come into sight that companies of every single sizes have been aiming to translate their marketing or promotion approaches to the Internet due to its availability towards their selected crowd in the aspiration of reaching a handful of interested ones. Through the years the markets all over the world have been more connected than ever before with the existence of Social Media. The significant purpose of this article is to elucidate why, when and how the role of social media has evolved the consumer behaviour to identify the opportunities and pitfalls in mandate to grasp and embrace the prospects on consumer decision making procedure. The usage of social media explores the existence and plethora of the latest information sources which influences the consumer and the marketers to its fullest in their marketing ventures, occupation strategies and performances (Li, et.al, 2021). Here in this paper we discussed those investigations which have been conducted linked to the role of social media in various patterns of consumer information search. This platform customizes the "brand" and stimulates the consumer by serving the same target market with a lot of value to determine what will work for them. Social media is proving to be an effacious tool to reach consumers in short term of period by carrying out greater growth (Saravanakumar & SuganthaLakshmi, 2012). The concept of social media has reanalyzed the way people interconnect and allocate their objectives as well as experiences. Consumers nowadays consider the social media as a more dependable and reliable source of information in contrast to corporate-sponsored communication (Constantinides, 2014). Therefore they also create high quality contents that are consumer relevant. One of the major reasons behind the growth of these social media usage is due to the increase in Internet penetration and the use of electronic gadgets and smart-phones. Most of the objectives provide and showed that people on these online platforms use information from these media as the guideline for their future needs. People mostly tend to believe through a review of selected literature on online platforms. Recommendations by friends or connections on social media also could help these consumers (Ioanas, 2020).

LITERATURE REVIEW

During the last few decades emergence of Web 2.0 has drastically revolutionised the consumers by allowing them to exhibit contents to share among networks in the history of commerce (Orenga-Roglá & Chalmeta, 2016). There has been a significant change during the last twenty to thirty years into the human lives and the consumers of market caused by technological developments. The internet has offered favourable conditions through innovative ways. Consumers of the market are referred as actors on the marketplace stage for which the products or services are eventually formulated for (Boucher, 2015). The ease of access and transparency of information through the social media has fundamentally affected and controlled the decision making process. Social media has become an exceptionally secured tool in influencing the consumers when they are making every effort to build awareness about the product. Most of the youngsters find social media's information reliable as compared to traditional media. Through the year 2004 these platforms have changed the lives and have been growing exponentially and are a major source of new as well as information in the recent years (Larson & Chang, 2016). These platforms or social media channels are unique in their way and platforms for the users or consumers to communicate whereas share information beyond social and local boundaries. Every social media platforms have their unique level of audience who tend to provide innumerable possibilities to allocate various kinds of user-generated content like photos and videos. According to survey as of January 2022, there are approximately 3.96 billion social media users totally across all these platforms. Most of the adults use these social media platforms and they are six times more likely to make a purchase from a product page which includes pictures or videos from social media. Nowadays they overwhelmingly trust the users as their "preferred" form of influencer who is more likely to buy from them based on their product recommendation versus celebrities. Social media has attained a massive user base and an advertising powerhouse in the influencer space. Nearly 75% of the world's population which belong or are above the age group of 13+ are engaged almost 96 minutes on their daily basis in the social media platforms (Kuss & Griffiths, 2017). Approximately 81% of consumers are influenced by the posts made by the brands or their friends for making better decisions. The data provided by the Consumer Electronics Association there are around 24% of the consumers in the market who consider making electronic purchase by referring to social media (Lamberton & Stephen, 2016). Many electronics giants have dedicated Instagram, Facebook, Twitter and many online platforms for serving their customers. Many companies are allocating their budget for creating their social media presence as the whole world is moving online and into social settings. It tends to impress the consumers with respect. Some studies revealed that consumers who use or consider social media during their information search and behavioural process ensured that they are four times more likely to spend than those who do not. Therefore it has basically provided many new opportunities to the consumers to get engaged in social interaction on the internet. With technologies and especially the source of Internet, consumers are getting more and more reliable information which is encouraging their perception (Djafarova & Rushworth, 2017). The continuous revolution in the marketplace today present opportunities by bringing change towards consumer experiences for promoting their products and brands. Social media appeared to mature each and every year as the need to digitalise thrust upon organisations in almost every sector. These platforms showed their real world impact and reminded us that it is a force for good.

Brands and savvy organisations considered it as one of the most important and powerful communication tool to develop a relationship as going social drives sales now and in the future (Rollins, et.al, 2014). They are being used in the right way as these online platforms are leading to a powerful real-world outcome which will go beyond sales. Majority of social media users use these platforms to research new products and commodities. Social media has expanded and evolved dramatically. Many social media sites have proven to be lucrative channels to reach consumers accessing information regardless of physical location from mobile devices for user insight to both consumers and businesses. These social networking trends have created various fun ways for the consumers and companies to interact collectively for beneficial outcomes. Consumers get better products and the company's get information through which they are able to drive traffic on their own social media sites in encouraging their consumers for products and services. It has become one of the most profitable digital marketing platforms that increase the brand recognition among the potential consumers to reach a bigger audience. Social interaction through these sources between the consumers and businesses improves the brand loyalty and their sales to deliver better omni channel customer experience. Research also says that 42% of consumers expect a better response on social media within few minutes to them with different social media channels (Chi, 2011). These social media networks are an ideal network for creating awareness to reach out a bigger audience. Social networks have become one of the major sources for people who are connected to these platforms as they are availed with latest information about new product, services and many other deals and promotions. It also maintains to build trust with the online consumers in a subtle way to forge connections that

bring voice to their brand. According to relevant researches it was seen that 72% people of social media users consider online reviews in the same light of the commodities as personal recommendations which are made by friends and family (Terrasse, et.al, 2019). These personal recommendations can be in the form of casual conversation or user generated content. In fact they consider these reviews and ratings before they make a purchase. People all over the social media discuss their experiences which have a higher, faster and real-time reach at the same time that is in line with their interest. Social Media also helps to personalize the message which makes it more relevant to the consumer thus helps to create effective word-of-mouth. These features of social media helps to reach more consumers, engage with their customers or audience which tends to positively impact by targeting the young population.

Social media has become one of the most powerful modes that cover a wide-variety of new sources of online information with others regarding any topic of interest which seek to reach out to their prospects and consumers (Solima & Izzo, 2018). In the following years it has become a new way to seek and obtain information on the multitude of products and services in the market all over the internet. Consumer reviews for the products and services are widely available on these platforms which are a primary source of information for both the customer and business. Through this they also help to develop their brand attitudes that generally lead to influence the buyer's of the market. Facebook, Instagram and youtube have become some of the favourite spots among the youngsters of the nation that excite their interest regarding information search. Users also get influenced through the promotions, discounts and deals on these platforms in decision making process. Our nation India has one of the world's largest populations and it has also expanded its digital infrastructure over the years into a prominent digital communications market. Increase in the telecom market, technological advancements and societal shifts of all sections in society as a means of communication and an information acquiring tool has arised over the years. With so much information freely available on these platforms helps to access and monitor consumer thoughts. The increased has changed the common consumer into a researcher. Social media users of the country are taking part in variety of role which range from participation, discussion and sharing of information to reach out the masses. In the country it has been an effective tool that almost every individual of the country follows depending on the way they use it by taking advantage of it rather than being a victim of it. The social media consumers are also able to communicate directly with the brand representative through these online sites which enable them to increase in their loyalty towards the company by establishing a personal connection (Labrecque, 2014). Consumers these days are relying heavily on the social media networks for the customer support and services to develop a thorough and achievable set of goals. These sites act as a linking pin between users and the firm whereby the consumers can easily access the information and also able to clear their doubts and misconceptions. People who are worldwide connected to these platforms are becoming digitally addicted as these sites are emerging as a pervasive form of communication in the society. Social networking sites are relatively low cost form of marketing which also ensures that customers should also experience brand and product orientation in the local and global market place in order to achieve their purchasing decisions. They tend to involve natural and general conversation to facilitate exchange of information and share their perceptions as well as opinions of brand value. Various brands and companies instantly communicate information; obtain valuable feedback to humanize their company by maintaining their brand identity and public image. Digitization of these content facilitated by the availability of digital data opened up novel opportunities boosting productivity and enhancing flexibility among users over the internet. It has also become one of the major enabler of this trend and the digital transformation has meant to influence businesses by making the world more accessible. Social media platforms have conveyed lots of information to people and audiences across the globe that was previously could not be reached. These researches also convey that these sites usually show more effective and efficient details about experiences that have purchased the same commodity to promote the brand value. The source of Internet has facilitated a resource to the humankind that has unfathomable reach and benefits. Each and every information's available is just a click away.

OBJECTIVE OF THE STUDY

1. To know the role of social media in consumer information search.

2. To know the impact of social media in consumer information search.

RESEARCH METHODOLOGY

Sample of 200 online consumers were surveyed to know the role and impact of social media in consumer information search with the help of a structured questionnaire. The study is quantitative investigation and the primary data was collected through random sampling method. Mean and z-test was applied to analyse the data and reach to end results.

FINDINGS OF THE STUDY

Table 1 is demonstrating the demographic details of the respondents in which it is observed that in total 200 respondents 59.5% are male and 40.5% are female. Among them 35.5% are below 35 yrs of age group, 4l.5% belongs to age group of 35-45 yrs and rest 23.0% are above 45 years. 29.5% of the respondents are salaried, 21.5% are from business sector, 30.0% are housewife and rest 19.0% are in some other occupation. 18.5% of the respondents frequently use WhatsApp, 20.5% Facebook, 26.0% Twitter, 16.5%Instagram and 18.5% frequently uses some other social media platforms.

Table 1 Demographic Details

Variables	Respondents	Percentage
Gender		
Male	119	59.5
Female	81	40.5
Total	**200**	**200**
Age		
Below 35 yrs	71	35.5
35-45 yrs	83	41.5
Above 45 yrs	46	23.0
Total	**200**	**100**
Occupation		
Salaried	59	29.5
Business	43	21.5
Housewife	60	30.0
Others	38	19.0
Total	**200**	**100**
Social Media Platforms		
WhatsApp	37	18.5
Facebook	41	20.5
Twitter	52	26.0
Instagram	33	16.5
Others	37	18.5
Total	**200**	**100**

Table 2 Role of social media in consumer information search

S. No.	Statements	Mean score	Z value	Sig
1.	**Social media empowers the consumers for new strategies of striving and obtaining instruction on the large quantity of outcome**	3.27	3.82	0.00
2.	Consumers get ease of access and transparency of information through the social media	3.32	4.53	0.00
3.	Social media works as a secured tool that influence the consumer to make all effort to build awareness about the product	3.19	2.69	0.00
4.	Social media provides more reliable information to consumers as compared to traditional media	3.67	9.48	0.00
5.	Social media provides massive user base and advertising powerhouse to consumers	4.03	14.57	0.00
6.	Social media provides consumers accessing information regardless of physical location	3.89	12.59	0.00
7.	**Social media provides latest information about new product, services and many other deals and promotions**	3.17	2.40	0.01
8.	Social Media allow its users to personalize the message and help to create effective word-of-mouth	3.12	1.70	0.05
9.	Consumer reviews for the products and services is a primary source of information for both the customer	3.55	7.78	0.00

	and business			
10.	**Social media provide information regarding promotions, discounts and deals to its users**	3.13	1.84	0.03

Table 2 is demonstrating role of social media in consumer information search in which it is observed that social media provides massive user base and advertising powerhouse to consumers with mean value 4.03, social media provides consumers accessing information regardless of physical location with mean value 3.89. Social media provides more reliable information to consumers as compared to traditional media with mean value 3.67 and Consumer reviews for the products and services is a primary source of information for both the customer and business mean value 3.55. Consumers get ease of access and transparency of information through the social media with mean value 3.32 and social media empowers the consumers for new strategies of striving and obtaining instruction on the large quantity of outcome with mean value 3.27. Social media works as a secured tool that influence the consumer to make all effort to build awareness about the product with mean value 3.19, Social media provides latest information about new product, services and many other deals and promotions with mean value 3.17, Social media provide information regarding promotions, discounts and deals to its users with mean value 3.13 and Social Media allow its users to personalize the message and help to create effective word-of-mouth with mean value 3.12. Further z-test was applied to know the significance of all the statements and found that the value under significance column for all the statements is below 0.05.

CONCLUSION

The presence of social media has influenced many consumers of the market form every nook in the world to reach their targeted group of consumers (Hacking, 2013). Consumers all over the social networking platforms are hugely benefitted for searching information regarding the products to get relevant information in a great range to a faster speed. These platforms also help to reach even the rural customers of the country that were revealed on different face book pages. Advertisements in social media has greatly influenced regarding different products information which tends to play a very vital role in consumer's decision making process (Zeng & Gerritsen, 2014). They were able to find decision making process to be easier and enjoyed the information searching process more when compared to those who used other kind of information sources. It also conclude that the information availed on these platforms are more diverse which are easier and quicker to get handled. Using these kinds and availed resources on these social media sites remain more reliable because they include both the positive and negative sides of the product (Leung, et.al, 2013). People or consumers share their experiences, results and feedbacks honestly of the commodities used by them. The research and study concluded by showing how the use of these social networking platforms improved satisfaction among the consumers during their initial stages of information search activities but did not improve satisfaction during the purchase decision stage among various users over the social sites.

The study concludes that there are different roles of social media in consumer information search such as social media provides massive user base and advertising powerhouse to consumers, provides consumers accessing information regardless of physical location, reliable information to consumers as compared to traditional media, Consumer reviews for the products and services is a primary source of information for both the customer and business etc. It is also found that there is a significant influence of social media in consumer information search.

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A Study on HR Practices in Insurance Sector: A Case Study on Krishna District Andhrapradesh

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ABSTRACT

This study examines the HR practices in insurance sector. Man ment for work, work ment for man. Work plays a major role in our daily life for the purpose of satisfying the need of individuals. The corporations and business refers to the individuals within an organisation deals with recruitment, selection, firing, training, performance appraisal, compensation, etc., ensure company growth and satisfaction of workforce through Human resource management practices. The human resource personnel plays an important role in bringing crucial changes in new work have the option in exercise the several choices, operating from home, virtual offices, flexible hours and possibility in enhancing the growth of the organisation.

Keywords: Human resource practices, Insurance.

INTRODUCTION

Many businesses regard human resources to be a valuable resource. Since the 1960s, thinking along these lines has progressed from the time office through people management to Human Resource Management. However, the emergence of knowledge-based companies such as Information Technology industries and other service sector enterprises from 1990 onwards caused managers to understand that the organization's human resources are the most important differentiators and uniqueness. Since then, HR practices have grown more employee-centric, seeing human resources as an asset, keeping them in the best of spirits, and instilling pride in the minds of employees. The human relations movement, which placed a greater emphasis on the human aspect than the machine element, restored the balance and highlighted the importance of people in companies.

Human Resource Management:

The importance of Human Resource Management113 in achieving organisational efficiency. Is HRM an end in and of itself? It's only a tool to help the organisation achieve its main goals. HRM implies that HR policies and procedures be aligned with the organization's strategic goals, both cooperative and functional. The HR executive helps to design and execute corporate strategy by integrating HR practices and policies. Afterwards, the HR manager fulfils the role of a strategic planner. Management ideas and functions are applied to the management of people in HRM.

HRM is the application of management concepts to the management of people in an organisation. This is a truncated statement that misses the point when it comes to HRM. Hiring, training, performance evaluation, remuneration, health and safety, and labour relations are just a few of the many responsibilities that fall under this umbrella. These are generally the administrative and support responsibilities of people management. These tasks are aptly referred to be "doable" since they are routine and have often been outsourced.

INSURANCE:

In the Indian life insurance sector, the following landmarks have occurred:

- First life insurance firm in India, Oriental Life Insurance Company was established in 1818.

- 1870: Bombay Mutual Life Assurance Society, India's first life insurance firm, was established.

- As early as 1912, the Indian Life Assurance Companies Act was passed to govern the life insurance sector.

- Indian Insurance Companies Act of 1928 was passed in order for the government to gather statistical data on both life and non-life insurance enterprises. Consolidation and amendment of prior laws was the goal of the Insurance Act, which was passed in 1938.

- More than 250 Indian and international insurance companies are nationalized in 1956, with the federal government taking control of 245 of them. The government of India contributed Rs. 5 crore to the LIC, which was established by an Act of Parliament, the LIC Act, 1956.

REVIEW OF LITERATURE

1. The study contributed by Arif Partono Prasetio, Bachruddin Saleh Luturlean, Chita Agathanisa (2020) 26 "Examining Employee Compensation Satisfaction and Work Stress in a Retail Company and Their Impact on Job Satisfaction".

2. It investigates the relationships between employees and employers in the retail business, as well as the obstacles that come with developing programmes that improve work happiness. Compensation had no influence on job stress, according to the researchers. Compensation, on the other hand, has a strong positive correlation with work satisfaction.

3. Hackman and Oldham (2019), extrinsic sources of happiness are situational and dependent on the environment, such as salary raises or job stability; they include monetary and other material incentives or employment benefits. In a composite measure of total work satisfaction, both extrinsic and intrinsic job facts should be reflected as evenly as feasible. Job satisfaction is a result of various significant aspects, including the characteristics of the job itself, which has been thoroughly examined.

4. P.Sudha Rani and Dr.K.Lalitha (2019)27 according to the report, the degree of job satisfaction among insurance personnel in connection to the quality of work life has become more important among researchers and practical managers for organisational success.

5. Clara Viñas-Bardolet (2018) according to his research, workers with greater information are happier than those with less expertise. Employee satisfaction in knowledge-based jobs is largely determined by the firm's financial and non-financial incentives.

6. Kerdpitak & Jermsittiparsert (2020, 2019), the company's human resource is the key to improved performance, and it can be improved by integrating HRM in the organisation.

7. J.Roman,O.Odera, P. Chepkuto, O.Okaka (2020) 71 according to the study "Effects of quality of work life on job performance: Theoretical perspectives and literature evaluation," QWL is one of the most pressing workplace concerns today. The research shows that there is a substantial link between employers' well-being at work and their motivation, as shown by the strong link between workers' well-being at work and the success of such organizations.

The people are aware of the uncertainty about what the future holds for them and therefore they show a strong desire for security both for their lives and professions. This security is only possible through Life Insurance for making the product to reach the customers sector, and needs more job satisfied employees with Quality of Work Life. The insurance sector is expanding. In 2012, this market was worth $72 billion, and it has the potential to expand to 280 billion dollars by 2020. Due to the Covid-19 Pandemic during the year 2020-21 there is no striking growth in Insurance Sector. India's economic growth has been greatly aided by insurance. The GDP of the nation is steadily expanding as a result of this sector's growth. As a result, insurance companies are expanding their investments in the infrastructure sector each year. As a result, India's job market has grown both directly and indirectly as a result of insurance.

RESEARCH OBJECTIVES

1. The study was carried out with the intention to work on the following objectives 1. As a first step, we'll conduct an in-depth investigation of the human resources procedures and factors that contribute to employee job satisfaction in the insurance sector.

2. To assess the impact of HR planning, job analysis, and selection on the quality of work life of chosen insurance sector workers.

RESEARCH HYPOTHESES

The suggested conceptual paradigm has spawned a number of hypotheses. Literature is used to determine the model's variables. The hypotheses are in null form since the research is exploratory in nature.

$H1_0$: Job Analysis will not have positive and direct influence on Quality of Work life

$H2_0$: HR Planning will not have positive and direct influence on Quality of Work life

Population of the Study Insurance sector workers from Krishna District, Andhra Pradesh in India would be included in the study's population frame.

SAMPLE SIZE

Sample size refers to the total number of objects taken from the universe to form a sample. The larger the sample size, the more accurate the results will be when compared to the genuine population values. It was also critical to choose an acceptable sample size for this study. It is important to choose a sample size that is efficient and representative, as well as reliable and flexible. The following formula (Nargundkar, 2007, p.92) was used to establish the minimum sample size required for this study based on past marketing research studies:

Sample size (n) = (Z s) 2 ∕ e2

Where:

Assuming Z = 95 percent (1.96), e= ± 6.0 %, and s=0.65

Sample size (n) = (1.96 x 0.65)2 ∕ (0.06)2 =180

A total of 180 responders were determined to be the minimal sample size.

Sampling Frame

The researcher collected the required samples from Krishna district of Andhra Pradesh. A total of 10 organisations, including five public sector and five private sector, are included in the study. In the following table, you'll find a complete list of examples

Table 2.1: Sample Frame

S. No	Insurance Company	Sector	Tot No of Employees	No of Samples
1.	United India Insurance Company	Public	29	19
2,	The Oriental Insurance Company Ltd	Public	26	17
3	Life Insurance Corporation of India	Public	29	18
4	The New India Assurance Co. Ltd	Public	23	19
5	National India Insurance Company	Public	25	18
6	Birla Sun Life Insurance Co. Ltd	Private	27	17
7	Bharti AXA Life	Private	29	18
8	Bajaj Allianz Life Insurance Co. Ltd	Private	25	20
9	AVIVA Life Insurance	Private	28	18
10	ICICI Prudential Life Insurance	Private	29	16
			270	180

DESCRIPTIVE STATISTICS:

The employees of insurance sectors in both the private and public sectors in and around Krishna District were invited to participate in the survey. A total of 270 employees were surveyed. Out of which, 90 were returned. This is an 66.62% response rate. Out of this, 180 were usable and rest was rendered unusable due to incomplete data. The following sub sections present the data analysis about respondent's socio-economic, demographic attributes.

Employees Socio-economic and Demographic Attributes:

All respondents were adult male and female insurance sector employees consisted of 105 female (58.7%) and 75 male (41.3%), The age group 30-40 years constitutes the largest proportion of the sample with 75 respondents (42%), while "50 to 60 years" has the smallest number with 2 respondents (11.8%).The majority of the respondents (82.2%) were married and a meagre 17.8 percent were un-married. The major chunk of the respondents (58.4%) had graduation as their educational qualification, post-graduate degrees (29.3%) and least 12.2 percent had SSC as their minimum qualification. Hence, the

Table 1: Employees perceptions towards the Job Analysis practices:

Demographic Description		Frequency	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Gender	Male	75	17	10	12	16	20
	Female	105	8	14	26	48	54
Age	20 - 30 Yrs	35	8	8	9	5	5
	30 - 40 Yrs	75	14	11	14	20	16
	40 - 50 Yrs	50	6	9	12	15	19
	50 - 60 Yrs	20	7	4	3	3	3

Marital Status	Married	132	16	12	23	35	46
	Unmarried	48	9	6	9	10	13
Education	SSC/Diploma	34	4	6	9	9	6
	Degree	86	8	11	17	22	28
	Post-Graduation	60	7	8	8	13	24
Monthly income	Rs 20000-30000	39	8	4	6	6	14
	Rs 30000-40000	72	4	6	14	20	24
	Rs 40000-50000	45	4	6	8	12	20
	Rs 50000 & above	24	2	3	5	7	9
Cadre	Tactical Level	75	8	11	15	18	23
	Operational Level	64	4	8	12	18	22
	Strategic Level	41	2	3	8	10	11
Family Size	1to3	28	3	2	5	8	10
	3 to 5	98	11	14	20	26	29
	above 5	54	6	4	9	14	21
Socio Economic Class	Lower Income Group	50	5	4	9	12	20
	Middle Income Group	92	6	12	16	24	34
	High Income Group	38	5	2	6	11	14

From the above table.1 we can understand that 16 of them are agree and 20 of them strongly agreed that they have a positive opinion towards the job analysis practices of the organisation. The female response is also like same as the male respondents as they agreed of 48 and 54 are strongly agreed. The major chunk of the respondents in the age group of 30-40 years are strongly believed that the job analysis practices are good. The married respondents 35 were agreed and 46 respondents out of 132 had a positive and strong opinion that the job analysis practices are good in their organisation.. The respondents who have Rs 30,000 – 40,000 also opinioned that (Agreed – 20, strongly agreed – 24) the job analysis practices are effective in their organisation. The tactical level employees in which 18 agreed and 23 members strongly agreed that the job analysis is going on well in their organisation. Majority of the employee's family size is 3-5 and they to obelize that the job analysis practices are good in their organisation. Majority of the respondents (92) belongs to the middle-income group and among them 24 agreed and 34 members strongly agreed that they have good job analysis practices in their organization.

Table: 2 Employees perceptions towards HR Planning

Demographic Description		Frequency	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Gender	Male	75	17	10	12	15	21
	Female	105	8	14	26	44	58
Age	20 - 30 Yrs	35	5	3	6	9	12
	30 - 40 Yrs	75	14	11	12	16	22
	40 - 50 Yrs	50	6	9	10	12	13
	50 - 60 Yrs	20	2	2	3	5	8
Marital Status	Married	132	16	12	23	35	46
	Unmarried	48	9	6	7	9	16
Education	SSC/Diploma	34	4	6	9	9	6
	Degree	86	8	11	15	23	29
	Post Graduation	60	7	6	10	13	24
Monthly income	Rs 20000-30000	39	6	7	9	13	24
	Rs 30000-40000	72	8	4	5	7	14
	Rs 40000-50000	45	4	6	10	18	30
	Rs 50000 & above	24	4	6	8	12	20

Cadre	Tactical Level	75	2	3	5	7	9
	Operational Level	64	5	7	10	18	24
	Strategic Level	41	3	2	6	10	13
Family Size	1 to 3	28	3	2	6	7	10
	3 to 5	98	11	14	20	26	29
	above 5	54	6	4	9	14	21
Socio Economic Class	Lower Income Group	50	5	4	9	12	20
	Middle Income Group	92	6	12	16	24	34
	High Income Group	38	5	2	6	11	14

From the above table 2 it is interpreted that out of 105, 75 female respondents had a positive opinion on HR planning process compare to male respondents (79). 75 respondents whose age group range between 30-40 years stated that HR planning is good. Out of 41 respondents, 13 respondents who occupy bottom level strongly agree with the statement.

FINDINGS
1. The Socio-Economic details of the respondents were consolidated as, 92 members i.e. 51.2 percent belongs to middle class segment, 50 members i.e. 27.7 percent belongs to lower class and 38 members i.e. 21.1 percent belongs to higher class.

2. It was observed that HRM practices plays a major role in insurance sector, HR planning, considered as determinants of job satisfaction .

3. It is observed that job analysis has a significant relation on work satisfaction in insurance sector.

SUGGESTIONS
1. The Human Resource Management strategies as Job analysis and human resource planning urge Human resource managers to concentrate on using various methodologies, establish, implement and design good HR planning strategies and job analysis techniques to produce favourable attitude among insurance industry workers about the quality of work life.

2. It is recommended that the HR managers have the ability to design and implement variety of recruitment and selection tactics to promote favourable attitude among Insurance industry workers about the quality of work life.

CONCLUSION
It is increasingly important for insurance businesses in India's highly competitive insurance market to ensure that its personnel are satisfied with their jobs. In the long run, successful HRM practices will lead to increased productivity and job satisfaction. Hence, the HRM practices and their impact over job satisfaction. In fact, the insurance companies will rely on the human forces of the organization, so it is the major responsibilities to the insurance companies to frame the good HRD practices and the better implementation of the HRM practices which in turns to Job satisfaction.

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Investigation of the Electrical Properties of Silar Grown Highly Oriented Lead Sulphide (PBS) Thin Films

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ABSTRACT

At room temperature, lead Sulphide nanocrystalline powder in pallet form and the successive ionic layer absorption and reaction (SILAR) procedure were used to create (PbS) thin films on a glass substrate with lead nitrate, thiourea, as well as sodium hydroxide as chemical precursors over a number of cycles. Semiconductors have a number of advantageous properties that can be exploited to make a variety of high-performance devices in fields such as electronics and optoelectronics. New semiconductors are constantly being developed, particularly in the form of thin films. Thin films have grabbed the curiosity of many academics due to their wide range of uses. When parts like resistors, transistors, capacitors, as well as solar cells are downsized, the film's properties become more critical as the film grows thinner. In this study, thin films were made from lead sulfide (PbS) in pallet form at room temperature using the successive ionic layer absorption and reaction (SILAR) method. The generated powder in pallet form as well as thin films were examined at room temperature using Hall measurement in van der Pauw configuration (ECOPIA HMS-3000). The Hall mobility, resistivity, carrier concentration, Hall coefficient, as well as conductivity of the material were all determined. Using the traditional two–probe technique, DC electrical conductivity measurements were made for powder in pallet form and thin films. DC conductivity studies were also used to calculate the activation energy. The van der Pauw method is one of the most effective as well as extensively used ways of evaluating the sheet resistivity of materials for powder in pallet form and thin films in the four-probe mode. Thermoelectric power measurements and thin-film photoconductivity were also investigated.

Keywords: Semiconductor, Thin films, Hall Effect, van der Pauw method, DC conductivity two-four probe technique, thin-film Photoconductivity and Thermoelectric power.

1. INTRODUCTION

The Hall Effect occurs when a magnetic field interacts with the current (electrons) flowing in a material. Despite the fact that the Hall Effect was first found in a metal, it is now mostly utilised to characterize semiconductors in thin layers. Hall Effect measurements can be used to characterize practically every semiconductor-making material. The Van der Pauw method [1] is commonly used to determine electrical properties of semiconductor materials such as resistivity, carrier density, and mobility. The Van der Pauw method can be used to determine samples of any shape, but in order to get accurate measurements, several basic sample circumstances must always be met, such as sample thickness must be constant, point contacts located at the sample's edges should be used for measurements, as well as sample quality should be homogeneous. This simple testing method is widely utilised since most semiconductor samples fit these conditions. In order to generate high-performance novel devices, the most of semiconductor thin films are being developed. The Van der Pauw method is an appropriate measurement approach for the investigation of semiconductor thin films. As a result, new thin films will occasionally be measured by using Van der Pauw method for establishing film quality as a reference, regardless of their homogeneity. Several research [2-5] have investigated how inhomogeneity impacts Van der Pauw's measurements of such inadvertently inhomogeneous samples. The Hall Effect, two probes as well as four probes methods, thin-film photoconductivity, and Thermo-electric power tests on PBS powder and thin films were all used in this study.

2. EXPERIMENTAL DETAILS & MATERIALS

Lead Sulphide powder is prepared in pallet form at room temperature, Thin films were formed using the silar method (successive ionic layer absorption and reaction) on a glass substrate (microscopic slide), with lead nitrate [$(NO_3)_2$] solution, thiourea solution, as well as sodium hydroxide solution as the complexing agent. Our Sulphide ion source was thiourea, and our ion source was lead nitrate.

Sulphide was made by immersing 15ml of 0.1 M [$Pb(NO_3)_2$] ,30ml of 0.8M thiourea [$SC(NH_2)_2$], 15ml of 0.8M sodium hydroxide [$NaOH$] and distilled water for 30 secs in the cationic precursor solution, rinsed 5secs in high-purify deionized water, immersed 30secs in the anionic precursor solution, the ions reacted with absorbed

lead. It was also optimised by 40 cycles, 50 cycles, 60 cycles, and 70 cycles, where the thickness of the film grows as the cycle increases throughout the film production process. The resultant film was homogeneous, well attached to the substrate, and had a darker surface than a mirror after being annealed at 150°C and cooled at ambient temperature.

3 HALL EFFECT MEASUREMENTS

Hall Effect measurements have proven to be useful in determining material characterization. When a magnetic field is passed through a sample as well as a current is passed along its length, the Hall Effect is observed, resulting in an electrical current perpendicular to both the magnetic field and the current, as well as a transverse voltage perpendicular to both the magnetic field and the current as shown in figure-1(A). The Lorentz force, or the force exerted on a point charge by electromagnetic fields, is the basic principle. Hall measurements in the Van der Pauw configuration at room temperature were used to determine electrical parameters such as resistivity, carrier concentration, and Hall mobility. [6]
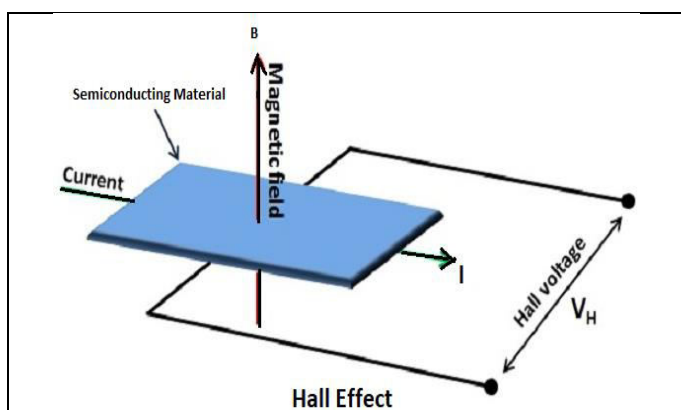
Figure-1(A) Schematic Diagram of Hall Effect
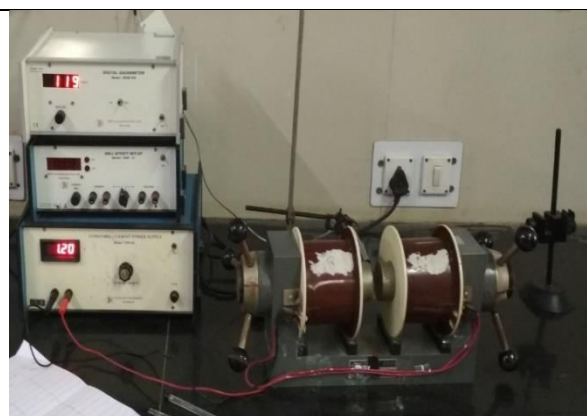
Figure-1(B) Measurement of Hall Effect
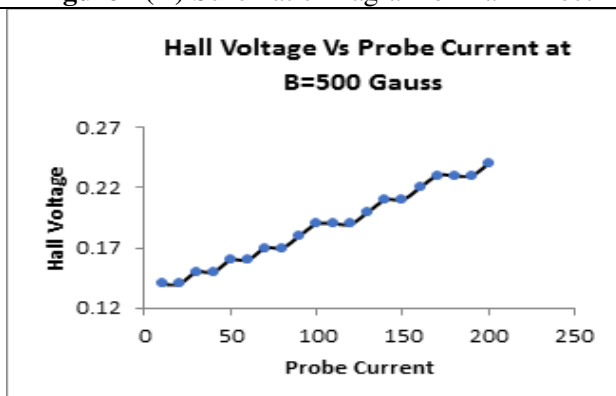
Figure-1(C) Shows the relationship between Hall Voltage and Probe Current at a magnetic field of 500 Gauss
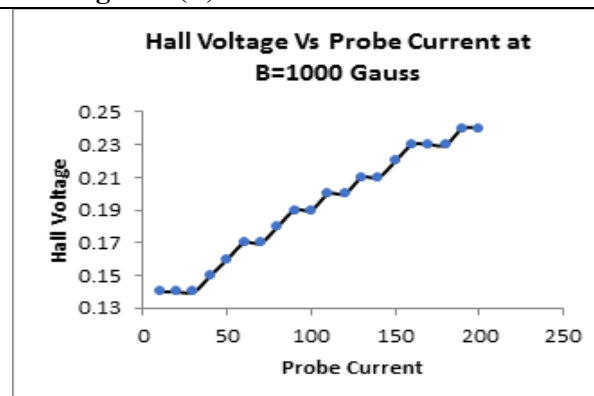
Figure-1(D) Shows the relationship between Hall Voltage and Probe Current at a magnetic field of 1000 Gauss

As from above Figure-1(C) and Figure-1(D) shows the relationship between Hall Voltage and Probe Current at Magnetic field 500 Gauss and 1000 Gauss and it is seen that the as Probe Current is increasing Hall Voltage is also linearly increased. This denotes that the taken semiconducting material has good conductivity.

Now from the above-mentioned equations we have made calculations for Lead Selenide (PbS) and obtained the value of Hall Coefficient 2.15 cm^3/Coulomb at 500 Gauss and 1.07 cm^3/Coulomb at 1000 Gauss. So here the value of Hall Coefficient is positive in both the cases hence we can say that the taken sample of Lead Sulphide (PbS) is p type in nature. So, holes are the majority charge carriers in the taken sample. The calculated value of Hall mobility is 581.24 cm^2/Vsec at 500 Gauss and 289.27 cm^2/Vsec at 1000 Gauss. Carrier concentration is 7.44×10^{18} cm^{-3} at 500 gauss and 14.95×10^{18} cm^{-3} at 1000 Gauss. While Resistivity is 3.70×10^{-3} Ω cm and conductivity will be 2.70×10^2 $(\Omega$ cm$)^{-1}$ same for 500 and 1000 Gauss.

Thus, we observed for the nanocrystalline PbS powder form, electrical resistivity, electrical conductivity, carrier mobility, and carrier concentration were measured in pallet form and thin films respectively shown in the table [1,2] below.

Table-1. Observed for the nanocrystalline PbS powder form, electrical resistivity, electrical conductivity, carrier mobility, and carrier concentration

Sr. No.	Magnetic field (Gauss)	Powder form	Resistivity (Ω cm)	Conductivity $(\Omega$ cm$)^{-1}$	Hall mobility (cm^2/Vs)	Carrier concentration (cm^{-3})
1	500	PbS-10gm	3.70E-03	2.70E+02	581.24	7.44 X 10^{18}
2	1000		3.70E-03	2.70E+02	289.27	14.95 X 10^{18}

The chemical stability of the material makes it a valuable choice for a wide range of photonic applications. It can be deduced that all of the ways have a considerable impact on the properties for PbS thin films.

Table-2. Observed for the nanocrystalline PbS thin films, electrical resistivity, electrical conductivity, carrier mobility, and carrier concentration.

Sr.No.	pH	Cycles	Resistivity (Ω cm)	Conductivity $(\Omega$ cm$)^{-1}$	Hall mobility (cm^2/Vs)	Hall Co-efficient (RH) (Cm^3/C)	Carrier concentration (cm^{-3})
1		40	4.79E+06	2.08768E-07	47	1.97 x 10^4	2.74E+12
2		50	3.83E+03	2.61097E-03	90.2	2.36 x 10^4	1.53E+14
3		60	3.65E+03	2.73973E-03	93.7	2.82 x 10^4	1.49E+14
4	11	70	1.12E+03	8.92857E-03	715.5	3.64 x 10^4	1.36E+14

3.1 Van Der Pauw Configuration
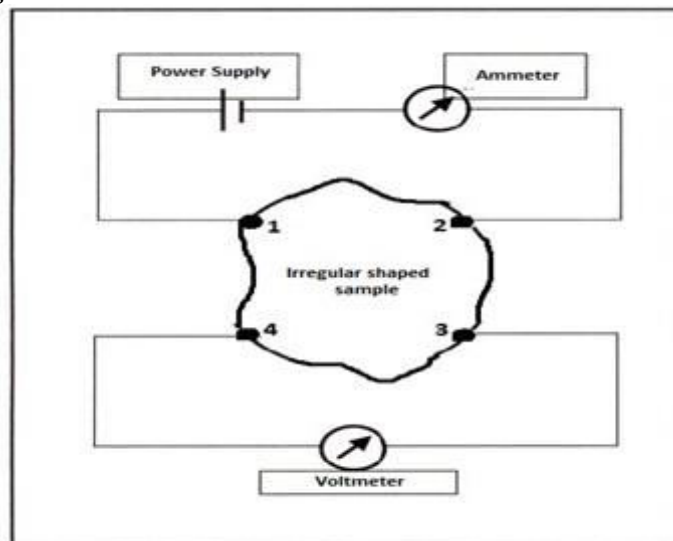
The Hall parameters are calculated using the classic van der Pauw method. The type of charge carriers, carrier concentration, charge carrier mobility, and film Hall coefficient can all be determined using Hall parameters. The Van der Pauw method involves delivering a current as well as measuring the voltage using four tiny connections around the circumference of a flat, arbitrarily shaped sample with uniform thickness. This method is particularly well suited to measuring very small samples because the geometric spacing of the connections is irrelevant. The influence of sample size, which is the approximate probe spacing, is negligible. This approach uses a total of eight measurements performed around the perimeter of the sample with the settings described in Figure-2 to determine the resistivity. The voltage measurements were taken; two values of resistivity, ρ_A and ρ_B were derived using the relations

$\rho_A = \frac{\Pi d}{2\ln 2} f_A (V_1-V_2+V_3-V_4/ 4I)$ and

$\rho_B = \frac{\Pi d}{2\ln 2} f_B (V_5-V_6+V_7-V_8/ 4I)$

where ρ_A and ρ_B are resistivities in Ω-cm, d is sample thickness in mm, V_1-V_8 are voltmeter voltages, I is current travelling through the sample in amperes, and f_A and f_B are geometrical parameters based on sample symmetry. After knowing ρ_A and ρ_B, the average resistivity (ρ_{AVG}) can be calculated as follows:

$\rho_{AVG=} \rho_A+ \rho_B /2$

While the current passed through the other two ends, the Hall signal was measured between two ends. Hall mobility (μ) is given by the ratio

$$\mu h = \frac{t}{\delta B} X \frac{\delta R}{\rho}$$

The following formulas are used to calculate the Hall coefficient (R_H) and carrier concentration (η); for Hall coefficient,

$R_H = \mu_h \times \rho$

and for carrier concentration is,

$$\eta = \frac{1}{Rh} X e$$

The sign of the RH can be used to determine the type of carriers, and consequently the type of conductivity. The flow of electrons (n-type) is represented by the negative value of R_H, while the flow of holes is represented by the positive value. [7].

4. DC CONDUCTIVITY STUDY

A two-probe technique was used to assess the thin films' DC conductivity. The samples were cut parallel to the cleavage plane to the suitable thickness of 1-2 mm. The opposing faces of the thin sheets were coated with good-grade graphite to provide good ohmic contact with the electrodes. The resistance of the films was measured using a megohmmeter. The DC conductivity (dc) of the film was calculated using the formula,

$\sigma_{dc} = t / RA$,

where R stands for measured resistance, t for sample thickness, and A for the area of the face in contact with the electrode. The approach stated above was used to determine the DC electrical conductivity. The general conductivity temperature variation relationship is given by

$\sigma_{dc} = \sigma_0 \exp[-E_a / k_B T]$

where σ_0 is a constant depending on material, E_a is the activation energy, T is the absolute temperature, and k is the Boltzmann's constant. The above equation can be rewritten as

$\ln\sigma_{dc} = \ln\sigma_0 \exp[-E_a / k_B T]$

From the Arrhenius plot of $\ln\sigma_{dc}$ versus 1000/T we get the slope ($- Ea/k_B$) and the intercept ($\ln\sigma_{dc}$). It is customary to Arrhenius plot $\ln\sigma_{dc}$ versus 1000/T, from the slope of which the activation energy (E) can be calculated. [8]

SILAR produced PbS films are semiconducting in nature, according to electrical resistivity tests. The graph depicts the variation of log with temperature reciprocal. The resistivity of PbS reduces as the film thickness or temperature increases, which could be related to an improvement in crystallinity of the thin films. Using the above relationship, the thermal activation energy 'Ea' was derived.

Thus the activation energy is of the order of 0.0719 eV, 0.0798 eV, 0.2248 eV and 0.0946 eV for Arrhenius plot $\ln\sigma_{dc}$ versus 1000/T for the thin film deposited at 40,50,60 and 70 SILAR cycles for thin films.
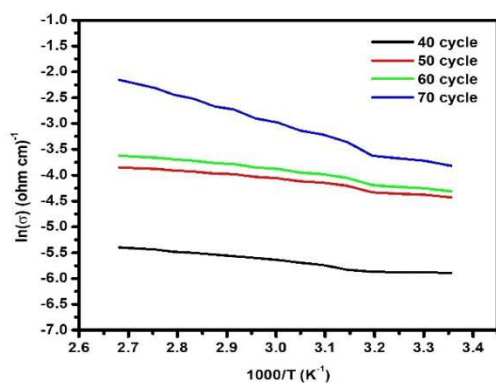
Figure-3 (A) Arrhenius plot $\ln\sigma_{dc}$ versus 1000 / T for PbS Sample
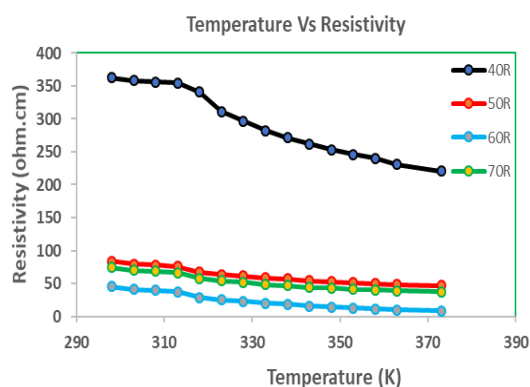
Figure-3 (B) shows the variation of Resistivity with temperature.

4.1 Two probe measurements or Bulk Resistivity measurement

This is the most basic way of measuring resistivity, as shown in fig. The voltage drops V across the sample and the current through a sample I are measured using this method. The current source is connected to both ends of the sample to provide continuous current. The voltmeter leads are separated by a predetermined distance. The resistivity of a sample is determined by its cross-sectional area and the distance between the voltmeters. The resistivity is then stated as This is the most basic way of measuring resistivity, as shown in fig. The voltage drops V across the sample and the current through a sample I are measured in this process. The resistivity is measured in ohms.

The resistivity is denoted by

$$\rho = \left(\frac{V}{I}\right)\left(\frac{A}{L}\right)$$

Where, ρ = resistivity V = voltage measured by voltmeter, I = source current,

A = cross section area of sample (w x t), L = distance between voltmeter leads
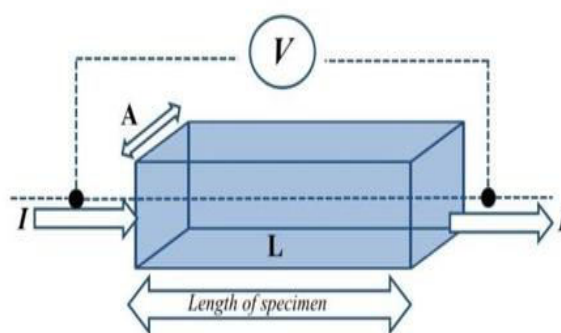
Figure-4(A) Electrical resistivity measurement using two probe techniques

Figure-4 (B) represents the variation of voltage with temperature.

Figure-4 (C) represents the variation of Resistivity with temperature.

Figure-4 (D) Arrhenius plot Log ρ versus 1000/T for PbS Powder Sample
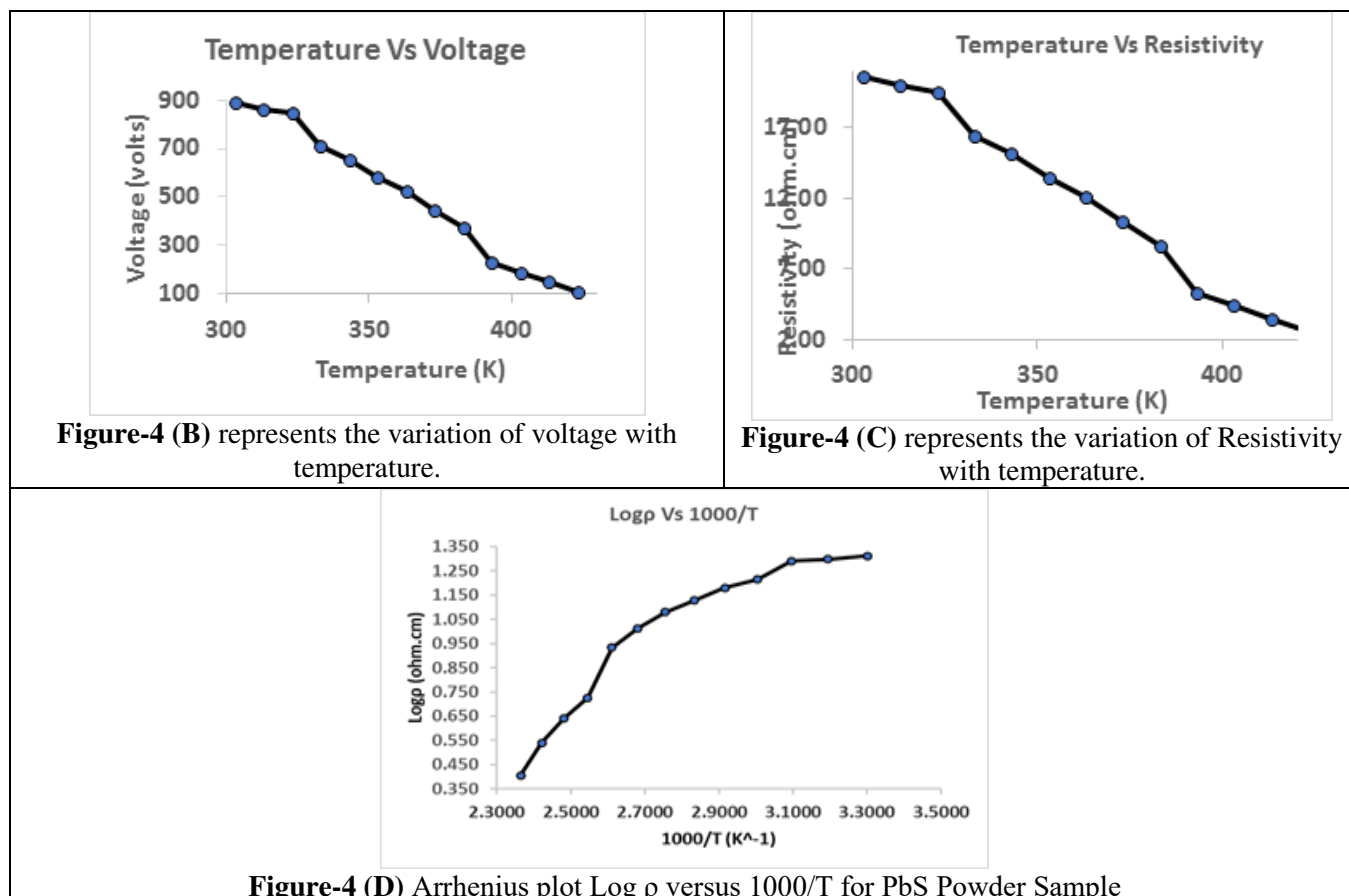
It is also observed from the above graph figure-4(B, C) that the voltage and resistivity of PbS decrease with increases in temperature which may be due to improvement in crystallinity of the Pallet form. Thus, the thermal activation energy 'Ea' was calculated by using the relation,

$E_a = 2.303 \times 10^3 \times 2 \times 8.617 \times 10^{-5} \times$ Slope (eV)

The activation energy is of the order of 0.379 eV for the powder in pallet form deposited at room temperature. [9,10]

4.2 Four probe measurements

In solidstate physics, the four-probe resistivity method is used to investigate the temperature dependence for conductivity and resistivity in any semiconducting material. This device has four probes: two for determining electric current and another two for determining voltage whenever applied to the material, as the name implies (sample). In order to examine the electrical characteristics of a material, the value of resistivity must be determined for a specified region and thickness.

Because four places or probes must be touched on the sample surface, this procedure is known as a four-point probe. Those four spots (probes) are supposed to be lined up in a straight line with equal distance between them. The two outermost probes, in conjunction with the sample, generate a constant electric current. When current flows through a sample with resistance, there is now a voltage drop. Two internal probes are used to measure the voltage change. The four-point probe method may readily determine electrical quantities that describe the quality of material conductivity, such as output voltage and output current.
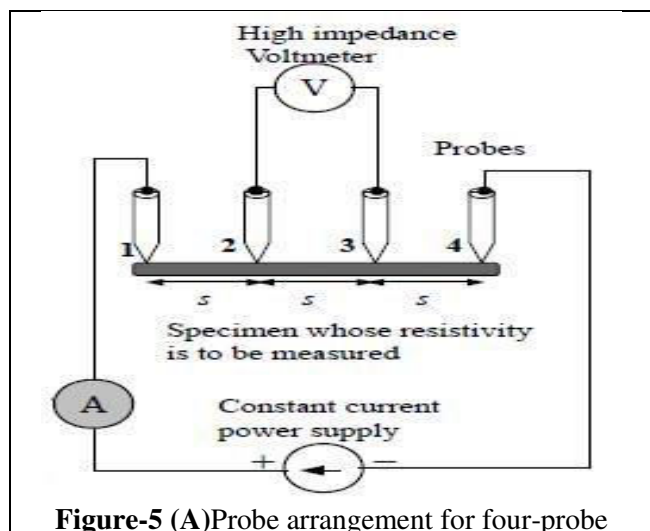
Figure-5 (A) Probe arrangement for four-probe	**Figure -5 (B)** Schematic diagram for four-probe

The four-probe technique is used when the sample to also be assessed is extremely thin, such as epitaxial wafers as well as conductive coatings. A resistivity testing setup with four collinear probes is shown in Figure-5 (A). Two outer probes give the current, while the voltage drop is monitored between two inside probes. The resistivity of a surface or sheet is computed as follows:

$$\rho_s = \left(\frac{\pi}{\ln 2} \right) \left(\frac{V}{I} \right)$$

Where ρ_s = is sheet resistivity, V = is measured voltage, I = is source current

The bulk or volume resistivity may be determined if the sample thickness is known.

$$\rho = \left(\frac{\pi}{\ln 2} \right) \left(\frac{V}{I} \right) t$$

Where ρ = bulk resistivity and t = thickness

The four-probe approach is the most popular method for testing sheet resistance. To create electrical contact with the substance, four equally spaced co-linear probes (also known as a four-point probe) are utilised. Sharp needles are used as probes in the majority of readily available four-point probes. These have the potential to

damage or penetrate the sensitive materials found in thin-film electrical devices. As a result, precise sheet resistance measurements may be challenging, and the thin film may become obsolete.[11]

4.3 Equation of Resistivity by Four Probe Method: -
If we assume a conductor with resistance R, length L, and cross-section A, we can write R using ohm's law theory,

$R = \rho l/A$

The resistivity of the conductor as well as the semiconducting material is shown here. The conductivity of the material will be determined by its inverse of it. Now, as seen in Figure-5 (A, B) above If t is the material thickness and s is the distance between the probes, the resistivity ρ is equal to,

$\rho = \rho 0 /f(t/s)$

The divisor for computing resistivity is f(t/s), and its value is dependent on the values of t and s. If V is the voltage across the sample and I is current, then $\rho 0$ is the resistivity of the semiconducting material.

$\rho 0 = 2\pi s (V/ I)$

In this temperature dependence of resistivity for semiconducting materials, we know that the overall conductivity of a semiconducting material is the sum of the conductivities of all valence band and conduction band charge carriers. Resistivity is now reciprocal to conductivity, as well as its temperature dependence is provided by the equation:

$\rho = \rho 0 \exp (-Ea /K_b T)$

Here, E_a is the activation energy and K_b is Boltzmann's Constant.
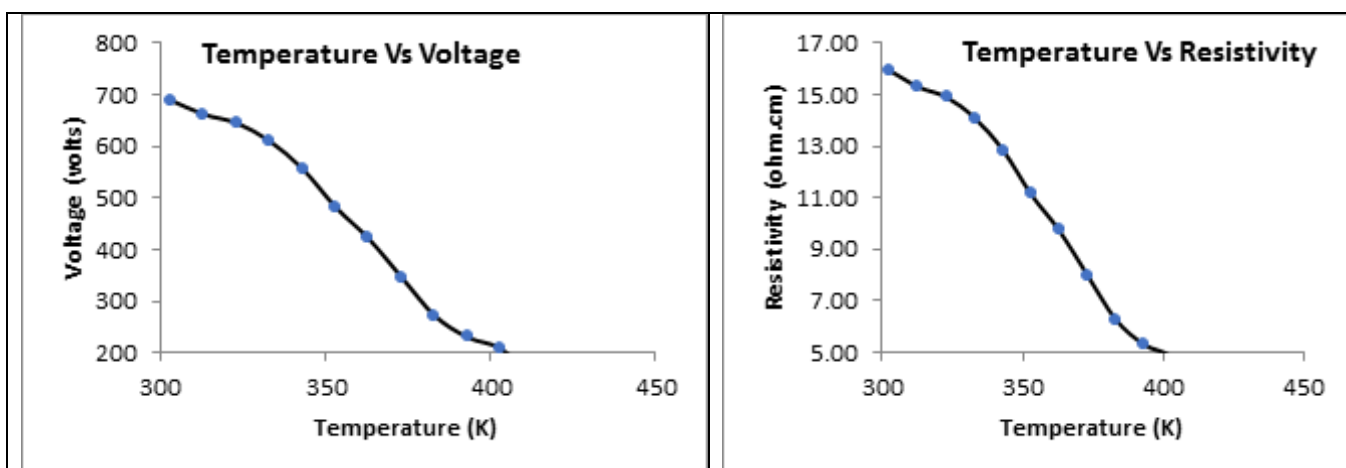
| **Figure-6 (A)** represents the variation of voltage with temperature. | **Figure-6 (B)** represents the variation of Resistivity with temperature. |

| **Figure-6 (C)** Log ρ versus 1000 / T for PbS Powder Sample | **Figure-6 (D)** Arrhenius plot Log ρ versus 1000 / T for PbS thin films. |
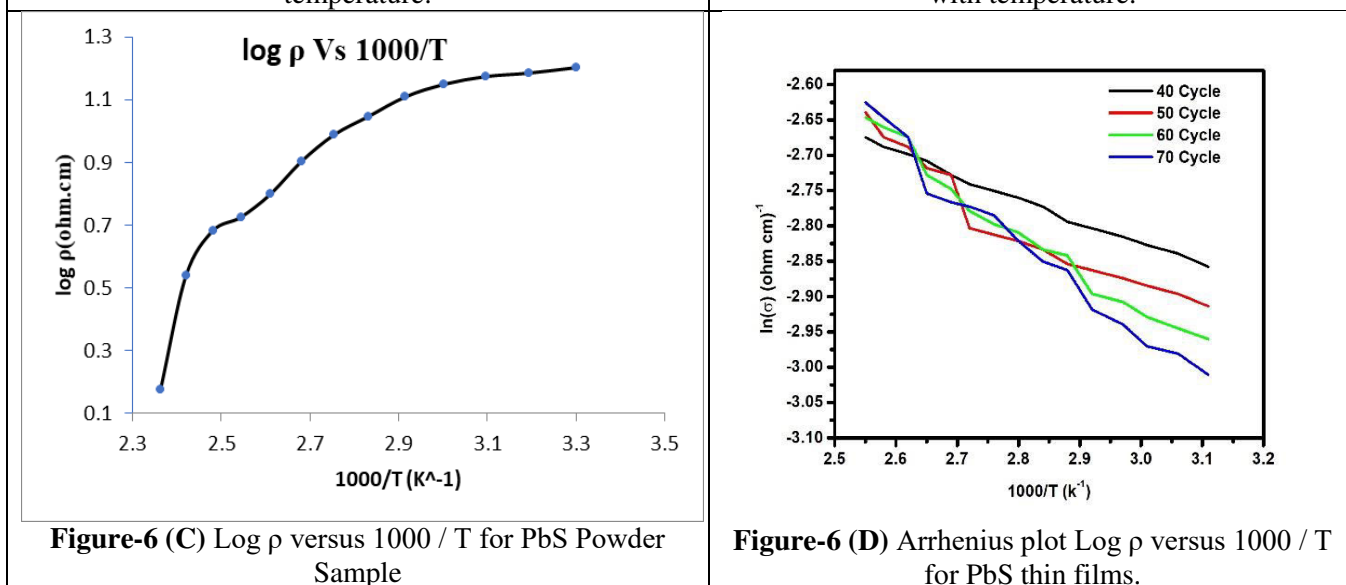
Also, it is observed from the above graph that voltage and resistivity of PbS decrease with increases in temperature which may be due to improvement in crystallinity of the pallet form.Thus,the thermal activation energy 'Ea' was calculated by using relation,

$E_a = 2.303 \times 10^3 \times 2 \times 8.617 \times 10^{-5} \times$ Slope (eV)

The activation energy is of the order of 0.363 eV for the powder in pallet form deposited at room temperature as shown in figure -6 (C). The sheet resistance of the four-probe method is $\rho_s = 370.40 \times 10^3$ ohm while conductance is 2.70×10^{-6} mho. Thus, the activation energy is of the order of 0.0282 eV, 0.0414 eV, 0.0504 eV and 0.0592 eV for Arrhenius plot $\log\rho$ versus 1000/T for the thin film deposited at 40,50,60 and 70 SILAR cycles for thin films as shown in figure-6 (D). [12,13]

5. THIN-FILM PHOTOCONDUCTIVITY

PBS samples were cut into 0.5×1.5 mm^2 slices for electrical tests. Dc sputtering was used to create gold pads with a 5 mm gap on PBS films for electrical connectors. A PBS sample has an active area of 0.5×1.5 mm^2. The samples were placed in an LN2 optical cryostat (Janis, VPF-100) on a custom constructed sample holder with spring-loaded probes with T-type thermocouples to measure thin-film photoconductivity (σ_p) and thermoelectric power (TEP) at 77 and 300 K. A source/meter unit (Keithley 2611) was used to measure current at a fixed bias of 20 V to estimate the photoconductivity of samples. A temperature difference of roughly 5 K between the hot and cold ends of the sample was maintained during TEP measurement, as well as the thermoelectric voltage generated has been measured with such a digital multimeter (Keithley 2700). The samples were either kept in the dark or constantly illuminated. At Maliba University UTU Bardoli-Surat, a tungsten halogen lamp (Philips, 12 V 50 W) was utilised as a light source with a fixed intensity of 80 mW/cm^2, as measured with pyranometer Instruments, (Kolkata).

Photoconductivity is described as an improvement in electric conductivity due to the absorption of light or any other suitable radiation in semiconducting materials. The conductivity (σ) changes only when light absorption raises the values of a dark free-carrier densities n and p or even the dark mobilities n and p. As a result, if n and p are not homogeneous throughout, light causes a change in mobility (μ). Photoconductivity in semiconductors can be caused by extrinsic or intrinsic excitations (Rehr et al., 1997). When the energy of incoming light exceeds the band-gap energy (Eg), intrinsic photoconductivity occurs, resulting in the creation of electron-hole pairs. Extrinsic image When free carriers appear to be photo-excited from impurity centres with energy levels within the forbidden energy gap, conductivity behaviour ensues. [14]

Table-3 Electrical photoconductivity of PbS thin films						
Sample No. / Details	Light Condition	Resistance (Ohm)	Difference ΔR	ρ=RA/l (ohm.cm)	Conductivity (ohm.cm)$^{-1}$	conductivity= sigmal-sigmad (ohm.cm)$^{-1}$
40	Dark	0.756 M	4x10^3	378000	2.6455E-06	1.40718E-08
	Light	0.752 M		376000	2.65957E-06	
50	Dark	197.14 K	5.43x10^3	98570	1.01451E-05	3.02609E-07
	Light	191.43 K		95715	1.04477E-05	
60	Dark	95.40 K	2.38x10^3	47700	2.09644E-05	5.36392E-07
	Light	93.02 K		46510	2.15008E-05	
70	Dark	171.55 K	3.08x10^3	85775	1.16584E-05	2.13141E-07
	Light	168.47 K		84235	1.18715E-05	

Thus, from table it reveals or shows that when the thickness of the cycles grows, the resistance decreases and the overall conductivity increases. Increased deposition number of cycles as time passes, surface roughness deteriorates, and conductivity rises.

6. THERMOELECTRIC POWER MEASUREMENTS

A differential temperature controller designed by Scientific Solutions, Mumbai (Agarwal et al., 1994) [15,16] For the samples utilised in the current research, was employed to measure the Seebeck coefficient as a function of temperature. The thermoelectric power of all of these samples was measured using the TPSS-200 thermoelectric power set-up.
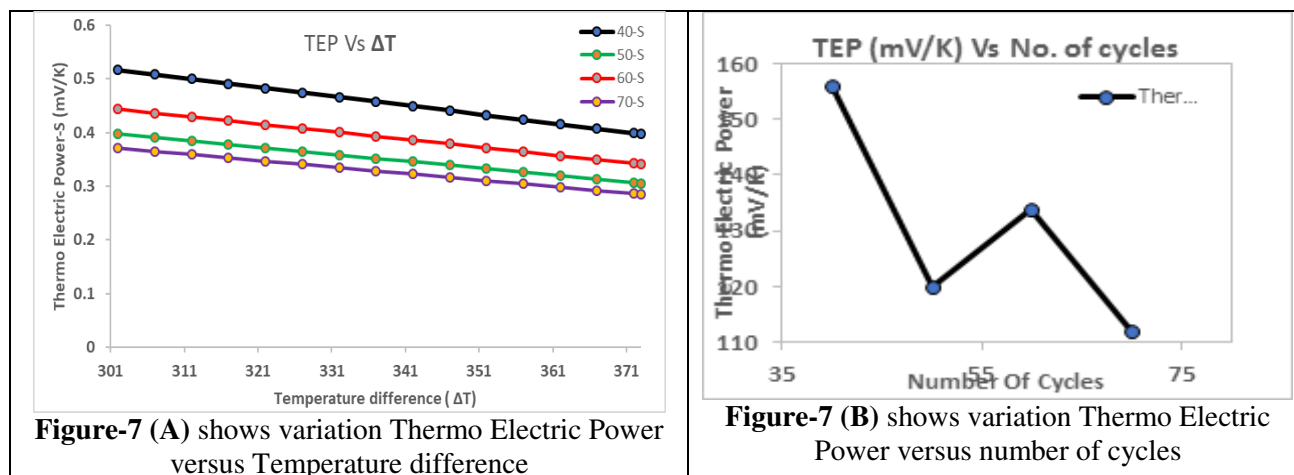
Figure-7 (A) shows variation Thermo Electric Power versus Temperature difference

Figure-7 (B) shows variation Thermo Electric Power versus number of cycles

Sr.No.	Number of Cycles	Temperature difference (^{o}C)	Thermo Electric Power (mV/K)
\multicolumn{4}{c}{**Table-3** Shows the thermo electric power values with number of cycles increases at temperature difference}			
1	40		156
2	50	5°C	120
3	60		134
4	70		112

The thermoelectric power measurements have been utilised to determine the type of conductivity in order to investigate it. The temperature difference between the two ends of the sample allows carriers to be transported from the hot to the cold end, resulting in an electric field and thermo-emf across the sample ends. The thermo-emf produced is proportional to both the temperature gradient maintained throughout the semiconductor ends and the thickness of the film. The positive thermally produced voltage at the cold end indicates that the films are p-type. The decrease in electrical resistivity produced by increased grain size is due to the increase in temperature as well as thin film thickness with lowering thermal electric power. As Shown in table-3 the thermo electric power values with number of cycles increases at temperature difference. The type of conductivity was determined by the sign of the emf created at the hot and cold ends, which is positive according to the table. PbS thin films produced using SILAR exhibit a P-type conduction mechanism in this study. The film with a thickness of 40 cycles has the highest thermal emf of all the films, which could be attributable to the deposited material's increased crystalline quality and porous shape.

7. CONCLUSION

From basic materials research to device development to device manufacturing, Hall Effect measurements are employed in various areas of the electronics industry. For PbS in pallet form and thin films, Hall Effect characteristics such as carrier mobility (μ), carrier concentration (n), Hall coefficient (R_H), resistivity (ρ), and conductivity (σ) were calculated. The Van der Pauw method was used to determine the electrical characteristics of the semiconductor pallet shape and thin films. The activation energy for the two-probe approach was estimated using DC conductivity studies. For the powder in pallet form, it was found to be 0.379 eV. While, the 0.0719 eV, 0.0798 eV, 0.2248 eV and 0.0946 eV for the 40,50,60 and 70 cycles of the thin films respectively. While for the four-probe method, it was found to be 0.363 eV for the powder in pallet form. The sheet resistance of the four-probe method is ρ_s =370.40 x 10^3 ohm while conductance is 2.70 x 10^{-6}mho. The activation energy is of the order of 0.0282 eV, 0.0414 eV, 0.0504 eV and 0.0592 eV respectively for the 40,50,60 and 70 cycles of the thin films. Also, the positive Hall coefficient and thermoelectric power of the formed PbS sheets validates the p-type conductivity. A Silar growing process was used to create nanostructured PbS thin films at low temperatures. The optical band gap energy varies with thickness, ranging from 1.45 to 2.32 eV. PbS p-type nature is confirmed by thermoelectric power measurements. Electrical resistance and, as a result, activation energy is thickness dependent.

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Novel Method for Reduction of Nitro- Aromatics and Heterocyclics with Hydrazine Hydrate and Sodium Acetate

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ABSTRACT

A new and efficient method has been developed for the reduction of aromatic and heterocyclic nitro compounds with hydrazine hydrate and sodium acetate in methanol. In this method, the reduction is chemoselective in the presence of different functional groups and the process has not used heavy metals, corrosive acids, pyrophoric reagents. The reduction products were purified using column chromatography and they were characterized using ^{1}H NMR and mass spectroscopy.

GRAPHICAL ABSTRACT

$N_2H_4.H_2O$ (10 eq), NaOAc (2 eq)
MeOH, reflux, 16 h
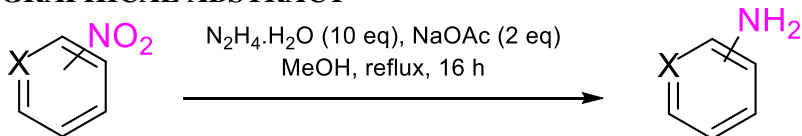
X=CH, N

Keywords: Reduction, Nitroarenes, Nitro heterocyclics, Hydrazine hydrate, Sodium acetate

INTRODUCTION

One of the most important processes in organic chemistry is the reduction of nitroarenes and nitroheterocycles to their corresponding anilines and heterocyclic amines.The industrialimportanceof anilines is highdemand for those pharmaceuticals, polymers [1], polyurethanessynthesis [2], agrochemicalproduction [3], coloring agents [4], rubber materials [5], dyes and other industrial items as antioxidants. Alkylation of ammonia [6], reductive amination [7], reduction of azides[8], amides [9], nitriles [10], or nitro compounds are all used to make these amines. Standard procedures such as hydrogenation [11], electrochemistry [12], electron transfer [13] and hydrogen transfer conditions [14] are used to decrease nitro precursors. This is because the nitro group rapidly deactivates the electrophilic aromatic substitution of benzene ring.

Some n - heterocyclic compounds are intentionally sprayed into the environment as pesticides, and others have been released into the environment due to improper handling or storage procedures. Reduction of nitro heterocyclics to their corresponding amine groups is a fundamental conversion in the pharmaceutical industry, for the synthesis of important metabolites and active pharmaceutical components. In most of these methods, nitro reduction is carriedout by catalytic hydrogenation [11], Iron in acidic media [15], stannous chloride in acidic media [16] and using heavy metals like Iron [17] and Zinc [18]. Many of these harshand strongly acidic conditions cancausesidereactions, when the molecule contains other sensitive functionalities. By-products of such condition reactions cause high environmental pollution [19].

Among the reductions, Bechamp reduction [20] is the oldest and most widely used approach, with a history of over 150 years. The first reduction of nitro functions to organic compounds by iron was described by Bechamp in 1854.The Bechamp process is still employed in aniline plants because it provides access tocolored iron oxide pigments as by-products. Raney nickel [21]is the most pyrophoric, toxic and inconvenient to handle highly flammable hydrogen gas.

Another common method is reduction of aryl nitro compounds with hydrazine hydrate. The reduction of nitro groups-containing aromatic and heterocyclic compounds with hydrazine hydrate in the presence of sodium acetate (NaOAc) is optimized in the present study, with good conversion and produced excellent yields.

Optimization of Reaction conditions
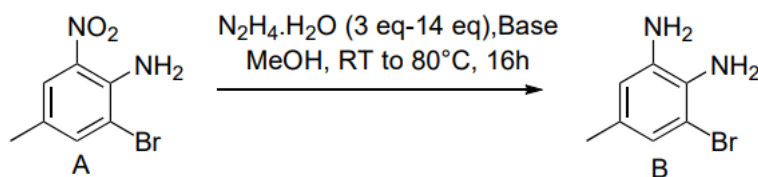
Figure 1. Reduction of nitro compound (A) to amine (B) with different Bases at various temperatures and changing the equivalents of Hydrazine hydrate.

Reduction of nitro compound (A) to amine (B) at different experimental parameters like different Bases, various temperatures and times and changing the equivalents of Hydrazine hydrate are listed in Table 1.

Table 1. Operative conditions for reduction of A to B with different Bases at various temperatures and changing the equivalents of Hydrazine hydrate

Entry	Reagent equivalents	Temperature	Time (h)	Yield (%)
1	$N_2H_4.H_2O$ (3 equiv.) NaOAc (2 equiv.)	80°C	16	6
2	$N_2H_4.H_2O$ (6 equiv.) NaOAc (2 equiv.)	80°C	16	41
3	$N_2H_4.H_2O$ (10 equiv.) NaOAc (2 equiv.)	80°C	16	92
4	$N_2H_4.H_2O$ (14 equiv.) NaOAc (2 equiv.)	80°C	16	92
5	$N_2H_4.H_2O$ (10 equiv.) KOAc (2 equiv.)	80°C	16	81
6	$N_2H_4.H_2O$ (10 equiv.) NaOAc (2 equiv.)	RT	24	0

Entries 1 to 4 from Table 1. The studies found that 10 equivalents of Hydrazine hydrate were optimal for good reduction yields, and that less than 10 equivalents resulted in unsatisfactory reduction yields. It also showed that the conversion and rate of response between low and large levels of hydrazine hydrate did not differ significantly. There is no reductionat room temperatureor at mild temperatures, with fixed hydrazine hydrate, sodium acetate, and solvent (Entry 6 from Table 1). It demonstrates that the process has only begun at extremely high temperatures. Subsequently, 10 equivalents of hydrazine hydrate and 2 equivalents of NaOAc at 80°C in methanol as a solvent for 18 - 24 h was shown to be an effective and efficient approach for reducing nitro groups including aromatic and heterocyclic compounds. The reduction was carried out with 2 equivalents of potassium acetate (KOAc) rather than NaOAc at fixed Hydrazine hydrate equivalents, temperature and duration (Entry 5 from Table 1).
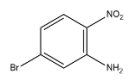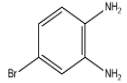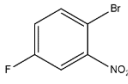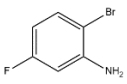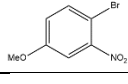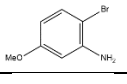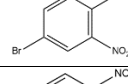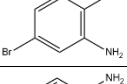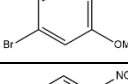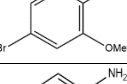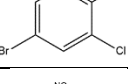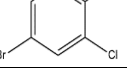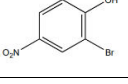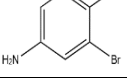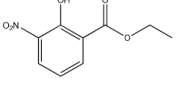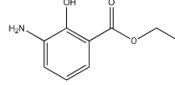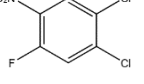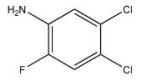
In conclusion, an effective and efficient method for the reduction of nitro groups containing aromatic and heterocyclic compounds has been 10 equivalents of hydrazine hydrate, 2 equivalents of sodium acetate in methanol as a solvent at 80°C for 16 to 24h.

Then nitro aromatic compounds with various substituents were reduced under the optimized conditions as given in Table 2.

Table 2. Using Hydrazine hydrate and NaOAc at the conditions specified in the equation to reduce aromatic nitro compounds
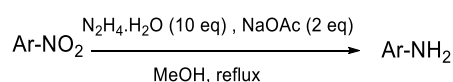
Entry	Substrate	Product	Time (h)	Yield (%)
1			16	92

2			16	91
3			16	93
4			16	80
5			16	94
6			16	81
7			24	92
8			16	83
9			16	83
10			16	80
11			16	84
12			16	91
13			16	78
14			16	90
15			16	94
16			24	0
17			24	0
18			24	0

There was chemo selectivity in entries [20, 21] and [22]. The reduction of 1-bromo-4-(tert-butyl)-2-nitrobenzene (19) with 10% Pd/C, hydrazine hydrate (10 eq) in methanol at 80°C in a sealed tube for one hour yielded 80% conversion to 3-(tert-butyl)aniline [20], whereas the reduction of 1-bromo-4-(tert-butyl)-2-nitrobenzene (19) with hydrazine [22].
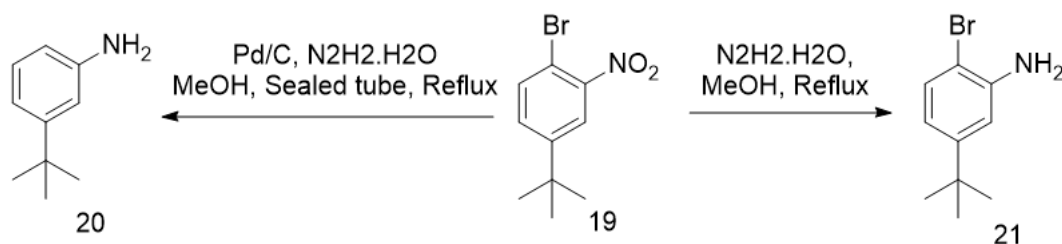
Figure 1. Chemo selective reduction

Comparison of Entries 3, 4 and 9 of Table 2: Reduction of 1-bromo-4-nitrobenzene (Entry 3) has given good yield (93%) in 16 h whereas 1-bromo-2-nitrobenzene (Entry 4) has given less yield. Comparison of Entries 6,11, 12 and 13 of Table 2:Reduction of 4-bromo-2-methoxy-1-nitrobenzene (Entry 12)has given good yield (91%) in 16 h, whereas2-bromo-5-fluoroaniline(Entry 6) and (4-bromo-2-chloro-1-nitrobenzene (Entry 13) has given less yields,this indicates that electron donating groups at ortho position have significant effect on reduction. Similar variation is observed in other reactions (Entries 1, 2 from Table 2).There is noreduction of 2-bromo-4-nitrophenol (Entry 16)and ethyl 2-hydroxy-3-nitrobenzoate (Entry 17). It represents that the highly acidic groups show significant drawback for the reduction and surprisingly (Entry 18) has no conversion.

Reduction of nitro heterocyclics in Entries 1 to 5 of Table 3 has given good conversion with excellent yields.

Table 3. Reduction of Hetero aromatic nitro compounds employing $N_2H_2.H_2O$ and NaOAc

$$\text{Heteroaro-NO}_2 \xrightarrow[\text{MeOH, reflux}]{\text{N}_2\text{H}_4.\text{H}_2\text{O (10 eq) , NaOAc (2 eq)}} \text{Heteroaro-NH}_2$$

Entry	Substrate	Product	Time (h)	Yield (%)
1			16	91
2			16	88
3			16	80
4			16	91

MECHANISM

Table 4. Reduction of some common intermediates using optimized condition: Hydrazine hydrate (10 eq) and NaOAc(2 eq) in methanol solvent at 80°C

Entry	Substrate	Product	Time (h)	Conversion (%)
1			16	90
2			16	0

TheaminewasformedfromEntry 1 butnotfromEntry 2 of Table 4[23].Reductionofthenitro proceeding via nitroso compounds was observed. The mechanism for the reduction of the NO2 group by hydrazine was discovered in these investigations. Monohydrate was proposed (Scheme 1).
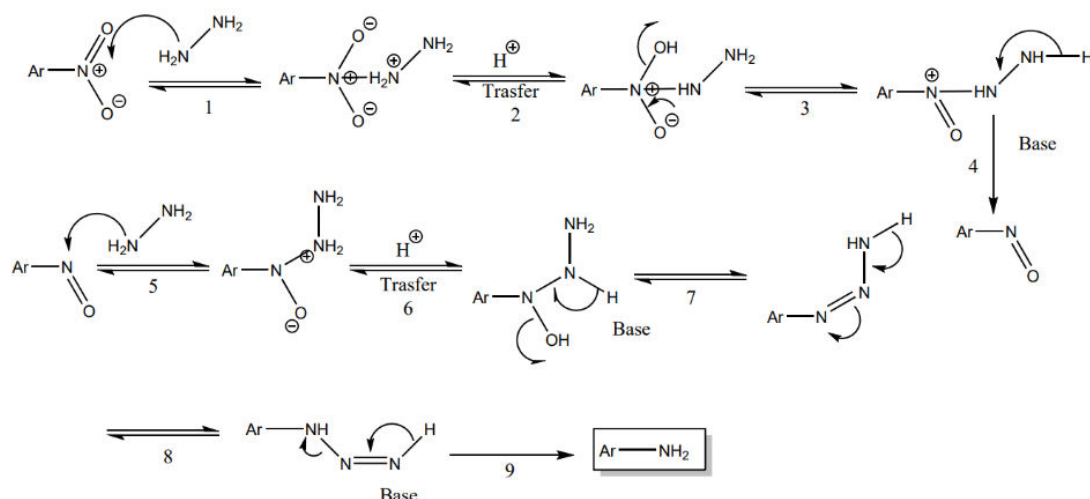
Scheme 1. Hydrazine might be used to reduce the nitro group. hydrate [23]

First, hydrazine would nucleophilically attack the nitro group to generate a 1-hydroxy-1-aryltriazane-1oxide. A nitrosointermediate is formed when a hydroxylanion is attacked. Hydrozine will be used to attack the nitrosoderivative to produce 1-hydroxy-1-aryltriazane, which will be transformed into anilino derivative. Hypotheses like these are supported by evidence such as favourable findings obtained using the nitroso (Table 4, entry 1) and the absence of reaction between HCL and the substrate (Entry 2 of Table 4).

MATERIALS AND METHODS

General Procedure
This was done by heating the solution of the nitro compound in Methanol to the required temperature, cooling to room temperature, quenching with water, and extracting it with dichloromethane, DCM (2-20 mL) in two separate extractions. For the crude product, the mixed extracts were washed twice with water (2 5 mL), brine solution (2,5 mL), dried (Na2SO4), and concentrated under vacuum. A silica gel column was used to purify the crude residue by eluting it with the appropriate solvents.

Preparationof3-bromo-5-methylbenzene-1,2-diamine[24][Entry 1 of Table 2]

For 16 hours at 80°C, a solution of 2-bromo-4-methyl-6-nitroaniline in methanol (2 mL) was heated with hydrazine and sodium acetate (217 mg, 4.34 mmol) to produce a solution of 2-bromo-4-methyl-6-nitroaniline. TLC was used to monitor the reaction's development. In order to get crude, the reaction mixture was quenched with water (5 mL), extracted with DCM (2x10 mL), and mixed organic layers were washed with brine solution (5 mL). To get 3-bromo-5-methylbenzene-1,2-diamine, a crude residue was purified using a silica gel column and eluting it with 4 percent Methanol/DCM. Entry 1 is an off-white solid (80 mg, 92 percent).

A 400 MHz NMR (DMSO) scan yielded the following results: 6.48 (d, J = 1.2 Hz), 6.33 (d, J = 1.6 Hz, 1H), 4.76 (bs, 2H), 4.38 (bs, 2H), 2.05 (bs, 2H) (sbr, 3H). In DMSO, the 13C NMR (13C NMR) is: 136.34 129.61 127.06 120 06. LCMS (EI) m/z 201.05 (M+H, 96%).

Preparationof3-bromo-5-methoxybenzene-1,2-diamine[25][Entry 2 of Table 2]

2-nitroaniline was heated to 80°C for 16 hours with the solution of 3-bromo-5-methoxy-2-nitroaniline (100 mg; 0.04 mole) and the solution of hydroxazine (203 mg; 4.06 mole), which was heated for 16 hours. TLC was used to keep tabs on the reaction's development. In order to get crude, the reaction mixture was quenched with water (5 mL), extracted with DCM (2x10 mL), and mixed organic layers were washed with brine solution (5 mL). By eluting with 4% Methanol/DCM and silica gel columns, the crude residue was refined to yield 3-bromo-5-methoxybenzene-1,2-diamine (2) (80mg, 91%).

It was found that the 1H NMR of 400 MHz (DMSO) was 6.26 (d, J=2.8 Hz; 1H), 6.18 (d; 2.4 Hz; 1H), 4.92 (bs), 4.17 (sbr, 2H), 3.58 (sbr; 2H) (s, 3H).

13C NMR (DMSO): δ151.91,137.54,126.07,108.62,104.06,100.49, 55.09. EI-LCMS (M+H, 96% purity) m/z 217.31.

CONCLUSIONS

Chemo-selective and extremely effective methods for the reduction of nitroarenes have been devised. Several advantages of the proposed method when compared to other methods are: (1) Methodology works on normal arenes and heteroarenes, (2) The chemo selective reduction can be conveniently controlled in the presence of bromo, chloro, iodo substituents, and (3) Most pyrophoric, toxic Raney nickel and corrosive hydrochloricacid are avoided.

FUNDING

SUPPORTING INFORMATION

Extensive information on the experiments, including 1H and 13C NMR data and LCMS results. The "Supplementary Content" portion of this article's homepage contains this additional information.

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Health Seeking Behaviour among the Jaintia Women of South Assam

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ABSTRACT

This paper is based on health seeking behavior of Jaintia women who are living in southern part of Assam that is Barak valley. Health seeking behavior of a community on group includes hygiene habit, food habit, eating practices, attitudes towards disease and pattern of treatment etc. So, health studies of a community largely depend on its health seeking behavior. Generally, it is believe that tribal people are less health conscious and their health problems are guided by traditional believed and practices. Tribal women are not exception in this regard rather their conditions sometime found worse as women health largely dominated by reproductive health and related practices. Tribal women are over burden with domestic as well as outside work. After maintaining all they neglected personal hygiene, taking food in time etc. All this has its effect on women health.

Keywords: Jaintia, living condition, hygiene habit, nutrition, food habits, eating practices, sanitation facility, Health care, treatment.

INTRODUCTION

Health seeking behavior is a form of social behavior used to express an individual's need for assistance relating to the condition of health. It is a wider concept which is the based on "any activity undertaken for the purpose of preventing or detecting disease or for improving health and well being" (Conner & Norman, 1996). It is the behavior patterns, action and habits that related to health maintenance to health restoration and health improvement (Gochman, 1997). **Mahapatra and A.K. Kalita (2000)** they conducted study on 'Health seeking behavior in a Tribal Setting on Bhattara Women in six major Tribal Villages of Nabrangpur District of Orissa' they found that infrastructure facilities such as drinking water, drainage and road are very poor in these villages and there was no electricity facility and almost 22.2% women suffers from fever, 21.3% as gynecological problem, 17.4% have respiratory infection respectively. They also found that Bhatpara women used home remedy as the first preference of treatment for any kind of illness and they are not women were not averse to the use of modern allopathic treatment despite the prevalence of the extensive use of traditional treatment. **Sutapa maiti et.al (2005)** in their study 'Health care and Health among Tribal Women in Jharkand', found that health seeking behavior of tribal women is very poor and most of them suffer from malnutrition with Anaemi. The utilization of health services and use of modern methods of contraception was found significantly less among tribal women which ultimately effect on their own health and wellbeing including their children.

Tribal also all effected by their socio-cultural and magic-religious beliefs and tradition, unawareness about different health problem and also shifted from traditional treatment to modern system of medicine. One of the major health problem of tribal women is anemia due to lack of nutrition such as low in iron, iodine, vitamin-A, Vitamin-B, vitamin-C etc again malnutrition is also a very common problem among them it is common various tribal community that pregnant women are advice to take the less food in order to reduce the size of the baby which is can easier for delivery. (Sonowal & Praharaj 2007) Following these entire aspects present study try to focus the health seeking behavior of living in Cachar district of Assam.

.OBJECTIVES OF THE STUDY

(i) To understand the hygiene habit of the Jaintia women of Mothurapur village.

(ii) To study the health condition of the Jaintia women of Mothurapur village.

(iii) To understand the pattern of natural adopted by Jaintia women of Mothurapur village.

(iv) To know the impact of government health care facilities of the Jaintia women of Mothurapur village

SOURCES AND TYPES OF DATA

The present study utilizes both primary and secondary data. Primary data were collected from field through structure interviews schedules during the March 2018 to March 2022 and respondents were female in between the age group of 15 to 49 years. The Secondary and documentary data were collected from books, journals, office records and census report etc.

Universe and Unit of the study

Mothurapur village is the universe of the study and 61 household of the village are selected on random basis as unit of the study. This village is located in Southern most part of Assam. The village came under the Narsingpur development Block, Sonai revenue circle and Jiban Gram gaon Panchayat. The village is near about 60 kilometer away from the district headquarter Silchar. The village is inhabited by Jaintia tribe only and they follow Christianity. The total population of the villagers is 351 out of which 181 male and 170 female. (Households survey: 11-04-2018-2022)

DISCUSSION AND FINDINGS

THE JAINTIA

Jaintia tribe is an original inhabitant of Meghalaya but after the partition of Bengal a good number of them migrated from Janita hills district of Meghalaya and settle down in different parts of Assam particularly in Barak valley which is consist of three districts namely Cachar, Karimganj and Hailkandi. According to 2011 census report total Jaintia population in Cachar district is 2, 70,352 and majority of them followed of Christianity. Jaintia is one of the unique tribal groups particularly living in Cachar district. They are locally known by the name of 'Khasia'. Historically, Janitia are the sub tribes of 'Khasi'. They belong to Monkhmer race of Proto Autroloid family. Jaintia followed the matrilineal family system and descendent goes through mother line. Rymbai (1979: 169) said it is very difficult to know the original history of Jaintia tribe as no authentic written documents are available only whatever is know about them this is only from their folklore, folk stories, songs which transmitted from one generation to another.

HOUSE CONDITION

Houses are one of the important spaces for human being insists of all the family members living together with believe, happiness and joyful under the one roof. Generally, House condition and health are closely related. Mothurapur village is situated near forest and isolated from mainstream life of the locality. The villager has constructed by different types of houses namely hut, Assam type and RCC etc. The types of house are shown in following table.

Table: 1 House types of the Respondents

SL No	Types of House	Respondents
1	Hut	23(37.70%)
2	RCC	04(6.55%)
3	Assam type	34(55.73%)
4	**Total**	**61(100)**

Source: Survey Conducted during March 2018-March 2022

The table shows that 55.73% respondent lives in Assam type houses with half brick wall and tin roofs, 37.70% respondents have hut which is made of bamboo walls, covered with mud and tin sheets roofs and only 6.55% respondents are living in RCC house which is full brick wall with tin roofs. So, majority of the respondents are living in Assam type houses and huts or two rooms only and it is hardly accommodate the entire family member therefore in an inadequate and congested space which affect the health condition of them.

Power Consumption			
Power plays an important role in our daily life. Power consumption is considered on active infrastructure for the socio-economic and physical development of the village.			
Table:2 Power Consumption of Respondents			
SL No	**Consumption of facility**	**Respondents**	
1	NIL	05(8.19%)	
2	Electricity	56(91.80%)	
3	**Total**	**61(100)**	

Source: Survey Conducted during March 2018-March 2022

From the above data it appears that 91.80% villagers have access of electricity, 8.19% villagers have not electricity facility.

COOKING FUEL

The villagers still practices of traditional methods of cooking that is through the using of firewood, cow dung, and coal etc but at present a small proportion of households are started to use LPG also.

Table: 3 Fuel uses by Respondents

SL NO	Types of Cooking fuel	Respondents
1	Firewood	19(31.14%)
2	Gas Stove(L.P.G)	42(68.85%)
3	**Total**	**61(100)**

Source: Survey Conducted during March 2018-March 2022

Above data shows that 68.85% respondent's uses of Liquid Petroleum Gas (L P G) and 31.14% uses firewood for cooking. Using firewood inside home for cooking create high health risk. Normally cooking is the duty of women and for this; health risk of using firewood is more to women than men. Burning wood create smoke, carbon monoxide and nitrogen which ultimately polluted air. Long time use of it can create health problem like, asthma, bronchitis, reduce immune function and so on. Most of the respondents said that when they use firewood for cooking they face difficulties like excess hit as they have to set near oven for cooking, sometime due to smoke they cannot take breath properly etc.

SOURCES OF DRINKING WATER

Water is an important natural resource and everybody needs which has a direct connection with health status of the people. A respondent uses water from four different sources like, well, ponds, community tap and stream water.

Table: 4 Sources of Drinking Water

SL No	Sources of water	Respondents
1	Wells	47(77.04%)
2	Ponds	02(3.27%)
3	Taps	03(4.91%)
4	Stream Water	09(14.75%)
5	**Total**	**61(100)**

Source: Survey Conducted during March 2018-March 2022

Above data shows that 77.04% respondent's uses water from the wells, 14.75% uses water from spring, 4.91% uses water from community Taps and 3.27% uses water from Ponds. From whatever the sources they collect water uses for cooking, cleaning, bathing, washing, drinking etc and almost all respondent said that they did not purity water before drinking which is high risky for health if people drink unpurified water then they may suffer from jaundice, diareahh and other water born diseases.

PERSONAL HYGIENE HABIT

A good hygiene habit indicates to feel good about the physical and mental health. It is one of the essential parts of daily routines both internal and external part of the body should be clean properly. It is very helpful to prevent of spreading the communicable disease. Jaintia women always engaged with household work and getting less time to maintain personal hygiene which affects their health.

Table: 5 Respondents Personal Hygiene habits

SL No	Hygiene Habit	Respondents		
		Regular	Irregular	Grand Total and Percentage
1	Bathing	05(8.19%)	Nil	05(8.19%)
2	Bathing and Washing cloth	09(14.75%)	01(1.63%)	10(16.39%)
3	Bathing, Washing and Cleaning teeth	12(19.67%)	03(4.91%)	15(24.59%)
4	Bathing, Washing, Cleaning cloth and cutting nail	26(42.62%)	05(8.19%)	31(50.81%)
5	**Total**	**52**	**09**	**61 (100)**

Source: Survey Conducted during March 2018-March 2022

Above data shows that around 42.62% respondents habituated in regular bathing, washing, cleaning, cutting nail and only 8.19% respondents are irregular of maintaining personal hygiene. The respondents are also not habituated of using soap for washing hand before taking food and after coming from loo, handling pet animals, doing household work, cleaning children's urin and stool and working in Jhum (shifting) cultivation. They take some especial food which is related to traditional belief and practice.

Using Pad During Menstruation

Using clean and safe Pads during menstruation is also closely related with women health. During menstruation if women fail to maintain proper hygiene than it may lead different types of problems related to her reproductive health. Jaintia women of Mothurapur village expressed mind reaction regarding the use of sanitary pad.

Table: 6 Use of sanitary pad by Respondents

SL No	Types of respondents real used	Respondents
1	Sanitary pad	16(26.22%)
2	Cloth	45(73.77%)
3	**Total**	**61(100)**

Source: Survey Conducted during March 2018-March 2022

Around three fourth respondent uses cloth during menstruation and rest of one fourth uses sanitary pad. A large number of women express their view that use of cloth is better than sanitary pad. Mrs Kmen press Rymbai said who will spend 100 rupees every month for purchasing pad. She also said that one pile of cloth can be use for many times when they are asked about the cleaning of cloth than majority of them said that they wash on it with plain water and keep for the use of next month. They are completely unaware about effect of using cloth in this way. They said traditionally they are using it but nothing happened with them.

Antenatal and Post natal Care

Care during pregnancy and postpartum that is after birth health care is closely related not only mother's health but new born's health also. Antenatal care is taken during the time of pregnancy. This care includes registration of pregnancy, antenatal examination, Laboratory investigation; maintain proper hygiene, taking nutritious diet etc. Whereas Post natal care includes care of mother and new born baby it includes proper medication for rapid reduction in size of uterus and return to pre-pregnant stage, complete rest, maintain proper personal hygiene as well as cleaning the surrounding, nutrition food for mother and taking proper care of children. Jaintia women of Mothurpur village are very casual about antenatal and post natal care. They said that before the introduction of NRHM they are not register their name for pregnancy but after 2010 the pregnant women of their village stated to register their name and prefer institutional deliver than giving birth of child at home.

SANITATION

For understanding standard of living especially people living in rural areas examination on availability of sanitary facility to most**.** It refers to the provision of proper hygiene facilities and services for the safe disposal of human waste faces and urine" (www.whointo/topics/sanitation/en/, down lorded on 23/8/17). A large number of villages have no access to toilet in India which lead different type health problem both for men and women particularly women are affected by it more because in most of the household.

Table: 7 Latrine used by the Respondents

SL No	Types of latrine	Respondents
1	Open defecate	03(4.91%)
2	Kachcha latrine	19(31.14%)
3	Semi Sanitary	24(39.34%)
4	Fully Sanitary	15(24.59%)
	Total	**61(100)**

Source: Survey Conducted during March 2018-March 2022

The data shows that 39.34% respondent's uses semi sanitary 31.14% uses Kachcha latrine, 24.59% have fully latrine and only 4.91% defecate open space. Uses of both open defection and kachcha toilet and different types of intestinal diseases and ultimately create high health risk. Not only this most of responsibility of cleaning old and young children dies on.

FOOD/NUTRITION

Food and nutrition are closely related with each other because nutrition is an important factors affecting general physique of human. Diet of the respondents consists of food habits rice, vegetable, fish, meat, dry fish, fruits, egg, milk, etc. Jaintia women said that they do not face any gender discrimination regarding food and among them of practice of taking left over is almost all.

EATING PRACTICES

So far as eating practice is concern the respondents inform that normally they take food twice or thrice and less than one fifth respondent take food one time. It is mainly because of ill health and poverty. Large numbers of Jaintia women are habituated in taking intoxicated things battle nut and leaf, Cigarette, wine etc. Following table make it clear.

Table: 8 Respondents Addiction towards Intoxicating Things

SL No	Intoxicating Things	Respondents
1	Betel nuts and leaf	08 (13.11%)
2	Betel nuts and leaf Cigarette	13 (21.31%)
3	Betel nuts and leaf, Cigarette, Tobacco	18(29.50%)
4	Betel nuts and leaf, Cigarette, Tobacco and wine	22(36.06%)
	Total	**61 (100)**

Source: Survey Conducted during March 2018-March 2022

From the above table it appears that 36.06% respondents habituated things like, betel leaf, nuts, cigarette, Tobacco and wine, 29.50% habituated of betel leaf, nuts, cigarette, Tobacco, 21.31 % habituated of betel leaf, nuts, cigarette and 13.11% habituated of betel nuts and leaf. All respondents are habituated in taking one or other types of intoxicated things and they are unaware of its effect on their general and reproductive health.

DISEASE

Now a day, the respondents are highly vulnerable to diseases wit unhygienic living condition, poor nutrition intact, taking intricate things etc. The Jaintia women of Mothurapur village suffer from different types of diseases like, malaria, dysentery, weakness, cold and caugh, urine track infection, irregular menstruation, white discharge etc.

Table: 9 Respondents suffer from disease during last 2 years

SI No.	Types of diseases	Respondents
1	Malaria, weakness, UTI	01 (1.63%)
2	Typhoid and dysentery	03 (4.91%)
3	Fever, Stomach pain, Headache, Diarrhea, UTI, irregular menstruation	12 (19.67%)
4	Weakness, cold and cough, white discharge	05 (8.19%)
5	Gastric problem, weakness, pain in lower abdomen	10 (16.39%)
6	Skin problems, teeth problem, white discharge	04 (6.55%)
7	Diabetes and high Blood pressure	06 (9.83%)
8	Diseases free	20(32.78%)
9	**Total**	**61 (100)**

Source: Survey Conducted during March 2018-March 2022

The data shows that 32.78% respondents are not suffering from any diseases during last 2 years, 19.67% suffer from Fever, Stomach pain, Headache, Diarrhea, UTI, irregular menstruation, 16.39% suffer from Gastric problem, weakness, pain in lower abdomen, 9.83% suffer from Diabetes and high Blood pressure, 6.55% suffer from Skin problems, teeth problem, white discharge, 4.91% suffer from Typhoid and dysentery, 1.63% suffer from Malaria, weakness and UTI. So, near about 70% Jaintia women of Mothurapur village suffer from different types of problems related to their general health and reproductive health. Common disease among them is fever, weakness, UTI, irregular menstruation cycle, white discharge etc.

TREATMENT

For treatment the respondents adopt different types of treatment like, home remedies. Sometime approaches local medicine men and modern treatment. Follwing table make it clear.

Table: 10 Pattern of treatment respondents adopted

SL No	Types of Treatment	Respondents
1	Ayurvedic and home remedies	11(18.03%)
2	Homeopathic, home remedies and magical means	09(14.75%)
3	Allopathic and home remedies	39(63.93%)
4	Magic-religious means	02(3.27%)
5	**Total**	**61 (100)**

Source: Survey Conducted during March 2018-March 2022

The data shows that 63.93% respondents' adopted Allopathic medicine and home remedies for treatment 18.03% preference Ayurvedic treatment along with home remedies and 14.75% preference Homeopathic, home remedies and magical 3.27% practices of magico-religious means for cure of diseases. So, it is found that more than 60% respondents adopted modern treatment than traditional one. Most of the respondents said that due to intermixing with other people, education, people gradually standard adopt modern treatment. They also said that for any health problem between they try home remedies which is based on traditional belief and knowledge that is if any one suffer from fever between they take ginger, black piper and honey together, Neem etc.

Mrs Potmi 40 years of old said that from best 10 years every pregnant women our village register their name and fellow the advice of Doctor along with traditional methods of care. But everytime they can't get the facility or afford modern allopathic treatment so they try homeopathy and ayurvedic treatment which is cheaper than allopathic treatment and easily available. Mrs Wandasisa 37 years old housewife said that she was suffering from Jaundice but include to take allopathic treatment due to poverty. She said at that time book private doctor, with a huge amount of fee, goes to lab for blood test etc so we go to homeopathy Doctor of Dholai and treated there.

HEALTH SERVICE

The village don't have even primary health centre so for treatment the villagers largely depends on the register medical practitioner of nearby village one is Jayanta Singha of 45 years and another is Bidya Singha of Mothurpur village. For further treatment they have to approach Dholai PHC which is 10 kilometer distance from village. But after implementation of NRHM, the villagers get regular immunization program me, pregnant women get medical care there ASHA.

CONCLUSION

In, sum it can be said that health seeking behavior of Jaintia women guided by traditional poverty, non-availability of a medical facility. Jaintia women are more vulnerable to diseases because of poor nutrition interact, low level of living condition, over burden of work, low level of personal hygiene habit, taking intoxicated things, lack of knowledge and so on.

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A Study on E-Commerce and Its Impact on Electronics Store Retailers

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ABSTRACT

The proliferation of mobile devices combined with internet access via affordable broadband solutions and mobile data is a key factor driving the tremendous growth in India's E-commerce sector. As growth of e-commerce business in India has increased steadily. Companies like Amazon, Flipkart, Snapdeal impacted a lot to the standalone stores which can be termed as showrooms. There was no choice available to consumers pre ' Ecommerce era, it's a new platform which has opened the door widely for the end consumers. The study is majorly focused on impact of e-commerce websites on electronic store retailers and also perception and buying behavior of consumers towards e-commerce websites and electronic goods stores. And study has found that majority of electronic shop retailers has adversely affected their business due to e-commerce and it is also discovered that buying behavior of consumers inclined towards services of e-commerce websites. Researcher has used statistical tools like chi-square and T-test for testing the hypothesis.

Keywords: - E-Commerce, Electronic Store Retailers

INTRODUCTION

E-commerce is the process of selling goods and services over the internet. Customers come to the website or online marketplace and purchase products using electronic payments. Upon receiving the money, the merchant ships the goods or provides the service. (Fuscaldo, 2021)

Convenience is one of the benefits that customer gets from the e-commerce and thus increasing customer satisfaction. This is due to customer can place a purchase an order from anywhere with internet connection. (Khan, 2016)

E-commerce is a boom in the modern business. It is a paradigm shift influencing both marketers and the customers. Rather e-commerce is more than just another way to boost the existing business practices. It is leading a complete change in traditional way of doing business. This significant change in business model is witnessing a tremendous growth around the globe and India is not an exception. Moreover, E-Commerce has every potential to curb the pollution and thus producing significant influences on the environment.

E-commerce in recent times has been growing rapidly across the world. It is a type of business model, or segment of a larger business model, that enables a firm or individual to conduct business over an electronic network, typically the internet. Electronic commerce operates in all four of the major market segments: business to business, business to consumer, consumer to consumer and consumer to business. In India, there are three type of e-commerce business model are in vogue (i) Inventory base model of e-commerce (ii) Marketplace base model of e-commerce (iii) Hybrid model of inventory based and marketplace model.(www.meity.gov.in, 2017)

GROWTH OF E-COMMERCE IN INDIA

India e-commerce will reach US\$ 99 billion by 2024, growing at a 27% CAGR over 2019-24, with grocery and fashion/apparel likely to be the key drivers of incremental growth. The Indian e-commerce sector is ranked 9th in cross-border growth in the world, according to Payoneer report. As of September 27, 2021, the Government e-Marketplace (GeM) portal served 7.65 million orders worth Rs. 140,648 crore (US\$ 19.09 billion) to 54,699 buyers from 2.8 million registered sellers and service providers. India's consumer digital economy is expected to become a US\$ 800 billion market by 2030, growing from US\$ 85-90 billion in 2020, driven by strong adoption of online services such as e-commerce and edtech in the country. The e-commerce market is expected to touch the US\$ 99-billion mark by 2024 owing to consumers increasingly developing a preference for online shopping, fueled by cheaper data and higher mobile penetration across the country. According to Global Data, e-commerce sales is expected to increase at a CAGR of 18.2% between 2021 and 2025 to reach Rs 8.8 trillion (\$120.1 billion). According to Grant Thornton, e-commerce in India is expected to be worth US\$ 188 billion by 2025.(https://www.ibef.org/, 2021)

SHARE OF VARIOUS SEGMENTS IN E-COMMERCE RETAIL

Segemnts	% of Share
Consumer Electronics	40 %
Apparels	40 %
Food and grocery	7 %
Jewelry	7 %
Furniture	4 %
Others	2 %
Total	100 %

Source: - Indian Brand Equity Foundation Report

From the above data which was published by Indian brand equity foundation in 2020 is clearly indicating that Electronics segments has highest numbers of share which is 40% out of total e-commerce sales.

As per research conducted by Statista global consumer survey on product which are significantly demanded by consumer on online mode, or we can say which of the product mostly consumer buy online. And the result of survey shows that consumer electronics is the second highest demanded products for buying online after apparels and garments. (https://www.statista.com, 2021) Pioneer companies like Amazon, Flipkart, Snapdeal etc. are succeed in getting attention from consumers with their discounts, offers and schemes.

REVIEW OF LIETRATURE
(Hasan, 2019) The study was conducted on impact of E-commerce on Retail stores in Slovakia region. Study states that in this digital age shopping from e-commerce and online stores is fast moving propensity, which get shoppers attraction easily. The two different ways of shopping have their advantages, yet in addition the negatives that the consumers decide to purchase. E-shops, in examination with customary stores, get to the front, particularly the tedious buy, solace, yet additionally a fast correlation of the opposition, the offered grouping, and costs. As the overall pattern demonstrates, normal retail shops generally dislike drawing in their clients, and in actuality, the improvement of internet shopping heads down the contrary path. In addition, so the inquiry for retailers is the means by which to draw in clients to the store and make where individuals feel much better and glad to return.

(Shahjee, 2016) The study was conducted to know the impact of E-commerce on business organization. This exploration paper includes an investigation of the failure to observe the item or administrations of premium rapidly is the greatest boundary to viable promoting this issue might be defeated through E-trade, where number of organizations express a few items viewpoint the net. In Short, Indian internet business needs to confront numerous challenges in web showcasing in view of infrastructural troubles and PC ignorance. Greater part of the clients live in rustic regions doesn't adequate information about PC and web. Some of clients in metropolitan regions don't have credit offices and accordingly web-based trading of products is restricted to metropolitan class knowing about PC web on the off chance that Indian advertisers consider fundamentals of good site they can make achievement promoting in global business sectors.

(Manjuladevi 2019) This paper assists with seeing more about E-business and what E-trade brings to the table for businessperson clients. It help to choose whether to grow support for E-trade in office, what sort of Ecommerce backing to give, and how to approach offering that help. This paper frames the monetary effects upon associations of offering content on the Web. Presently many organizations, whose Internet exercises are not their center business, frequently try not to produce adequate benefit from giving this High innovation ventures are dependent upon a similar market influence as each and every other industry.

(Néstor Duch-Brown, 2017) In this paper researcher has estimated a differentiated products demand model to analyze some of the effects related to the introduction of e-commerce. Researcher has used a rich dataset on prices, quantities and characteristics of three different consumer electronics products: digital cameras, portable media players and portable computers in several European countries. In this setting, researcher has ask three questions. First, people are interested in determining whether the introduction of e-commerce increases total sales or, on the contrary, only crowds out sales from traditional channels. Second, consumers would like to know whether consumers or firms benefited most from online sales. Finally, researcher ask whether the adoption of e-commerce has had any effect on the European integration process.

(Nisha Chanana, 2012) The study was conducted to discuss the future of e-commerce industry. Researchers has observed that there are various segments that would grow in the future like: Travel and Tourism, electronic

appliances, hardware products and apparel. There are also some essential factors which will significantly contribute to the boom of the ECommerce industry in India i.e. replacement guarantee, M-Commerce services, location based services, multiple payment option, right content, shipment option, legal requirement of generating invoices for online transactions, quick Service etc.

RESEARCH METHODOLOGY

OBJECTIVES

1. To know the Impact of e-commerce companies on electronic retail stores

2. To know the perception of consumers towards buying electronic goods from e-commerce websites and electronic retail stores.

HYPOTHESIS

[HO] E-Commerce companies did not affect the business of electronic retail stores
[H1] E-Commerce companies adversely affected the business of Electronic retail stores

[HO] Consumer Buying Behavior is inclined towards E-Commerce companies
[H1] Consumer Buying Behavior is inclined towards electronic retail stores.

SOURCES OF DATA COLLECTION AND SAMPLING

For the purpose of study, researcher has collected the samples from two categories i.e. from Electronic Store retailers and Consumers. Researchers has used convenient sampling method total 100 samples for electronic store retailers and 200 samples for consumers has been collected

LIMITATION

- The Geographical limitation of Primary data is bound to the Palghar district only

- It will be limited to the sample size of individual in the selected category of Electronic Goods Stores

- Electronic Goods includes only goods like Mobile, Laptops, Tabs, and Earphones etc.

DATA ANALYSIS

1] Impact of E-Commerce Companies on Electronic Retail Store Business

TABLE NO – 1

Observed	Do You Think It Is Become Difficult To Satisfy And Retain Your Regular Customers						
	Frequency	SD	D	N	A	SA	Grand Total
Does E-Commerce Industry Affect Your Business	SD	4	4	3	1	7	19
	D	2	7	2	3	3	17
	N	8	1	3	2	3	17
	A	4	1	4	7	13	29
	SA	2	2	4	7	3	18
	Grand Total	20	15	16	20	29	100

TABLE NO - 2

Observed	Price And Rates Of Electronic Goods Are Become More Competetaive Due To E- Commerce Retailers						
	Frequency	SD	D	N	A	SA	Grand Total
Due To E-Commerec Industry My Profit Margin Are Reduced	SD	4	4		2	5	15
	D	5	7	6	3	6	27
	N	4	1	2	7	4	18
	A	2	2	5	6	7	22
	SA	4	1	2	5	6	18
	Grand Total	19	15	15	23	28	100

INTERPRETATION

Data from Table no 1 and 2 clearly shows that business of electronic retail stores is affected due to e-commerce websites, Table no 2 shows that their profit margin are reduced and also price of goods are getting more competitive due to e-commerce business. For testing the hypothesis researchers has used chi-square test and By Using Chi-Square test, researchers derived the p value = 0.028597024 As, p value is less than 0.05. Therefore,

null hypothesis is rejected, i.e., E-Commerce companies adversely affected the business of electronic retail stores.

2] Perception and Buying Behavior of Consumers towards E-Commerce and Electronic Goods Stores

1) Consumer Buying Behavior due to Product Quality

Product Quality	[E-Commerce Websites]	[Electronic Shops]
Mean	2.94	3.065
Variance	2.036582915	2.111331658
t Stat	-0.867980781	
P(T<=t) two-tail	0.385927904	
t Critical two-tail	1.965942324	

2] Consumer Buying Behavior due to Price of Goods

Price of Goods	[E-Commerce Websites]	[Electronic Shops]
Mean	3.025	3.055
Variance	2.185301508	2.293442211
t Stat	-0.200474042	
P(T<=t) two-tail	0.841212257	
t Critical two-tail	1.965942324	

3] Consumer Buying Behavior due to after sale services

After Sale Services	[E-Commerce Websites]	[Electronic Shops]
Mean	3.055	2.855
Variance	2.152738693	1.873341709
t Stat	1.409625579	
P(T<=t) two-tail	0.159431181	
t Critical two-tail	1.965942324	

4] Consumer Buying Behavior due to Discount and Offers

Discount and Offers	[E-Commerce Websites]	[Electronic Shops]
Mean	3.51	2.83
Variance	2.170753769	2.141809045
t Stat	4.630801802	
P(T<=t) two-tail	4.93989E-06	
t Critical two-tail	1.965942324	

5] Availability of Branded Products

Availability of Branded Products	[E-Commerce Websites]	[Electronic Shops]
Mean	3.425	2.84
Variance	1.913944724	2.114974874
t Stat	4.121701759	
P(T<=t) two-tail	4.57865E-05	
t Critical two-tail	1.965942324	

6] Wide Range of Varieties

Wide Range of Varieties	[E-Commerce Websites]	[Electronic Shops]
Mean	3.4	3.02
Variance	1.829145729	2.381507538
t Stat	2.618929782	
P(T<=t) two-tail	0.009157555	
t Critical two-tail	1.965942324	

INTERPRETATION

To test the hypothesis with respect to Consumer perception and their buying behavior toward E-commerce websites and electronic shops, researcher has used Paired T-test and found the following results. Inferences: if p value < 0.05, Null Hypothesis is rejected.

1] As, p value greater than 0.05. Therefore, on the basis of product quality Consumer Buying Behavior is not inclined towards E-Commerce companies.

2] As, p value greater than 0.05. Therefore, on the basis of price of goods Consumer Buying Behavior is not inclined towards E-Commerce companies

3] As, p value greater than 0.05. Therefore, on the basis of after sale services Consumer Buying Behavior is not inclined towards E-Commerce companies

4] As, p value less than 0.05. Therefore, on the basis of Discount and Offers Consumer Buying Behavior is inclined towards E-Commerce companies

5] As, p value less than 0.05. Therefore, on the basis of Availability of Branded Products Consumer Buying Behavior is inclined towards E-Commerce companies

6] As, p value less than 0.05. Therefore, on the basis of Wide Range of Varieties Products Consumer Buying Behavior is inclined towards E-Commerce companies.

CONSLUSION

E-commerce business are gaining a tremendous growth from past few years, one of the main reasons is to be growth in number of internet users. Giant e-commerce business companies operating their business on large scale which has defiantly impact the retailers. As study is focused on electronic shops and from the data it is observed that consumer perception and their buying behavior is very much inclined towards e-commerce websites and there for the electronic stores owners suffer their business, as many e-commerce companies are giving huge discount and offers which is not possible for shop retailers. And in case of electronic goods consumes are now days aware with price differentiation between e-commerce and electronic retail stores. From the responses of electronic store owners, it is observed that their business is very much affected with E-commerce as their profit margin are reduced and it is getting difficult for them to satisfy their consumers.

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Thyroid Ultrasound Image Malignancy Classification through Machine Learning Model

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ABSTRACT

To decrease the burden of cancer in India, it is mandatory to control the subjectivity of the interpretation of medical imaging outcome by medical professionals. Due to multiple benefits of ultrasound imaging it is consider as a ideal imaging modality for early cancer diagnosis at remote places. Current diagnosis of thyroid cancer leads to invasive procedures to detect the malignancy in gland. To address the issue, in this research work total 347 ultrasound thyroid images with benign and malignant results are taken from open access data set for classification.Python is taken as the base platform to develop this overall state-of-art computer aided diagnosis for thyroid cancer detection from ultrasound images.Proposed method is having a unique combination of Pyradiomics feature extraction method and F-Regression feature selection methods further used for classification.Random Forest classifier trained on half of the malignant and benign images and rest of the images are given for the testing purpose. The research experiment result shows accuracy:96.36% on testing dataset.

INTRODUCTION

Thyroid is a largest endocrine gland and the hormones produced by this gland is responsible to control the important task of body like body temperature, heart rate, metabolism etc. [1]. Thyroid cancer is an unusual growth of thyroid cell that forms a lump in the thyroid gland.Thyroid is often an asymptomatic diseases and palpable nodules are common clinical findings. As per the information in GLOBOCAN 2018, thyroid cancer was ranked ninth among most common type of cancer which means it is accounted for 3.1% (56,7223) of the total cancer incidence [2]. 5-15% of thyroid cancer cases are depended upon the sex, age and exposure to risk factors like tobacco, alcohol consumption, dietary habits and inadequate physical activity [3, 4].

Ultrasound(US) is consider as a powerful tool for visualizing the complex anatomical structures. Portabil- ity, real time imaging, low-cost and radiation free scanning are the virtue of US imaging [5]. The diagnostic benefits makes US imaging as a first choice for the radiologist for better prognosis for thyroid nodule de- tection.Thyroid nodule were diagnosed by the high-frequency US machine in 19% to 68% of the cases [6].However, US machine has certain limitation too like the image taken from the machine is having low resolution, vague margin, noisy and monochrome. The features of cancer region in gland are homogeneous to the normal or benign tissues [7]. Thus it is difficult to differentiate the cancerous tissues from the anal- ogous tissues. The overall accuracy of thyroid US diagnosis is completely depended upon the experience and cognitive ability of the radiologist. Manual detection of tumor from US image is quite time consuming and subjective task. Thus, the need of automated tumor segmentation and detection system holds significant role. Precise, well-timed thyroid tumor detection is a challenging task.

In last decades, digitization of the information in the medical field has seen a constant increases. More sophisticated software have been developed to analyze the medical data available in different formats. Even though researchers in the field of Artificial Intelligence (AI) has long reached a point where it is accepted that software tools are not stand alone powerful to conclude the diagnosis but it is aiming to support clinical decision-making to encounter repetitive workflow of clinicians in their daily diagnosis Prochazka *et al.* [8] . Computer aided diagnosis with the advantage of high speed and low cost can add to accurate treatment and increase the survival rate of patients.
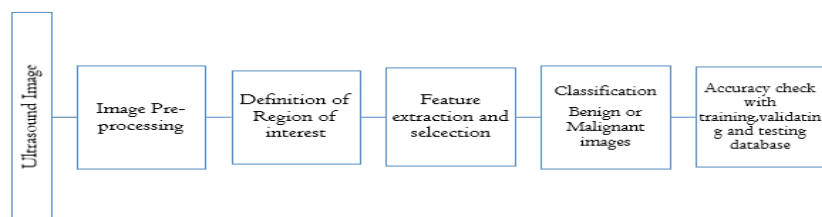
Figure 1. Flowchart of overall process

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To identify the nodule inside the US image, five major traditional steps has to be followed as below:

(1) Pre-Processing: Raw images taken from the ultrasound machine form the different resources are referred to remove speckles and enhance the image for further operations. Image sharping, Image smoothing,filtering are also part of image pre-processing.

(2) Segmentation: In this task, region of interest form the image is determine and cropped. Once it is identified, it will be easier for expert to differentiate the background and nodule features form the image. It is important to give only those areas for further process which are contributing for malignancy identification and further will be useful to reduce processing time.

(3) Feature Extraction: US images pixels are not capable enough to provide the microscopic information which can be assessed visually. So, features of the images extracted through various feature extraction tech- niques like Gray Level Co-occurrence Matrix, Gray Level Run-length Matrix, etc for image representation [9]. Features signify the properties of images and has plays an important role in simplifying the content of the image. It is very important to identify the features of image for accurate classification.

(4) Feature Selection: Due to "dimensionality curse" and "over fitting" problem there is a need of feature selection techniques. This task will eliminate the irrelevant and redundant features and determine optimal set of features for classification purpose [10].

(5) Classification: Feature selection step undergoes the classification step which helps to classify the image in to two parts which are normal cells and abnormal cells.It is an important step for the final cat- egorizations diagnostic result of thyroid nodule. Random Forest (RF), Support Vector Machine (SVM), k- nearest neighbors (KNN), Convolution Neural Network (CNN) and many more techniques are used for the classification of the images.

For practical application, above said steps are followed with combinations of different techniques to achieve maximum accuracy. The aim of this study is to identify the potential and additional efforts to improve the diagnostic performance through innovative tool. The rest of the paper is divided in to four more sections. Section 2 is for literature review of authors having similar studies with different techniques on thy- roid data sets used for malignancy classification. Section 3 is for specific methods used in this research work to achieve maximum accuracy with less computational source and time. Section 4 is the results achieved through this method. Section 5,6 are contributes to for conclusion and future scope of this research.

LITERATURE REVIEW

The existing literature for thyroid ultrasound imaging tumor classification in more objective manner with different techniques and data sets are summarised in this section. Two major techniques are used for the classification of the thyroid ultrasound images. One is deep learning methods and another is machine learn- ing methods [11]. Deep learning methods require large number of images to train the model. Further to that it also requires high computational resources to train and test the over all model accuracy. While in case of machine learning, small data sets as with lower computational resources are needed. Though accuracy seems higher in deep learning methods compared to that of machine learning for thyroid nodule identifi- cation from ultrasound images. Below table shows various authors work with machine learning and deep learning methods with accuracy achieved.

TABLE I: Performance summary of different authors work on Thyroid Ultrasound images classification

Author	Number Images Nodules	of with	Classification method	Results
[12]	482		CNN [1] with ResNet34	Accuracy:81.5%
[13]	537		CNN Deep learning	Accuracy:75.0%
[14]	92		Elastic net classifier	Accuracy:76.0%
[15]	807		Decision Tree	Accuracy:98.89%
[16]	340		SVM [2]	Accuracy:95.00%
[17]	84		SVM	Accuracy:98.33%
[18]	589		CNN	Accuracy:87.3%
[19]	131731		DCNN [3]	Accuracy:95%
[7]	4670		R-CNN	Accuracy:93.5%
[20]	2888		Modified DeneseNet	Accuracy:99.25%

[21]]	1358	Inception-V3	Sensitivity: 95.2%
[22]	4635	DCNN	Accuracy :99.13%
[23]	1936	modified U-Net model	Accuracy :99.13%
[24]	2836	Inception-v3	Sensitivity: 93.3%
[25]	39	Multilayer Perceptron	Accuracy:89.74%
[26]	7690	Multi-scale detection	Accuracy: 97.5%
[27]	219	SVM	Accuracy: 97.27 %
[28]	814	ResNet-50	Accuracy : 97.33%
[29]	1416	CNN	Dice's coefficient: 0.876
[30]	20	KNN [4]	Accuracy:98.9%
[31]	298	Resnet50	Accuracy:87.131%
[21]	1358	Inception-V3	Sensitivity: 95.2%
[1]	7800	CNN Classification	Accuracy:87.32%
[3]	12786	QUADAS-2 tool	Sensitivity:87.9%,
[32]	230	10-fold cross validation	Accuracy:89.13%
[33]	85	PNN [5]	Accuracy:95%
[34]	60	Random Forest	Accuracy:95%
[25]	39	Multilayer Perceptron	Accuracy:89.74%
[35]	298	VGG16- BottleneckSVM	Accuracy:99%

[1]Convolution Neural Network

[2]Support Vector Machine

[3]Deep Convolution Neural Network

[4]K-nearest neighbors

[5]Probabilistic Neural Network

In all above mentioned methods there is manual annotation for region of interest delineated by medical physicians. So accuracy varies with expert annotation along with classification. The existing research in classification of thyroid ultrasound images is rich with different techniques used with different data sets. Unfortunately, it is not feasible to directly compare the outcome of these approaches on same data sets . However table shows different types of methods and their results used in recent years for thyroid ultrasound image nodule identification.

METHOD DESCRIPTION OF MACHINE-LEARNING ALGORITHMS

DATASET
Thyroid ultrasound images dataset which is used in this research work is DDTI (Digital Databse Thyroid Image) which is available ain public open access dataset by Pedraza [36]. Total 347 US images from data set are taken for reseach which are extracted from TOSHIBA Nemio 30 and TOSHIBA Nemio MX US machine.This US images are captured from the video sequences. Annotation of each image is available in XML format. This annotation is given by expert radiologists and disorders are categorized in cystic, benign and malignant nodules.

IMAGE PREPOSSESSING
Raw images taken from the data set have readings along with other markings in the image. So it is important to remove the redundant information from images before stepping in further for feature extraction. This step is crucial when the image data has been taken from different operators through different protocols. To standardize the data for features and training/testing, division prepossessing is relatively helpful. Outline of the image is well-defined so we have to cut off the remaining parts from the image and taken only required part for image segmentation.
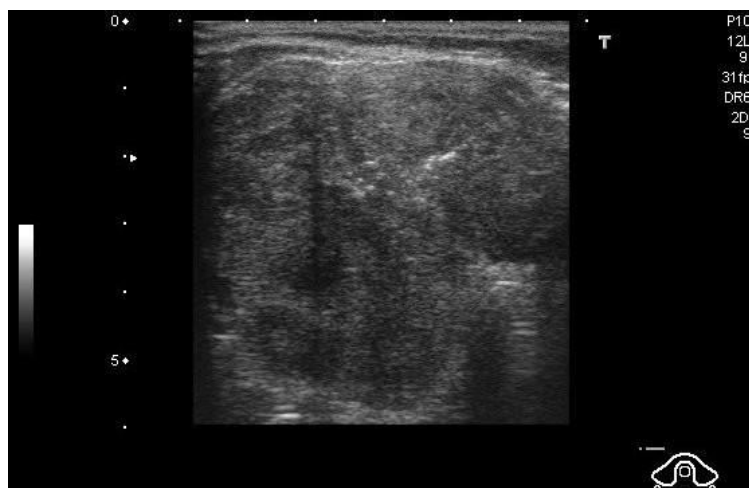
Figure 2. Raw Image

IMAGE SEGMENTATION

In the data set, there are XML files along with the JPEG files which are annotated by the experienced radiologist so the region of interest from images can be identified. The prepossessed image taken as an input for this and the output of the same is the labeled image. By end of this task, annotated area from the image is labelled so background area and nodule area can be clearly distinguished for feature extraction.
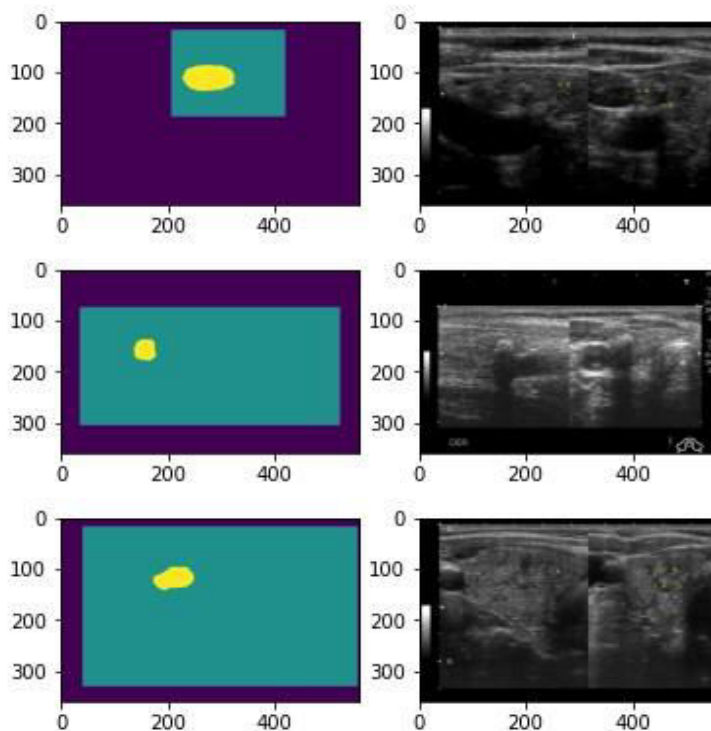
Figure 3. Label segmented from the prepossessed image

FEATURE EXTRACTION

Feature extraction is a basic and important task for information retrieval from the image for human inter-pretation. This will help us to find distinctive pattern recognition to build a machine learning system more carefully. Feature extractor will transform raw data of an image in to considerable domain related expert information which will be further used for classification. Each internal representation of area of interest will be in terms of mathematical calculations for feature extraction [2]. There are many feature extraction techniques which are used to quantify characteristics of the grey levels within the ROI. In this research our focus is to extract radiomics features from the image which is emerged from the radiology and oncology. In

medical field, radiomics feature extraction method is used to uncover the tumoral patterns and characteris- tics that fail to be appreciated by the unaided eye. Radiomics feature extraction is consider as a quantitative approach in medical imaging to quantify the pixel interrelationships by the means of advance mathematical analysis.
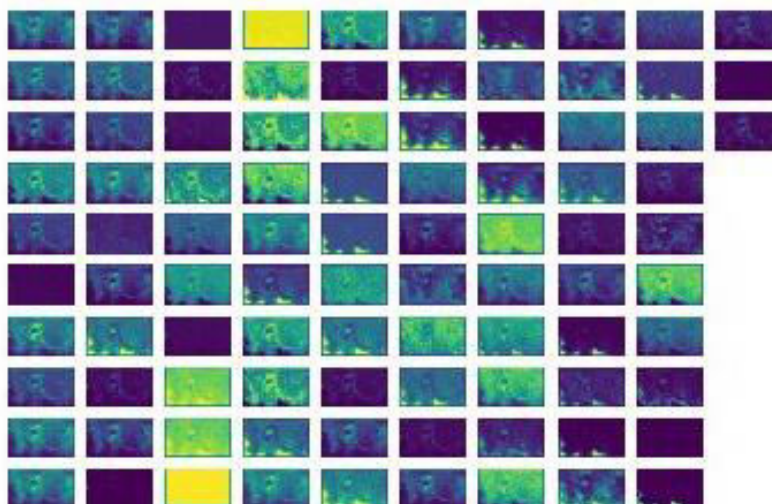
Figure 4. Features extracted from images

RADIOMIC FEATURES

Radiomics is trending field which uses high-throughput feature extraction algorithm to achieve quantitative information from the medical images. Unlike traditional methods for image characterization, radiomics is an invaluable tool to extract quantitative features in the filed of radiology [37]. Pyradiomics is an open-source python package for radiomics feature extraction from medical imaging [38, 39]. Each features extracted under pyradiomics calculates single value for segment-based or voxel-based feature which maps with math- ematical formula. For MRI and CT images analysis radiomics has been proven effectively helpful tool but its application for ultrasound imaging is rarely done. Therefore, it is inevitable to investigate the radiomics approach for investigation of thyroid ultrasound images. Through Pyradiomic total 104 features can be ex- tracted which are subdivided as follows:

(1) First order Statistics (19 Features)

(2) Shape- based (2D) (10 features)

(3) Grey Level Co-occurrence Matrix (24 features)

(4) Grey Level Run Length Matrix (16 features)

(5) Grey Level Size Zone Matrix (16 features)

(6) Neighbouring Grey Tone Difference Matrix (5 features)

(7) Grey Level Dependence Matrix (14 features)

The aim of this study is to extract the features from primary tumors and background images, which will further be used for training of the model for tumors recognition.

FEATURE SELECTION

The process to select set of the features in effective way to reduce the dimension of feature space without losing important information is called feature extraction.Supervised machine learning fails to fit with the new data other than trained data so to mitigate over fitting issue feature selection is a useful tool. It will also help to reduce redundant data of the data set. This dimensionality reduction will reduce the machine's efforts and increase the speed of machine learning process. Most relevant subset of the features can create robust machine learning model. The optimal data set which is the outcome of the feature selection method will decrease the computational time and burden on the machine, hence overall computational efficiency will be increase [40].

F_REGRESSION

In this research work, F_Regression method algorithm is applied to all features to check the maximum correlation - minimum redundancy to eliminate redundant and irrelevant features. FRegression method has more potential to predict the set of features for downstream classifiers for target variable compared to other regression methods [41]. This method tries to find the relationship of different features to determine the independent variable and dependent variable based on the variance. The null hypothesis and alternative hypothesis is defined on the statistical significance of individual features for best fit model [42].F_Regression will generate the ranking of all the features and most prominent features to be used for model training and testing.

CLASSIFICATION

Classification is considered as a decision making task among binary or discrete set of choices. Workflow of classification process is divided in to two parts: (1) Training Phase: In this phase, labelled data set is given to the model for training with their corresponding labels used for predication. In this phase, the region of interest in the input image is delineated manually or programmed semi-automatically. Features from ROI and background are used as input to the classification algorithm to train the model. (2) Application Phase: In this phase, images used for testing purpose are given as input and output is derived in terms of malignant and non-malignant cell in the images. It is important to mention that classifier accuracy is completely depended upon training set so to get robust and reliable evaluation, training dataset should be sufficiently rich. The accuracy of overall system completely depends upon the accuracy of the classifier used for classification. Hence, the algorithm of classifier plays critical role in overall automated system. For classification the data is implemented on SVM, KNN and Random Forest Classifier (RFC) but in RFC good accuracy is achieved in lesser computational time for binary classification.

RANDOM FOREST

RFC approach is basically an ensemble learning method which classifies each of the patched extracted form the US images as malignant and non-malignant thyroid. A train-test split of 50 - 50 % is used for each of the trees. Model training data is chosen randomly for each tree to reduce dependency between training and testing data. 10-fold-cross-validation method is used to improve final prediction in which data is randomly divided in to ten parts, repeated ten times and holds 10% of the data in each cycle. Total 100 tress are used for forest and top 30 features from F_Regression are taken for classification in this work.

RESULTS

Overall diagnostic performance of the RFC model was evaluated by using confusion matrices, where result is measured as the number of true positives (TP), true negatives (TN), false positives (FP), and false negatives (FN) according to the pathological sampling results. By using the combination of Pyradiomics feature extraction and SVM classification, the accuracy achieved is 93.83%. When the same combination was used for Pyradiomics feature extraction with Random forest classification the accuracy achieved was 96.36% for open access data set taken for testing purpose.

CONCLUSIONS

In the filed of medical science especially in India, availability of data is always a biggest issue so to overcome this limitation machine learning approach is more viable than deep learning. This technique is highly cost-effective for thyroid cancer diagnosis considering developing nations like India. Different biological abnormalities with patient history can make the dataset more smart for classification. Effectiveness and appropriateness of this result will help researchers, policymakers, purchasers and health care professionals. Once model is trained on more images, accuracy will definitely increase and in future it can be used for real time USG scan in hospitals for real-time diagnosis of thyroid cancer. This will work as a second opinion in to the findings by radiologist during real-time bed side scanning and diagnosis. This techniques requires less resources and less time compared to deep learning for the classification of process so this technique can be implement at remote places or countryside places in a vast country like India, Africa and other developing nation for early thyroid cancer diagnosis and which will lead to enhance life expectancy of the patient.

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Behavioral Economic Analysis of Commuters towards the Closure of Mumbai Local Railway Services For Masses during Pandemic Lockdown – Otherwise the Most Preferred Travel Mode

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ABSTRACT

The present study aims to understand the commuters travelling behaviour during closure of Mumbai local train services for a layman in the period of pandemic lockdown. For the study purpose, responses of 101 respondents were taken as sample size. Findings of study reveal that due to pandemic lockdown restrictions to travel in the local train, commuters faced lot of problems viz: large expenditures on different travel modes, longer travel time, difficulties in commuting and sacrifice on leisure time due to long hours of travel which proved to be tiresome.

Kewords: Mumbai Local Train, Pandemic, Lockdown, Behavioral Economic Analysis

INTRODUCTION

The Mumbai local trains are referred to as the "lifeline of Mumbaikar's", with an average of approximately 80 lakh passengers using the railway services on a daily basis prior to the Covid-19 pandemic outbreak. **(Hindustan Times, Oct 28, 2021)** The economy declared on March 23, 2020, the closure of suburban train services. On June 15, 2020 the partial opening of Mumbai local services was announced for essential service providers. They were issued special passes to board these trains.

The Western and Central Railway has a stretch of 319 km. Local train services time in memorial has played a vital role for Mumbai city's workforce in facilitating the north-south movement. It facilitates the inter-district travel of commuters in five districts namely Mumbai, Mumbai Suburban, Thane, Palghar and Raigarh.

The Central Railways used to operate 1,774 services while the Western Railway would operate 1,367 services each day prior the pandemic. However, during pandemic both the divisions were not operating local trains to its full capacity. Western Railway was operating at 37% capacity running 506 of its 1,367 services, while Central Railways was operating at 24% capacity operating 423 of its 1,774 services. Initially only government employees and essential services providers are allowed to board local trains.

The restriction for commuters excluding government employees and those employed in essential services to travel in Mumbai local trains had caused hardships to large number of residents of Mumbai's satellite subarbs/towns, especially those in the lower income groups and those in the unorganized sector. As the economy relaxed the lockdown, the city's labour work force who resided in far away locations from the peripheral of commercial business centers/districts in the city experienced doubling of daily commute time in an attempt to reach their respective destinations.

In extreme cases commuters from satellite suburbs like Vasai, Virar, Panvel, Kalyan spent over four hours extra, one way to reach their work place. The expenditure of commuting increased substantially. In normal time period approximate, 6 to 7 km commute on the suburban line would cost around Rs.35/- prior to lockdown, commuters were spending anything between Rs. 200-300/- to cover the same distance by road. There were protests and demonstrations in these places seeking the resumption of normal train services. **(The Indian Express, Sept. 29, 2020)**

REVIEW OF LITERATURE

The paper titled "**Choice behavior of commuters' rail transit mode during the COVID-19 pandemic based on logistic model**" aims to understand whether commuters will take rail transit during the COVID-19 pandemic. For that a logistic regression model was constructed from three aspects of personal attributes, travel attributes and perception of COVID-19. The results reflected that: self-employed people and freelancers, commuters who used non-public transport before the COVID-19 pandemic, and commuters who walked down from their residences to the nearest subway station were less likely to commute by rail transit during the pandemic. Commuters were of the opinion that the risk of being infected with the virus in public transport was higher and hence a lower probability of choosing rail transit. The confidence in other modes like bus/subway/taxi/taxi-hailing of commuters who did not choose rail transit during the pandemic was not high. **(Limin & Changxi , 2020)**

The research paper "**COVID-19 Impact on Transport: A Paper from the Railways' Systems Research Perspective**" analyzes the possible impact of COVID-19 on the transport sector and specifically on the railways. It aims at investigating how the sector should approach the "new normal." This paper introduces the five "R"s - resilience, return, reimagination, reform, and research - as the necessary steps the rail sector would need to address to continue to provide services throughout future crises. The paper exclusively highlights new avenues for research which can play an essential role in enhancing rail competitiveness and resilience for solving future crises. In conclusion, this paper reminds that the pandemic might be considered as a testing ground for upcoming crises and an opportunity to introduce the discussion about a new green and public paradigm of mobility. **(Alessio & Et.l , 2021)**

The paper titled "**Exploring the relationship between the COVID-19 pandemic and changes in travel behaviour: A qualitative study**" aimed at investigating the differences in individual travel behaviour during and after the COVID-19 pandemic, using Huzhou as an example. The results indicated initially, travel demand reduced signaficantly. Second, decreased travel reduced participation in activities, which can have adverse effects on people's health as well as their economic well being. Third, the degree & duration of such impacts varied from person to person. Students, lower income cohorts, groups living in small communities with insufficient green spaces, and those working in tourism, catering, informal businesses & transport-related sectors were more vulnerable than others. **(Yang & Et.l, 2021)**

The study titled "**Commuting before and after COVID-19**" has attempted to investigate the changes in attitudes to travel resulting from COVID-19 in Australia and New Zealand Respondents were asked about car use, car sharing, public transport, and air travel before, during, and after COVID-19 travel restrictions. The results showed attitudes towards travel were negatively affected, particularly attitudes towards public transport and international air travel. Further, although respondents indicated some recovery in attitudes when asked to consider when travel restrictions were removed, they did not recover to the levels of positivity seen pre-COVID. There were slight differences between the two countries in their post-COVID attitudes, possibly due to their different experience of travel restriction. **(Thomas & Et.l, 2021)**

In the analytic study titled "**Analysing the impact of the COVID-19 outbreak on everyday travel behaviour in Germany and potential implications for future travel patterns**" aimed to analyse changes in the travel behaviour patterns during the first coronavirus-related lockdown in Germany. The results of the study show that travel behaviour and mode choices changed during the lockdown period. Public transport suffers from the crisis most: it is used less often than before the Coronavirus outbreak and more than a half of the respondents stated to feel uncomfortable being in a public transport during the pandemic period. Simultaneously, the use of car as a mode of transportation for daily trips increases. **(Kolarova & Et.l, 2021)**

RESEARCH GAP
Some research articles are written on the commuter travel behaviour during COVID-19 pademic in other parts of world. Researcher did not come across any article related to commuter travel behaviour in Mumbai area. So the present research is an attempt to fill up this gap.

OBJECTIVES OF THE STUDY
1) To know commuter's general satisfaction from Mumbai local train service.

2) To know the amount spend on travelling by commuters during pandemic lockdown

3) To know the commuter's travelling experience by other public/self-owned vehicle during pandemic lockdown.

HYPOTHESIS STATEMENTS
1) H_0 = There is no significance difference between frequency of travelling by Mumbai local train and rating the Mumbai local train services by commuters.

2) H_0 = There is no significance difference between gender and experience of commuters travelling by other public/self-owned vehicle during pandemic lockdown.

RESEARCH METHODOLOGY
6.1 Type of Research
Descriptive research design is used where focus is on survey and fact finding enquiries through structured questionnaire. Quantitative research design is also used as it allows the researcher to examine relationships among variable. The research is also a qualitative research design.

6.2 Area of study:
The research was conducted in Mumbai area.

6.3 Sampling method
The sampling technique followed was convenience sampling method where the samples were taken from Mumbai area from the commuters who were easy to approach via mobile phone.

6.4 Target Population and Sample size
101 commuters from Mumbai area were taken as a sample for research.

6.5 Type and Source of Data
The present study is based on primary and secondary data. The primary data was collected by structured questionnaire. Close ended questions were asked to get the answers of those questions, which were related to the objectives laid down in the study. Respondents were sent Google form questionnaire on their mobile phone (on whatsapp) and requested to fill the same Secondary data is collected from various websites and research papers.

6.6 Statistical Tools Use:
Graph is used to organize data and to display the data in a way that is easy to understand and remember. Kruskal Wallis Test and Mann Whiteney U Test are used for hypothesis testing.

DATA ANALYSIS AND FINDINGS OF THE STUDY

Fig. 7.1 Gender of Respondents
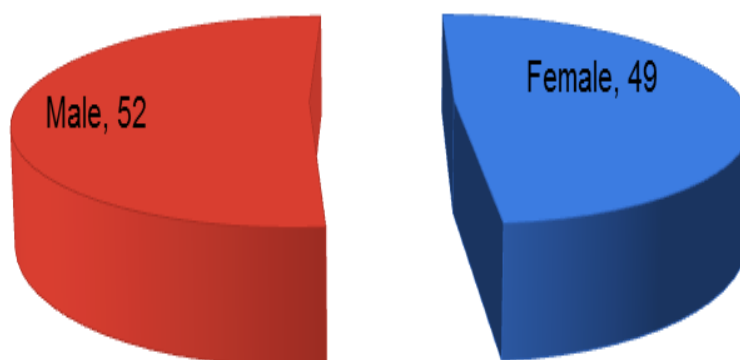
Source: Primary Data

The above graph shows gender of respondents. 49 respondents were Females and 52 respondents were Males.

Fig. 7.2 How often do you commute by local train?

	Daily	Occasionally	Once a year	Once in a week
■ Total	54	30	6	11
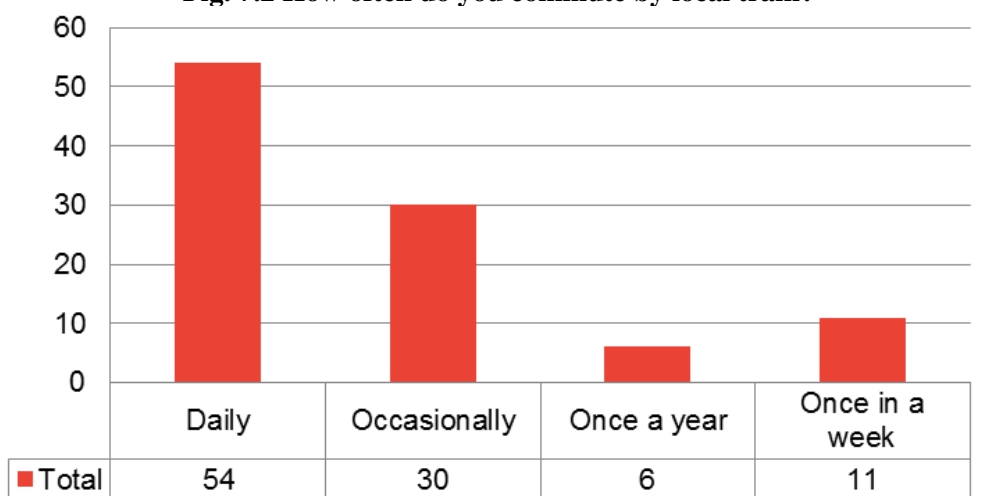
Source: Primary Data

The above graphs represent frequency of commuters to travel by Mumbai local train.54 respondents said daily, 30 said occasionally, 11 said once a week and 6 said once a year.

Fig. 7.3 In comparison to other modes of travel, how do rate the level of comfort travel by Mumbai local train?

	Average	Excellent	Good	Poor
Total	23	32	43	3
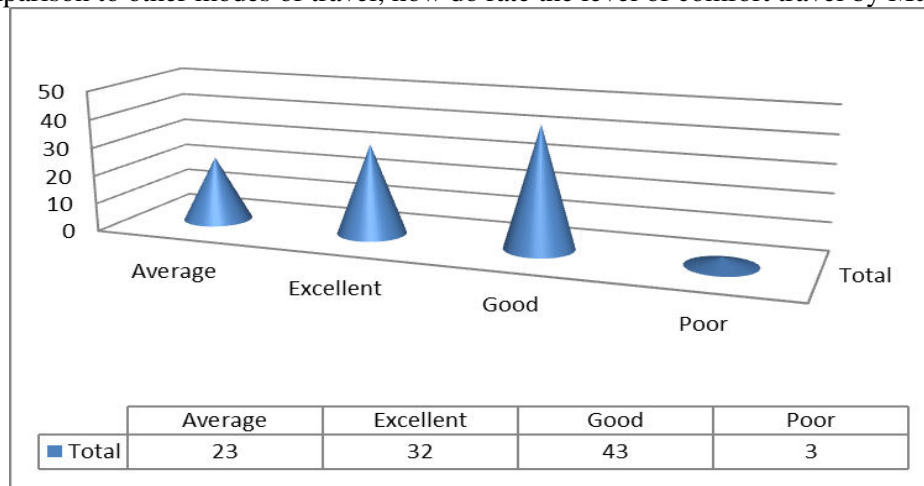
Source: Primary Data

The above graph represents travel comfort of commuters by Mumbai local train. 32 respondents said excellent, 43 said good, 23 said average and only 3 respondents said poor. So we can conclude that Mumbai local train is very comfortable for the commuters as compared to other modes of transport.

Fig. 7.4 What was the amount you spend on commuting daily before the local trains closed?
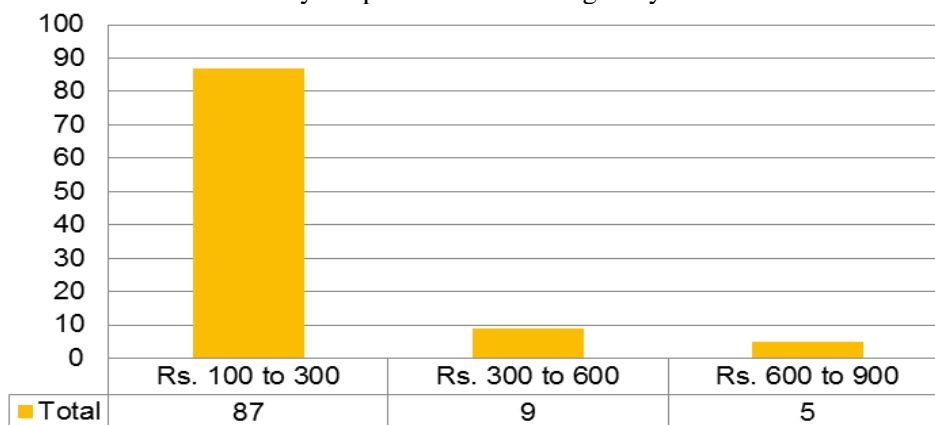
	Rs. 100 to 300	Rs. 300 to 600	Rs. 600 to 900
Total	87	9	5

Source: Primary Data

The above graph states that most of the respondent said that they were spending in the range of Rs.100-300/- for commuting daily before the local trains were closed.

Fig What is the amount you spend on commuting daily when local trains were closed?
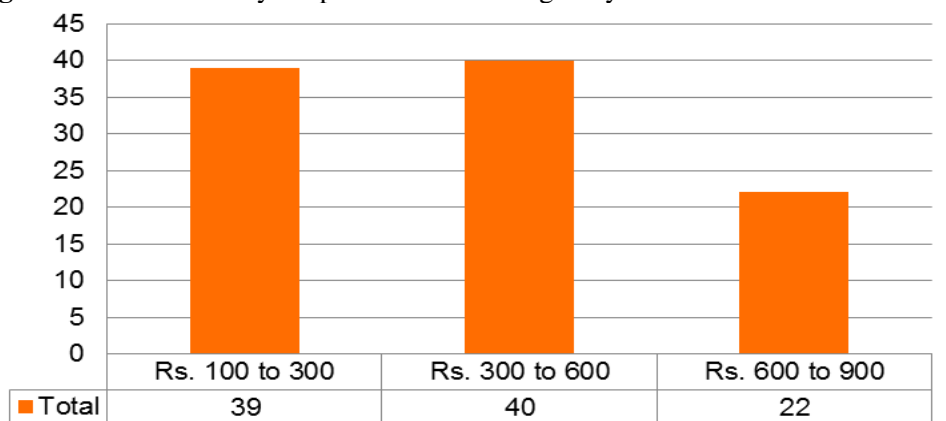
	Rs. 100 to 300	Rs. 300 to 600	Rs. 600 to 900
Total	39	40	22

Source: Primary Data

The above graph states that most of the respondent said that they were spending in the range of Rs.300-400/- and equal number of respondents said Rs.100-300/- for commuting daily when the local trains were closed. It means that daily spending on travelling was increased due to closure of local trains.

Fig. 7.6 Closing of local trains for masses has affected the income/revenue generation of other economic activities adversely?

	Agree	Disagree	Neutral	Strongly agree	Strongly disagree
Total	46	4	17	27	7
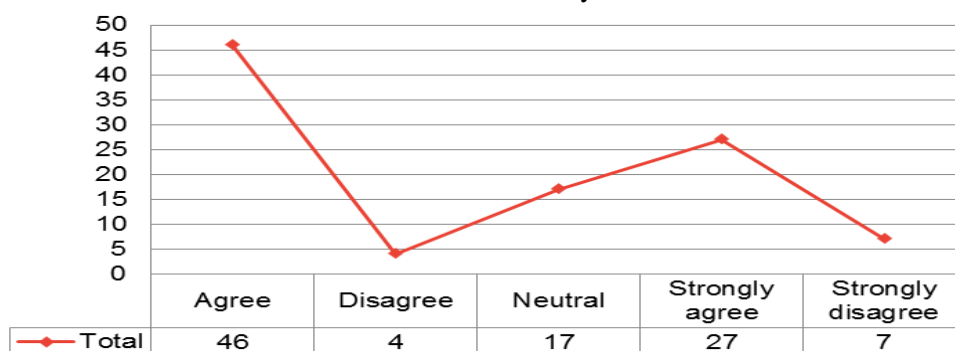
Source: Primary Data

Above graph makes it clear that, significant numbers of respondents agreed that closure of local trains for masses has adversely affected the income/revenue generation.

Fig. 7.7 How do you rate the Mumbai local train services in general?

	Affordable price of tickets/monthly passes	Cleanliness	convenient E-ticket facility	Efficient in time management	Time saving
Sum of Dissatisfied	6	22	10	8	7
Sum of Highly dissatisfied	7	9	4	3	3
Sum of Highly satisfied	55	13	38	37	51
Sum of Satisfied	22	25	31	33	30
Sum of Neutral	11	33	18	20	10
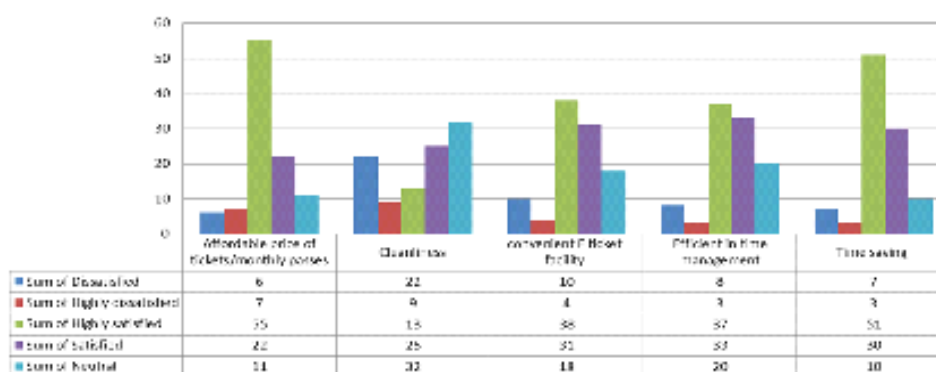
Source: Primary Data

The respondents were asked to rate the services of Mumbai local train services on the basis of affordable price of tickets/monthly passes, time saving, efficient in time management, convenient E-ticket facility and cleanliness. Most of the respondents responded found highly satisfied followed by satisfied from the above factors. So it can be concluded that commuters are satisfied by services of Mumbai local trains.

Fig. 7.7 What was your experience while travelling by other public transport /self-owned vehicles during pandemic lockdown due to closure of Mumbai local trains

	Upset in the monthly income budget	Need to spend more on travel than in pre pandemic period	Longer travel time	Increased the difficulties of commuting	Extremely tiring
Agree	33	37	32	38	32
Disagree	11	5	10	10	9
Neutral	26	19	21	20	23
Strongly agree	23	32	31	28	28
Strongly disagree	8	8	7	5	9
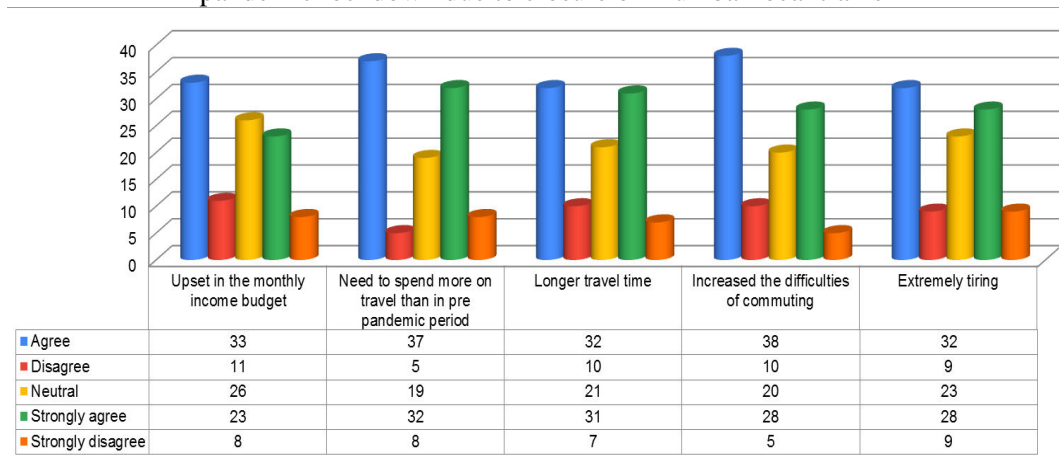
Source: Primary Data

The respondents were asked their experience while travelling by other public transport /self-owned vehicles during pandemic lockdown on the basis of upset in the monthly income budget, spending more on travel than in pre-pandemic period, longer travel time increased the difficulties of commuting and extremely tiring. Most of

the responded were agreed followed by strongly agree with above factors. So it can be concluded that commuters experience while travelling by other public transport/self-owned vehicles during lockdown was not good.

HYPOTHESIS TESTING

1) There is no significant difference between frequency of travelling by Mumbai local train and rating the Mumbai local train services by commuters.

Kruskal Wallis Test

Test Statistics[a,b]					
	Affordable price of tickets/monthly passes	Time saving	Efficient in time management	Convenient E-ticket facility	Cleanliness
Chi-Square	8.693	2.630	2.646	2.627	2.702
df	3	3	3	3	3
Asymp. Sig.	.034	.452	.449	.453	.440
a. Kruskal Wallis Test					
b. Grouping Variable: 5. How often do you commute by local train?					

The Kruskal Wallis Test shows that p value of affordable price of ticket / monthly passes is 0.034, which is less than 0.05 therefore H_0 is failed to accept (rejected) which states that there is significant difference between frequency of travelling by Mumbai local train and rating the Mumbai local train services by commuters. Commuters having different frequency of travelling by Mumbai local train have different rating for affordability of price of ticket / monthly passes. i.e. Commuters who travel daily by Mumbai local trains may be more satisfied with affordability of price of ticket / monthly passes**.**

The Kruskal Wallis Test shows that p value of time saving is 0.452, efficient in time management is 0.449, convenient e-ticket facility is 0.453 and cleanliness is 0.440 which is more than 0.05 therefore H_0 is accepted which states that there is no significant difference between frequency of travelling by train and other factors (time saving, efficient in time management, convenient e-ticket facility and cleanliness) of Mumbai local train. Commuters having different frequency of travelling by Mumbai local train have same rating for time saving, efficient in time management, convenient e-ticket facility and cleanliness.

2) H_0 = There is no significant difference between gender and experience of commuters travelling by other public/self-owned vehicle during pandemic lockdown

Mann Whitney U Test

Test Statistics[a]					
	Upset in the monthly income budget	Need to spend more on travel than in pre pandemic period	Longer travel time	Increased the difficulties of commuting	Extremely tiring
Mann-Whitney U	1266.000	1058.000	1075.000	1134.500	1041.000
Wilcoxon W	2491.000	2283.000	2300.000	2359.500	2266.000
Z	-.056	-1.537	-1.403	-.990	-1.638
Asymp. Sig. (2-tailed)	.955	.124	.161	.322	.101
a. Grouping Variable: 2. Gender					

The Mann Whitney U test results shows that p value of all the factors (Upset in the monthly income budget, Need to spend more on travel than in pre pandemic period, Longer travel time, increased the difficulties of commuting and Extremely tiring) is more than 0.05 therefore H_0 is accepted which states that there is no significant difference between gender and experience of commuters travelling by other public/self-owned vehicle. Males and Females have same experience of travelling by other public/self-owned vehicle. I.e. Males and Females faced same problems while travelling by other public/self-owned vehicle during pandemic lockdown.

LIMITATIONS

1) Sample size of 101 is a limitation; the findings may differ with higher sample size.

2) The study is limited to Mumbai area.

3) Responses given by respondents may be biased.

CONCLUSION

The study concludes that most the commuters of Mumbai local train find it affordable and comfortable for travelling. But due to pandemic lockdown restrictions to travel in the local train they faced lot of problems like spending more money on travelling, longer travel time by other modes of transport, difficulties in commuting and tiring commuting. Travelling by train in Mumbai is preferred mode despite the overcrowding into the suburban has become inevitable phenomenon. The study indicates indirectly indicates despite all the hassle for travelling in suburban trains it is inevitable to deny that there will remain demand which will continue to exceed the supply of local trains in Mumbai. There exists greater scope for research to build tangible solution for those overcrowding uncomfortable yet the most preferred mode of travel.

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A Study of Investment Preferences among Working Women in Mumbai

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ABSTRACT

Financial investment is an important aspect of wealth creation for every individual. Indian financial market offers multiple investment instruments for retail investors, based on their investment requirement. It is important for every investor to choose appropriate investment instrument to achieve their financial goals. Women have a significant contribution in income of a family. Women are also accelerating in their professional careers by participating in all sectors of employment. This study is conducted to analyze investment preferences of working women in Mumbai. 612 respondents were considered for this study via random sampling method to study and understand various aspect of women investment preferences among available avenues.

Keywords: Financial investment, Financial goal, Working women, Investment preferences

1. INTRODUCTION

Investment is done primarily with a goal in future to achieve. Financial goals are set for creating wealth for retirement planning, to increase standard of living, planning for big purchases like property, Child education and many more. Some investments are also made with an objective of save tax in current year and earn decent return at the same time. Indian financial market offers various financial instruments for retail investors. Financial instruments related to equity market often has high or moderate level of risk associated but expected to give better returns than other financial instruments based on debt funds or government securities, Post office and Reserve Bank of India also offers fixed return investment options like Post office recurring scheme, National Saving Certificate (NSC), Kisan Vikas Patra, RBI Bond etc. Few other relatively safe investment options offered by Government of India includes Public Provident Fund(PPF), National Pension Scheme (NPS). Investors should analyze and then select appropriate investment avenue based on their goals and risk appetite. Nature and sum of Investment is link to income of a person as saving from income is invested to get returns. Women in India are integral part of economy and has contributed significantly to the development of country. Women are participating in all profession equally with men. Recent socioeconomic changes in country have promoted women education and employment. Women and men in a family now contribute equally to family income. The rising employment and income level in women also contributes a growth in women investors in financial market. Many women are inclined towards investing in hybrid financial instruments with moderate risk and good returns. Education and financial literacy among women investors are making them independent while taking decisions and choosing appropriate financial instruments.

2. OBJECTIVE OF STUDY

To study and present investment preferences of working women in Mumbai.

To study and present the important factors considered by working women while choosing investment options.

3. REVIEW OF LITERATURE

(Santhiyavalli & Usharani, 2014) analyzed Investment Behaviour of Women Investor in Coimbatore city. Objective of this research was to study socioeconomic profile of women investors of Coimbatore city along with their investment behaviour. The study was completely based on primary data and the data was collected via survey method in Coimbatore. Total 100 respondents were selected for this survey. ChiSquare test technique was used for data analysis. The study concluded that Women investors are quite risk averse, and prefer to invest safe investment options.

(Thulasipriya, 2015) did a study on the Investment Preference of Government Employees on Various Investment Avenue. Objective of this study was to examine factors considered by government employees before investing and their risk tolerance level. 500 government employees from Coimbatore city was selected for this study as sample. ANOVA Test, t-test, Freidman's Ranking Analysis were used for analysis. The study concluded that investors still prefer for risk free returns. They prefer investment options with low risk.

(Atchyuthan & Yogendrarajah, 2017) performed a research on investment awareness and preferences of working women in Jaffna district in Sri Lanka. Objective of this study was to analyse impact of demographic factors on investment awareness and preference among women investors. It was observed that bank fixed deposit was the first preferences of investment followed by gold. Also they have more preferences on investment with high safety and liquidity.

(Bansal, 2017) examined preference of investment among working women of Ludhiana. The study is base don 100 samples collected from city. The study concludes that working women between age 20-30 and 30-40 give importance to investment. They prefer 10 to 25% of their income in investment. It is also concluded that they prefer returns on invrestment as major factor for investment.

(Bhat, 2019) studied investment preferences of working women in District Kupwara of Union Territory of Jammu and Kashmir with spefic reference to banding and education sector. The study infer that majority of population prefers investment which guarantees returns like fixed deposit. Safety of investment is prime factor.

(Silvester & Gajenderan, 2020) studied investment behavious of working women in Chennai city. Simple frequency distribution, one-sample t-test, Independent t-test, Friedman test, and Chi-square techniques are used to examine the awareness level of working women in Chennai. 281 samples were collected for this study. The research concluded that majority of women are conscious about their investment decision and do periodic investment. The study also concluded that there is significant association between annual income and investment.

4. RESEARCH METHODOLOGY :-

The study is focused on finding out investment preferences of working women in Mumbai with respect to most known investment avenues. The study further aims to show the important factors considered by working women in Mumbai to choose investment options. The research is mainly based on primary data collected directly from respondents via online questionnaire and personal interviews.

4.1 Sample :- Intended respondents of this study are working women from Mumbai region. Women from all education background, self-employed and salaried were selected for this study. The survey is limited to earning women in Mumbai. The primary data is collected from employed women of all sectors in Mumbai. A simple convenience sampling technique is adopted for sample selection. This is a non-probability sampling method to collect data from random respondents which are convenient to reach and give honest opinion. Responses received from this method are collected via online and offline mode. Structured questionnaire was built online as well as in hardcopy. Initially questionnaire was circulated to limited known audience of 50 respondents for testing. Further the questionnaire was circulated widely to all audiences. Respondents were reached out via mail, references, personal interviews, and calls. 612 samples were collected by way of structured questionnaire to record their responses.

4.2 Statistical Treatment on data :- This study was conducted to explore and present investment preferences and factors affecting investment decision. The collected data was stored in MS Excel and segregated separately with defined categories. Further the data was analyzed using descriptive statistical techniques of simple frequency distribution, percentage analysis and graphical interpretation.

5. DATA ANALYSIS AND INTERPRETATION :-

Primary data collected was analyzed to understand sample distribution and characteristics of samples collected. Overall data is segregated primarily on age and income factors to present percentage distribution of samples.

Below figure 1 shows age distribution of respondents of the survey. It is observed that samples are evenly distributed in all age groups. The distribution shows minimum of 15% respondents in the age of 26 to 30 years at maximum 21% respondents are of 45 and above age.
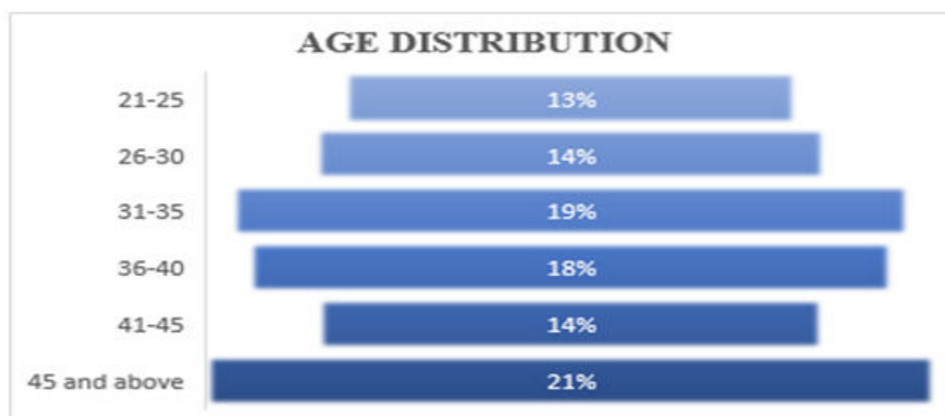
Fig 1 :- Showing distribution of age of respondents

Below figure 2 shows income level distribution of the respondents of this study. It was observed that majority of respondents have net individual income upto 5 lacs per annum. 48% respondents earn upto 5 lacs per annum followed by 29% respondents earning 6 lacs to 10 lacs per annum. 14% respondents reported income between 11 to 15 lacs where as 4% respondents earn 16 to 20 lacs. The distribution suggests that majority of working women from samples collected from different age group and employment sectors earn up to 5 lacs net income per year.
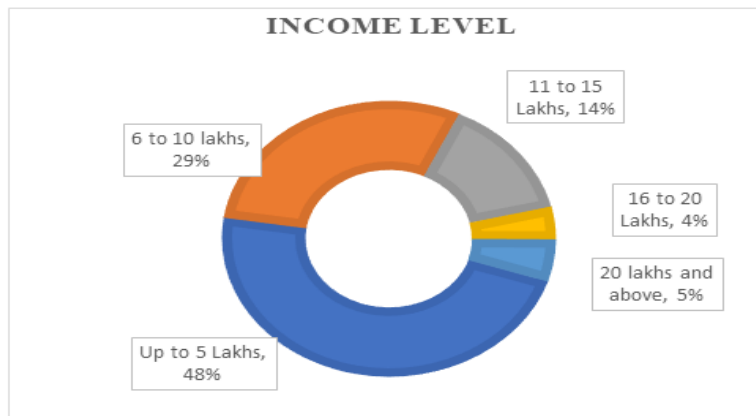
Fig 2 :- Showing distribution of income level of respondents

Below Table 1 shows how working women in Mumbai invest their savings in various financial instruments available in financial market. It is observed that majority of working women prefers to invest in Insurance policies, Provident Funds (PF) and band fixed deposits. It is noted from the analysis that 82% (F=499) of working women invests in insurance policies via premium and 79% (F=483) invest in PF via salary or personal investment. It is seen that 78% (F=475) working women prefers to invest in Bank Fixed deposits. It is also observed that 70% (F=429) also invest their savings in Mutual funds. The table suggests that 64% (F=388) also considers gold as investment avenue. The lowest frequency reported at 31% (F=189) working women investing n Government Securities. Overall it is observed that working women in Mumbai prefers to invest in low risk financial instruments as Insurance, PF and bank FD. It also noted that considerable number of working women population also invest in equity based instruments such as Mutual fund and also via direct equity shares.

Investment Instrument	Nil	Below 25%	26% to 50%	51% to 75%	Above 75%	Total Respondent	Total Respondents making investment (F)	% Distribution
Insurance Policies	112	344	132	16	7	**611**	**499**	**82%**
PF/PPF/VPF	128	354	108	16	5	**611**	**483**	**79%**
Bank FD	136	321	116	28	10	**611**	**475**	**78%**
Mutual Funds	182	278	110	30	11	**611**	**429**	**70%**
Gold	223	292	70	19	7	**611**	**388**	**64%**
Equity Shares	259	244	84	19	5	**611**	**352**	**58%**
Real Estate	376	135	67	20	13	**611**	**235**	**38%**
Post Office Schemes	397	161	37	12	4	**611**	**214**	**35%**
Government Securities	422	127	47	12	3	**611**	**189**	**31%**

Table 1 : Showing number of respondents with percentage of saving invested in respective investment instrument

Below table 2, presents the importance of various factors considered by working women while making investment decision. It is observed that 75% of total respondents consider Safety of invested amount as most important factor while choosing investment option. It is further observed that return on investment is also considered very important by 60% population. These are two primary factors considered by working women in Mumbai while deciding on the investment options. These analysis shows that working women in Mumbai are inclined towards investing in financial instruments with more safety and moderate returns which is also inferred in table 1 that majority of working women invests in Insurance policies and PF.

Factor	Very Important	Important	Moderately Important	Slightly Important	Unimportant	Total
Safety of invested amount	456	141	10	3	1	611
Returns on investment	364	230	16	0	1	611
Liquidity (how soon and easily you can sell off your investment)	214	281	97	13	6	611
Your knowledge on the investment option	280	269	54	5	3	611
Safty of invested amount (%)	75%	23%	2%	0%	0%	100%
Returns on investment (%)	60%	38%	3%	0%	0%	100%
Liquidity (how soon and easily you can sell off your investment) (%)	35%	46%	16%	2%	1%	100%
Your knowledge on the investment option (%)	46%	44%	9%	1%	0%	100%

Table 2 : Showing number and percent of respondents with importance level on the factors considered while choosing investment option.

6. LIMITATIONS

This study is limited to working women in Mumbai region.

The study is limited to financial instruments listed in Table 1 above as these are commonly known financial instruments in India.

7. CONCLUSION

This research aims at analyzing the preferences of working women in Mumbai towards investment avenues available in Indian financial market. The study concludes that working women in Mumbai prefers to invest in safe investment avenues which are Insurance policies, PF and bank FD. They prefer a slightly lower and moderate returns by ensuring safety of their principle amount. This research shows that safety of invested amount is most important factor while making investment decision and choosing financial instrument.

Working women from all age group and with different income level still considers investment should be done n safe instrument with good returns. Also, a considerable population also invests in equity market via Mutual fund and direct equity shares. They are aware of the equity based financial instruments and prefers to invest in the same compared to real estate or government securities.

It is suggested that working women should also increase their investment in equity market and for safe investment they should also focus on government securities which offered good security and returns.

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A Study on Consumer's Preference of Digital Space in the Realm of Shopping

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ABSTRACT

With the advent of the age of digitalization, consumer preferences with respect to buying and selling are shifting from the conventional (in-store) mode to the dynamic world of digital shopping. Modern technologies as such are playing a massive role in providing a comprehensive and a detailed insight about the products and services a business has to offer to its prospective customers. Technological advancements have in fact drastically changed the way people consume today. Every activity are being done online be it payment of the utility bills or insurance, shopping or booking tickets, banking, etc. Here, the paper focuses on online shopping apps which enable its customers to shop online in a few simple steps at the convenience and comfort of their home, thereby saving a lot of time and energy. Consumers can buy goods as well as services directly from the sellers over the internet. Online Shopping is in fact, the third most popular activity on the internet after email and web browsing. The paper thus, makes an attempt to analyze the preference of consumers for digital space in the realm of shopping and the factors that influence their choice.

Keywords: Digitalization, Technologies, Consumer preference, Online shopping.

I. INTRODUCTION

The rise and popularity of digital shopping in the modern world is not a sudden trend but a continuous development. It has a shared history with the origins of the internet as well as the advent of globalisation in the early 1990's. Michael Aldrich is credited for introducing the concept and practice of online shopping (*Videotex system*) in 1979 to the world. Although the form was in a rudimentary stage, it nevertheless served the purpose of online transaction between businesses as well as customers; the form has now been developed/ upgraded to encompass not only individuals and businesses of local areas but the entire world. What was once a novelty has become an ingrained part of our daily lives.

Despite the ease of transactions in terms of digital shopping, it is still too early to predict the demise of traditional (in-store) forms of shopping. One major factor is the idea or sense of 'immediacy' that the traditional mode of shopping offers. An article titled **Shoppers Still Prefer In-store Over Online Shopping** published in the *Business News Daily* (*Brooks. Nov 18, 2021*) corroborates this point by highlighting that consumers prefer to see and feel the items to be purchased in person, and thereby ensuring the authenticity of their purchase. The study also showcases that majority of the people like to visit their local stores in an effort to support the community. However, a growing undeniable trend that has been noticed among potential shoppers/ consumers is that they look for information regarding products online before making purchases; consumer behaviour, to a great extent, is influenced by the digital space. This is an indication that the move away from the analogue mode to the digital version will definitely take place in the near future as new forms of applied technology is explored.

In the post-pandemic world, the shift from the traditional mode of shopping to the digital mode is more of a necessity. It would not be an exaggeration to assume that the pandemic has not only accelerated a drastic shift towards a more technologically oriented world, but has also simultaneously triggered unprecedented, definitely not unexpected, changes in the way of consumers shopping behaviours. It has altered the way people/ consumers browse and buy. The article titled **The Evolving Consumer: How COVID-19 is changing the way we shop** (*Mckinsey & Company. 2021*) lists some of the major changes that the world is likely to witness in the coming years after the pandemic has subsided. As such, the present article seeks to study some of these changes in consumer behaviour by looking at certain factors/criteria ranging from gender, age, diverse income groups, shopping credentials etc. of select demographic profile in Dibrugarh town.

II. OBJECTIVES

➢ To understand the overall consumer preference towards online shopping

➢ To identify the factors influencing online shopping decision and shopping pattern of consumers based on select population of Dibrugarh town in Assam.

III. DATA AND METHODOLOGY

To cope with the objectives of the paper, an evaluative and descriptive method has been adopted. The paper relies on select secondary data collected from various reports, websites, journals, relevant books, and research articles in the proposed area of study under consideration. Besides, the study is based on primary data collected

from the respondents of Dibrugarh town through structured questionnaires. Due to time constraint a sample size of 150 respondents has been selected from different parts of the town comprising of residential area and a general market area. Data were collected through structured questionnaires purposively distributed on select population of Dibrugarh town in Assam based on convenient sampling technique. The data collected were first tabulated, then interpreted and finally analyzed by using arithmetic tools such as percentage method. Further, Ranking method was also used to analyze the data.

IV. FINDINGS AND DISCUSSIONS
4.1 Demographic Profile of the Respondents
In this section, the demographic profile of the respondents are analyzed and interpreted in terms of percentages using respective tables.

Table 1: Gender wise responses of respondents

Gender	Frequency	Percentage
MALE	70	47
FEMALE	80	53
TOTAL	150	100

Source: Primary data

For the purpose of the study 150 sample respondents were selected out of which 70 respondents were male (i.e. 47%) and 80 respondents were female (i.e. 53%).

Table 2: Age Group of Respondents using Online Shopping

Age Group	Frequency	Percentage
21-30	60	40
31-40	45	30
41-50	30	20
50 and above	15	10
Total	150	100

Source: Primary data

Table 2 shows the age group of the respondents using online shopping. 60 respondents (i.e. 40%) of the online shopping users are in the age group between 21-30 years, 45 respondents (i.e. 30%) of are in the age group of 31-40 years, 30 respondents (i.e. 20%) were in the age group of 41-50 years and 15 respondents (i.e. 10%) were in the age group of 50 years and above.

Table 3: Educational Qualification of the respondents

Educational Qualification	Frequency	Percentage
Under Graduate	20	13
Graduate	70	47
Post Graduate	40	27
Others	20	13
Total	150	100

Source: Primary Data

Table 3 shows the educational qualifications of the respondents. Out of 150 respondents, 13% were under graduate, 47% were graduate, 27% were post graduate, and 13% were found to be in the other category.

Table 4: Employment status of the respondents

Employment Status	Frequency	Percentage
Student	50	33
Self employed/Business	30	20
Service	40	27
Professional	30	20
Total	150	100

Source: Primary Data

In table 4, it can be seen that 33% of the respondents are students, 20% are self employed or engaged in business activities, 27% are in the service sector and 20% are in Professional activities.

Table 5: Monthly Income of the Respondents

Income	Frequency	Percentage
Under 20,000	20	13
20,000 - 40,000	45	30
40,000 - 60,000	60	40
60,000 - 80,000	15	10
80,000 and above	10	7
Total	150	100

Source: Primary data

Table 5 represents the monthly income of the respondents. About 13% of the respondents have an income under 20,000, 30% of the respondents have an income in the range 20,000-40,000, 40% of the respondents have an income in between 40,000-60,000, 10% of the respondents have an income in between 60,000-80,000 and 7% of the respondents have an income above 80,000 respectively.

4.2 Consumer's preference of online shopping

In this section, the preferences of the consumers for online shopping are analyzed and interpreted using tables and charts.

Table 6: Frequency of Using Online Shopping by Respondents

Use of Online Shopping	Frequency	Percentage
Monthly	80	53
Quarterly	40	27
Half-Yearly	20	13
Annually	10	7
Total	150	100

Source: Primary data

Table 6 shows the frequency as well as the percentage of the respondents using online shopping. Out of 150, 80 respondents (i.e. 53%) use online shopping monthly, 40 respondents (i.e. 27%) use it quarterly, 20 respondents (i.e. 13%) use it half-yearly while only 10 respondents (i.e. 7%) use online shopping annually.

Table 7: Basis for using Online Shopping by Respondents

Basis	Frequency	Percentage
Own Interests	75	50
Advertisements	20	13
Reference by Acquaintances	30	20
Social media Influence	25	17
Total	150	100

Source: Primary data

The above table 7 represents the basis or the reasons that guides the respondent's preference for online shopping. Out of the total, majority of the respondents i.e. 50% of them use online shopping for their own interests, advertisements seem to influence the respondent's preference by 13%, while 20% of the respondents are influenced to shop online by the references made by their acquaintances (friends and family) and 17% of the respondent's preference was based on social media influencers.

Table 8: Factors influencing Online Shopping of Respondents

Factors	Responses						
	R1	R2	R3	R4	R5	R6	Total
Time Saving	45	**50**	35	10	5	5	150
Convenience & comfort	**60**	40	25	15	5	5	150
Cost effective	25	30	**45**	25	10	15	150
Product Availability	20	25	**35**	30	20	20	150
Mode of payment	25	20	15	20	**45**	25	150
Others	10	15	20	25	30	**50**	150

Note: R1, R2, R3, R4, R5 & R6 are rank 1, rank 2,…, rank 6 respectively.
In the above table 8, 6 probable factors that influence online shopping were taken into account such as, time saving, convenience & comfort, cost effectiveness, product availability, mode of payment, and others. The respondents were asked to give ranks to these 6 factors that influence their preference of online shopping.

From the above table 8, it is quite evident that the highest number of respondents (60) has given rank 1 to convenience and comfort. 50 respondents have given rank 2 to the time saving factor while cost effectiveness and product availability shares rank 3 as 45 and 35 respondents have voted for it respectively. Mode of payment factor is given rank 5 by about 45 respondents and 50 respondents have voted rank 6 to other factors. Thus, from the analysis it can be interpreted that the factors like convenience, time and cost effectiveness, and availability of product primarily influences consumer's decision to opt for online shopping. While mode of payment remains more or less neutral as nowadays offline mode of shopping also offers wide range of payment options to its customers.

Table 9: Consumer's perception of the benefits of Online Shopping

Benefits	Responses						
	R1	R2	R3	R4	R5	R6	Total
24*7 availability & accessibility	**60**	40	20	15	10	5	150
Availability of Discounts and Offers	50	**55**	30	5	5	5	150
Home Delivery Service	25	30	10	35	**40**	10	150
Easy to return and Replace Policy	20	25	**35**	30	25	15	150
Satisfactory level of product information	20	30	20	**35**	25	20	150
Availability of customer reviews	20	15	25	25	30	**35**	150

Note: R1, R2, R3, R4, R5 & R6 are rank 1, rank 2, …, rank 6 respectively.
From table 9, it can be seen that majority of the respondents i.e. 60 has given rank 1 to 24×7 availability and accessibility, likewise 55 respondents have given rank 2 for availability of discounts and offers, 35 respondents has given rank 3 to easy to return and replace policy, 35 respondents have given rank 4 to satisfactory level of product information, 40 respondents have given rank 5 for the service of home delivery and 35 respondents have given rank 6 to availability of customer reviews respectively. Thus, when it comes to the benefits of online shopping people are more attracted towards it because of its 24*7 hours of service availability and for the great deals it provides in terms of heavy discounts, festive as well as seasonal offers and coupons etc. Easy return and replace policies as well seems to tempt the customers to opt for online shopping as offline mode at times becomes way too fussy. However, home delivery service ranks 5th since nowadays the option is easily available everywhere.

Figure 1: Problems faced by Consumers while shopping online

Source: Primary data

Figure 1 gives an idea regarding the problems faced by the consumers while shopping online. The percentages are given based on the responses of the population under study. The major drawback of online shopping found to be the absence of physical check as 22% of the respondents voted for it. Inability to check the products physically in person on the part of the consumers thus creates a major hindrance in online shopping. Second

major problem faced is the differences in the products ordered and delivered, be it in terms of quality, quantity, color, size, damaged item etc. which accounts for 21% given under the head items not per expectations. Third, is the high shipping charges followed by non-availability of COD (Cash on delivery). Besides, difficulty in return and replacement of items as well as problem of refund faced during return of the products also causes problem in online shopping.

Further, in terms of any risk perceived in online shopping, the respondents were asked whether they feel any risk or threat in online shopping. Out of 150 respondents, 70 respondents claimed that they feel certain risk while shopping online whereas the remaining 80 respondents were neutral or claimed that they don't feel any kind of risk in online shopping. Thus, in order to assess and to have an idea about the type of risk the respondents face the researchers have stated four probable options which are presented in the table below along with the responses given by the study population.

Table 10: Risk perceived by the consumers in online shopping

Category	Number of Respondents	
	Frequency	Percentage
Delivery Risk	15	21
Product Risk	20	29
Payment/Financial Risk	15	21
Security Risk	20	29
Total	70	100

Source: Primary data

Out of 70 respondents who claimed certain amount of perceived risks in online shopping, 29% of them labeled product risk and security risk as the highest risk factors respectively while 21% of them identified delivery risk and payment risk as possible risk factors. Product risk includes consumer's concern regarding product quality, authenticity, performance, etc. Security risk includes consumer's concern regarding the security and confidentiality of personal information shared online. Some respondents feel that information related to their home address, contact number, email ids, bank details etc. could be misused. Delivery risk creates concern regarding loss or damage of the product, delivery to faulty destination etc. Lastly, payment or financial risks create issues of concern in terms of sharing of confidential information in the process of payment and its consequences.

Figure 2: Products most preferred in online shopping
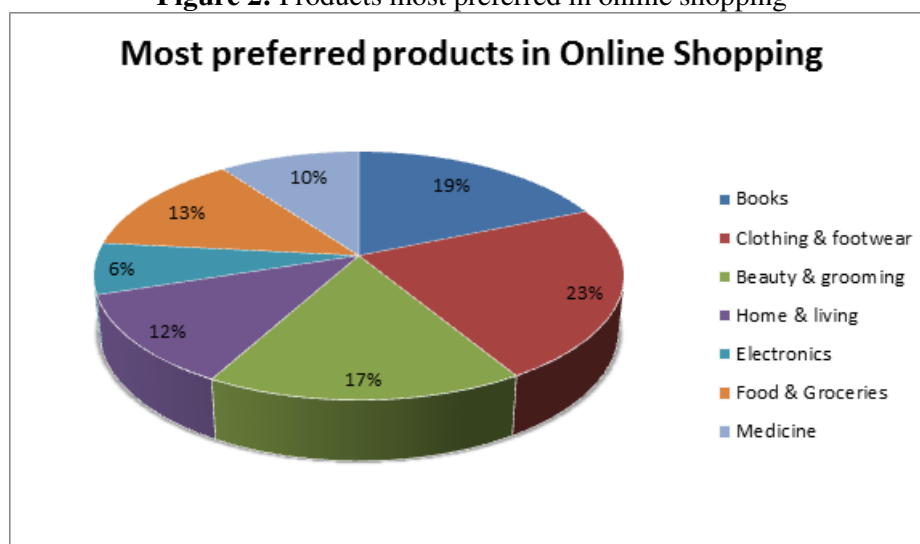
Source: Primary data

Figure 2 shows the most preferred products for purchase in online shopping among the study population. Among the most preferred products, clothing and footwear followed by books tops the list with 23% and 19% of the respondents voted in its favor respectively. Next most preferred items include beauty, skin care and grooming products, home and living products including decor, furnishing, kitchen & dining items and the like, electronics and gadgets, etc. Besides, consumers have also adopted preference over online shopping with respect to buying food, groceries and medicines as well.

On being asked about the most preferred online sites/apps used for online shopping, the respondents gave mixed responses. For instance, they tend to prefer Flipkart and Amazon mostly for purchasing books and stationeries, home and living items, electronics etc.; for products related to fashion and lifestyle, they preferred Myntra and Ajio; for beauty and grooming, Nykaa is most preferred; Swiggy tops the list when it comes to ordering food online while groceries are mostly preferred from Amazon and Flipkart and lastly, for purchasing medicines local apps and available home delivery services are mostly preferred followed by Netmeds.

Figure 3: Preferred mode of payments of the consumers
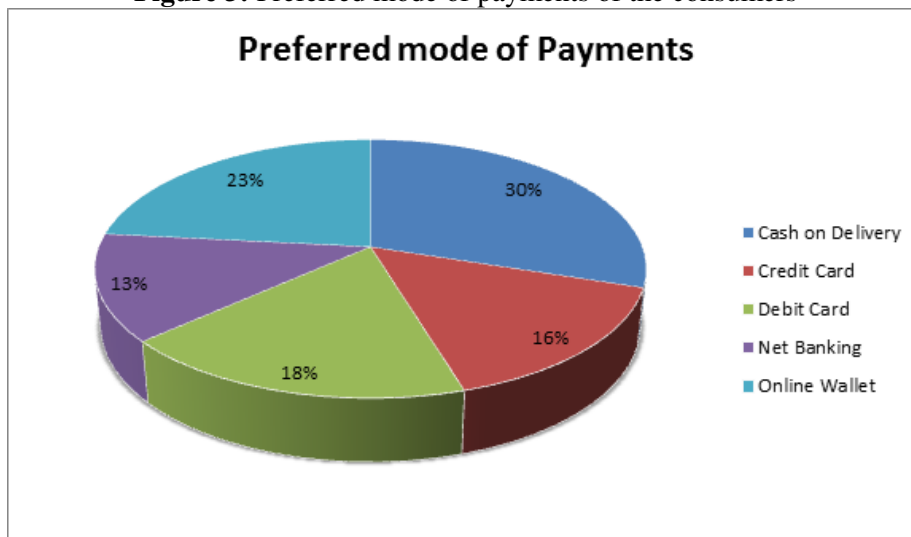
Source: Primary data

Figure 3 shows the preferred mode of payments opted by the consumers in online shopping. Cash on Delivery mode of payment is most preferred among the study population followed by the preference for online wallet. Online wallet mode of payment provides its customers with a wide range of payment options like Google Pay, PhonePe, BHIM UPI, Paytm etc. Besides, debit card, credit card and net banking options are also preferred for use in online shopping. However, the use of net banking is comparatively low among the available payment options under the study population.

Figure 4: Expenses made on online shopping by the consumers
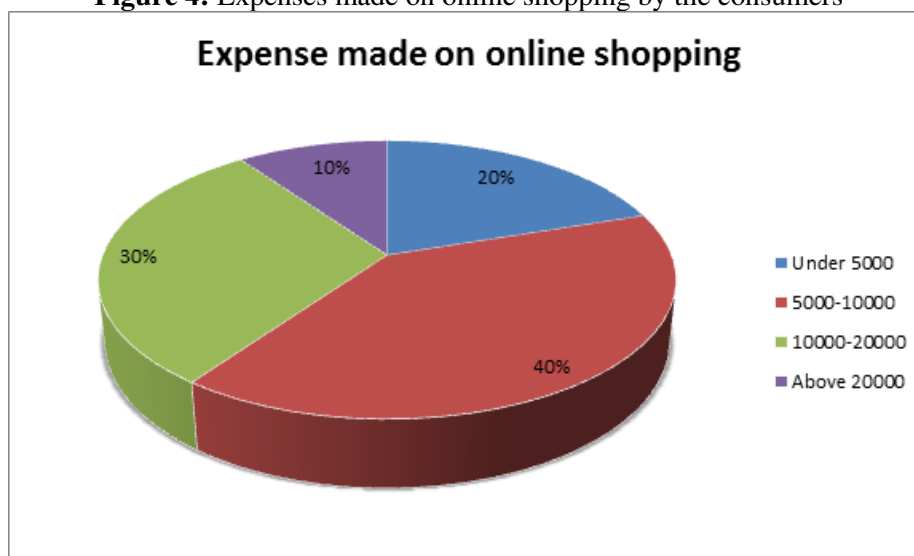
Source: Primary data

Figure 4 gives an idea regarding the amount of money spent on online shopping by the respondents. Of the study population, majority of the respondents accounting for about 40% spent between 5,000 – 10,000 rupees on online shopping and 30% of them between 10,000 - 20,000 rupees on an average. The remaining 20% of the respondents spent fewer than 5,000 rupees while 10% of them spent above 20,000. However, it is noteworthy to mention that their expenses vary as per the need and requirements of the respondents. Further, their spending pattern is also largely affected by current trends, festivals, discounts and offers etc. as claimed by the

respondents themselves. Thus, although the given chart gives us a rough estimate of the expenses made on online shopping by the study population, it cannot be considered constant as it keeps on varying based on the factors mentioned.

V. CONCLUSION

Online mode of shopping has become a part and parcel of every individual's day to day life which is quite evident from the analysis of the study. Online shopping is gaining popularity among the masses specially the younger generation. Besides, people belonging to the middle age and the older generation as well are seen adapting to the new age technological changes equally. In this fast changing world, people tend to have very less time to go for conventional mode of shopping and hence find it convenient to opt for online shopping options. Online shopping sites offer a wide range of options and great deals to its customers to choose from and hence, customers get more attracted towards it. However, it also has certain risks involved pertaining to product quality, product delivery, finance and security which should be tackled with immediate effect as well for the smooth functioning of the system. Developmental changes do play a vital role and are necessary for a developing country like ours. Thus, the government should give attention to implement laws related to consumer security in terms of online/digital stores so that they feel comfortable using it.

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Development and Validation of a Stability Indicating HPLC Method for the Simultaneous Determination of Doxofylline and Theophylline in Pharmaceutical Dosage Form

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ABSTRACT

The study describes development and subsequent validation of a stability indicating reverse-phase highperformance liquid chromatography technique for the simultaneous estimation of Doxofylline and Theophylline in pharmaceutical dosage forms. A reversedphase phenomenaxC18 column (250 mm × 8 mm i.d., particle size 10 μm) column with mobile phase consisting of acetonitrile and phosphate buffer 65:35 (v/v) (pH 4.2 ± 0.02, adjusted with triethylamine) was used. The flow rate was 1.2 mL min 1 and effluents were monitored at specific wavelength. The retention times (t R) of Doxofylline and Theophylline were found to be 4.87 min and 16.36 min, subsequently . The technique was validated in terms of linearity, range, specificity, accuracy, precision, limit of detection (LOD) and limit of quantitation (LOQ) and degradation study. The linearity for both the drugs was found in the range of 5to30 μg mL 1 . The % recoveries of Doxophylline and Theophylline were found to be 100.87 and 102.43, respectively.

Keywords: Theophylline, Doxofylline, stability indicating technique, pharmaceutical dosage form etc.

INTRODUCTION

A fixed dose combination of doxofylline and theophylline is available for the treatment of asthma. Doxofylline and theophylline chemical structures are given in Fig.1 and 2.
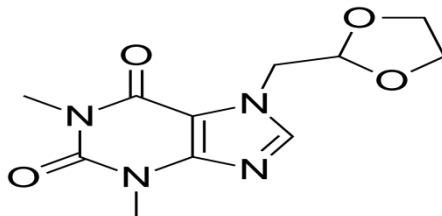
Fig. 1: Chemical structure of Doxofylline
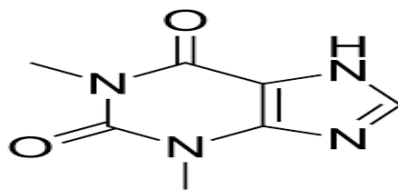
Fig.2: Chemical structure of Theophylline

Doxofylline is a new methyl xanthine derivative used in obstructive airway diseasesand has same effectiveness as theophylline. But theophylline often results in a wide range of adverse effects, involving cardiac, GIT, and CNS, which accounts for the poor compliance and high dropout rates reported with its use. Although, it has a tapered therapeutic index, thus warranting strict monitoring of its level in the blood. Doxofylline has remarkably fewer side effects, making the drug extremely advantageous to the patients [13]. Theophyllineis a chemically, 1, 3-dimethyl-7H-purine-2, 6dione also known as dimethylxanthine, is a methylxanthine drug used in respiratory diseases like COPD and asthma [4].

The several UV, HPLC, GC and HPTLCbased technique have been described forassessment of these drugs single or in combination with additional drugs in pharmaceutical dosage forms [5-9]. But not any stabilityindicating assay technique has been described for the simultaneous estimation of Doxofylline and Theophylline in the presence of their degradants utilizing the ICH perspective of stresstesting. That's why, this study was aimedto develop a simple, rapid, precise, and accurate

isocratic reversedphase stability indicating HPLC process for simultaneous estimation of Doxofylline and Theophylline in the tablet dosage form. Stress testing under several situations such as hydroly sis(i.e., acid, base, and water), oxidation, heat, and photolytic degradation was performed as per IC H guidelines [10-13]. Validation of developed analytical technique was performed as per ICH guidelines [14].

MATERIAL AND METHODS
MATERIALS
Doxofylline gifted by Pure and Cure Healthcare Pvt.Ltd. Haridwar and Theophylline is also the gift sample obtained from Cipla ltd. Kurkumbh. HPLC grade acetonitrile, water and triethylamine were obtained from Rankem, RFCL Limited, New Delhi, India. Potassium dihydrogen orthophosphate A R and ortho phosphoric acid AR grade were procured from Central Drug House (P) Limited, New Delhi, India.

Stability indicating method by HPLC
For the treatment of asthma, a fixed dose combination of Doxofylline and Theophylline is available . doxofylline plus Theophylline produces greater bronchodilation and less skeletal muscle tremor tha n a higher dose of theophylline taken by mouth alone. Because efficacy and safety go hand-in-hand, a fixed dose combination of Doxofylline and Theophylline is a better replacement for the treatment of acut e and chronic asthma.

The individual estimate of Doxofylline and Theophylline in biological fluids and pharmaceutical for mulations was reported using a variety of analytical approaches. Only three analytical techniques, sp ectrophotometry and, more recently, HPLC, have been published for simultaneous measurement of D oxofylline and Theophylline, although none of them are stabilityindicating.As a result, a stabilityindi cating HPLC method for estimation of both the drug in pharmaceutical formulation.

Chromatographic conditions
In preliminary investigations, the medicines were separated using buffers such as ammonium acetate (50 mM and 25 mM), acetonitrile, and methanol as organic modifiers at an acidic pH on the C1 8 columOn the Zorbax SB- Phenyl analytical column, good separationwas found. As a result, the Zorbax SB- Phenyl analytical column was used for HPLC separation and quantification (250 mm length, 4.6 m m i.d and 5 pm particle size). The final optimal technique conditions were an isocratic mobile pha se of 25 mM ammonium acetate, pHadjusted to 5.0 with 0.1 percent glacial acetic acid and aceton itrile in the proportion of 85:15percent v/v at a temperature of 40 °C. At a given wavelength, the eluate was detected. Empower software, version 3.0, was used to process the output signal.

Preparation of standard stock solution
50 mg Doxofylline and 50 mg Theophylline were accurately weighed and transferred to 100 mLvol umetric flasks separatelyand dissolved in the mobile phase to give stock solutions of 500 µg mL^{1} each ofDoxofylline.

Preparation of sample solution
Twenty tablets were weighed and powdered finely. Tablet powder equivalent to 4 mg of Doxofyllin e and 200 mg of Theophylline was transferred to a 100 mL volumetric flask and dissolved in 50 mL of mobile phase. The solution was ultrasonicated for 30 min and filtered through 0.45micron membrane filter. The solutions were additionally diluted among mobile phase to acquired concentrati on of 2 µg mL^{-1} of Doxofylline and 100 µg mL^{1} of Theophylline and were subjected to HPLC analysis as reported earlier. From the peak area of Doxofylline and Theophylline the quantity of drugs in samples wa s computed.

FORCED DEGRADATION STUDY
To determine the drug's stability, researchers conducted forced degradation tests under acid, base, o xidation, dry heat, and photolysis situation. In the solid state, dry heat and photo deterioration wer e carried out.

METHOD VALIDATION
LINEARITY

Aliquots of 0.6, 0.8, 1, 1.2, and 1.4 ml were transferred from standard stock solutions towards 10 ml volumetric flasks anddiluted until the trace among mobile phase, resulting in a final attentiveness of 60-
140 g/ml. Among the use of a syringe, a volume of 20 l of every sample was inoculated. For each attentiveness, all quantification were performed six times, and a calibration curve was created by graphing apex region vs concentration.

PRECISION:
The repeatability of sample injection, as well as intra-day and inter
day difference, were used to assess the
method's precision. The peak area was measured by injecting 100 g/ml of Doxofylline and theophylline into the column andmeasuring the repeatability. The experiment was repeated six times.

Three replicates of three different concentrations of 60, 80, and 100 g/ml were evaluated in a day for the intraday investigation, and percentage RSD was calculated.Three replicates of three distinct concentrations of 60, 80, and 100 g/ml were examined on three successive days during the interday variation research, and percentage RSD was deliberate.

ACCURACY
The accuracy of an analytical technique is the closeness of outcomes acquired by that technique to the true value for the sample. It is expressed as recovery (%), that is determined by the standard addition technique. Samples were spiked with 80, 100, and 120% of the standard and analyzed. The experiment was carried out in triplicate. Recovery (%) and RSD (%)were determine for each concentration.

SYSTEM SUITABILITY
Mixed standard solution of 400 pg/ml ofDoxofylline and 5 pg/ml of Theophylline
solution was injected in six replicates andsystem suitability parameters were determined.

RESULT AND DISCUSSION
Linearity and range : Six different concentrations (5, 10, 15, 20, 25 and 30 µg mL[1]) of the mixture of two drugs were prepared for linearity studies. A typical HPLC chromatogram obtained during simultaneous determination of Doxofylline and Theophylline is given in Figure 2**.**

The calibration curves obtained by plotting peak area against concentration showedlinear relationship over a concentration range of 5-30 µg mL
[1] for both the drugs. The linear regression equations for Doxofylline and Theophylline were found to be $y = 1.6012x + 3022.1$ and $y = 16607x$ 91346, respectively.The regression coefficient values (R^2) were found to be 0.9991 and 0.9995, respectively indicating a high degree of linearity.Calibration curves of Doxofylline and Theophylline are shown in following fig.

$$y = 37618x - 13096$$
$$R^2 = 0.9988$$
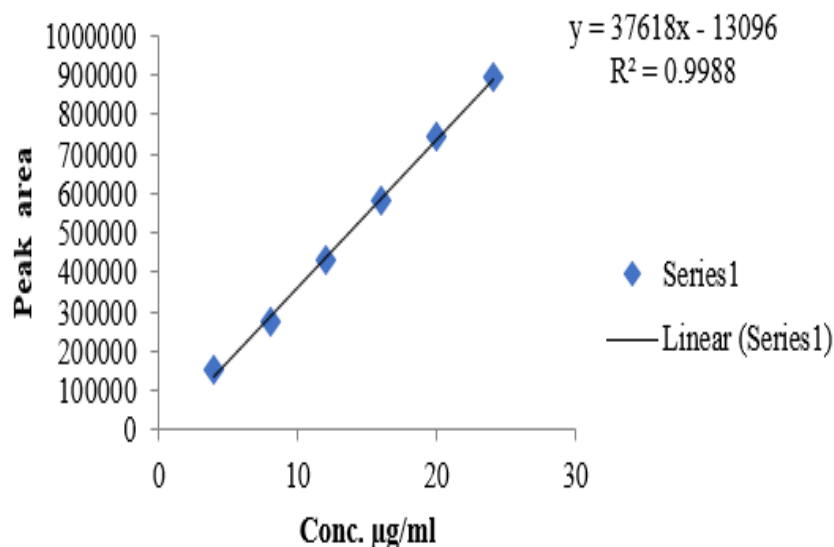
Fig.3 Calibration curve of Doxofylline
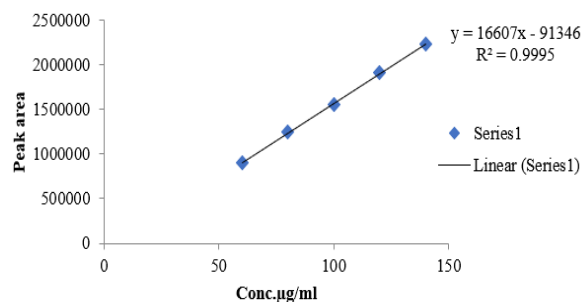
Fig.4 Calibration curve of Theophylline

METHOD DEVELOPMENT

Several mobile phase compositions were tried to resolve the peaks of Doxofylline and Theophylline. The optimum mobile phase containing acetonitrile and phosphatebuffer 65:35 (v/v) , (pH 4.2 ± 0. 02, adjusted with triethylamine) was selected because it could resolve the peaks of SS (t_R = 3.13± 0.03 min) and TP (t_R = 4.58±0.05 min) with a resolution factor of 7.51.Quantification was achieved with UV detection at specific wavelength on the basis of peak area at 1.2 mL min^{-1} flow rate.

METHOD VALIDATION

The current investigation used an isocraticmobile phase consisting of 25 mM ammonium acetate pH adjusted to 5.0, 0.1 percent glacial acetic acid, and acetonitrile in an 85:15 percent v/v proportion. All measurements were carried out at a temperature of 40°C in the column. The injection volume was 10 pL, and all samples werediluted with the mobile phase preparationswith UV detection at a specified wavelength, the flow rate was 1.00 mL/min. Theseparation of Doxofylline and Theophylline was exhibited in a typical chromatogram as shown in Fig. At a retention time of 5.02, doxofylline and theophylline wereeluted 13.97 minutes and 13.97 minutes, respectively.
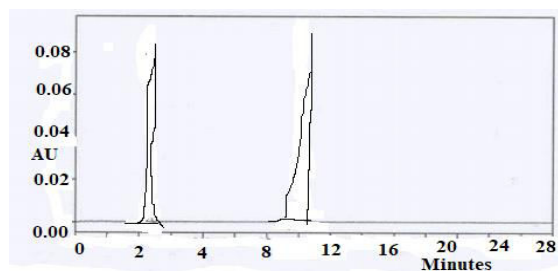
Fig.5: A typical chromatogram demonstrating the method's separation of Doxofylline and Theophylline

PEAK PURITY EVALUATION

The PDA detector was used to determinepeak purity, and the findings are reportedin Table 1. The proposed method's linearity was determined using least squares regression analysis of the calibration curve. The calibration curves for Doxofylline and Theophylline were linear over the concentration ranges of 280-480 |jg/mL and 3.5-6.5 MQ/mL, respectively, with correlation coefficients (r) of 0.9998 0.002 and 0.9998 + 0.002, respectively. The proposed approach had good precision, with a percent RSD of less than 1.0 percent. Table 2 summarises the findings
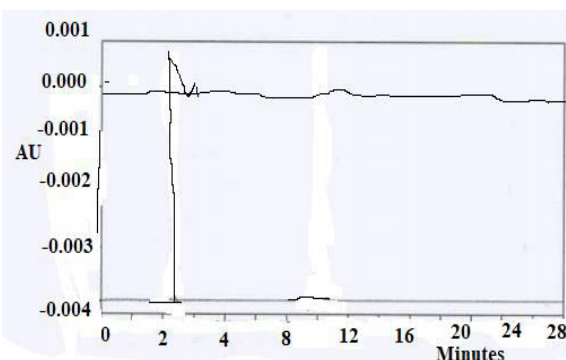
Fig.6: Chromatogram of placebo solutionwhich shows noninterference of excipients.

Table 1: Peak purity data

Name	Purity angle	Purity threshold
Doxofylline	0.12	0.35
Theophylline	0.24	0.54
Acid degradant		
Degradant 1	0.15	0.42
Degradant 2	1.30	1.45
Degradant 3	19.76	37.86
Degradant 4	16.87	31.65
Base degradant		
Degradant 1	40.54	91.65
Degradant 2	0.65	3.02
Degradant 3	55.34	91.0
Oxidative degradant		
Degradant 1	33.23	91
Degradant 2	57.98	91
Degradant 3	62.54	91
Degradant 4	11.87	91
Degradant 5	68.97	91
Photolytic degradant		
Degradant 1	37.98	69.43
Degradant 2	26.56	68.12

Specificity: The specificity studies proved the absence of interference, that's why noone peaks emerged at the retention time of Doxofylline and Theophylline. The interactivity study in standard solution was also performed by comparing and contrasting peak of each drug separately and in drug combination.

Precision: From the standard stock solutions, mixed standards containing Doxofylline and Theophylline were prepared. Standard solutions were injected using a universal rheodyne injector amonginjection volume of 20 μL. The intra-day and inter-day precisions were estimated by analysing standard solutions. The % RSD was found to be between 1.91 and 01.98 for both the drugs. The lower values i.e., 1.34of % RSD indicate that themethod is precise.

ACCURACY

Accuracy was checked by spiking the standard drugs Doxofylline and Theophyllineat three different concentration levels to the placebo. Recovery of individual components from the placebo ranged from 97.33 to 100.87 % and 98.34 to 102.43. Results are presented in Tab.2.

Table 2: Standard addition method fordetermination of Doxofylline and Theophylline by HPLC

Quantity of drug added to placebo (mg)	Amount found	% Recovery	% RSD
Doxofylline			
291.77	290.02	98.98	1.87
404.67	400.08	97.33	1.91
490.12	493.76	100.87	1.34
Theophylline			
4.54	4.55	102.43	1.56
6.13	6.07	98.34	1.34
7.45	7.34	99.46	1.98

DEGRADATION STUDIES

Acidic conditions: Both the drugs were found to be labile to acid hydrolysis in 0.1N HCl at 100 °C. It was noticed that Doxofylline gradually degraded on heating at 100°C in 0.1N HCl for 5 h, forming degradation products showing retention time 8.09- and 11.98

min. Theophylline manifested higher degradation as contrast to Doxofylline. At the end of 5 h, around 25% fall in Theophylline peak area was observed. After refluxing for 5 h, drug was degraded by 65% with corresponding increase in concentration of the degradation products.

Degradation in alkali: Doxofylline was found to be highly labile to alkaline hydrolysis. Around 65 % degradation of the drug was observed in 0.1N NaOH at 100°C within 5 h. The degradation peaks appeared at 0.22 and 4.56 min consequentlymild degradation was seen in Theophylline in alkaline condition. It was observed that around 12-14 % of the drug degraded on heating itin 0.1N NaOH for 5 h at 100°C. Three peaks were generated at 8.0 and 12.11 and 20.76 min in the chromatogram Figure 7 b.

Neutral conditions: In neutral condition, Doxofylline was found to be correspondingly stable. Upon heating the drug solution in water at 100°C for 5 h, only minordegradation product at 4.78 min was formed. On further heating up to 10 h, there was no revolt in the proportion of thepreviously degraded peaks. On the other hand, 10-15% degradation of Theophylline was seen after heating for 5 h at 100°C with the generation of three minor peaks at around 4.52, 18.08-, and 20.87-min Figure 7 c.

Oxidative conditions: Doxofylline was found to be correspondingly stable following exposure to oxidative condition (10% H_2O_2 at RT for 5 h) resulting in 3-5% degradation while Theophylline was found to degrade more than 25%. Mild degradation was seen in Doxofylline with appearance of peaks at 6.62 min consequently the degradation products of Theophylline appeared at 16.07 min.

Photolytic conditions: Mild decompositionwas seen on revelation of Doxofylline and Theophylline solid drug powder and their tablets to light in the photo stability chamber. The photolytic revelation (30 days) of Doxofylline in 0.1N HCl and 0.1N NaOH resulted in 48% and 15% degradation, respectively. On the other hand, standard Theophylline and its tablet were found to be more stable under acidic photolytic stress conditions, resulting in 30% decomposition. Doxofylline and Theophylline API and the pharmaceutical tablets were found to be sufficiently stable under neutral photolytic degradation conditions.

a)

b)

c)

d)

e)
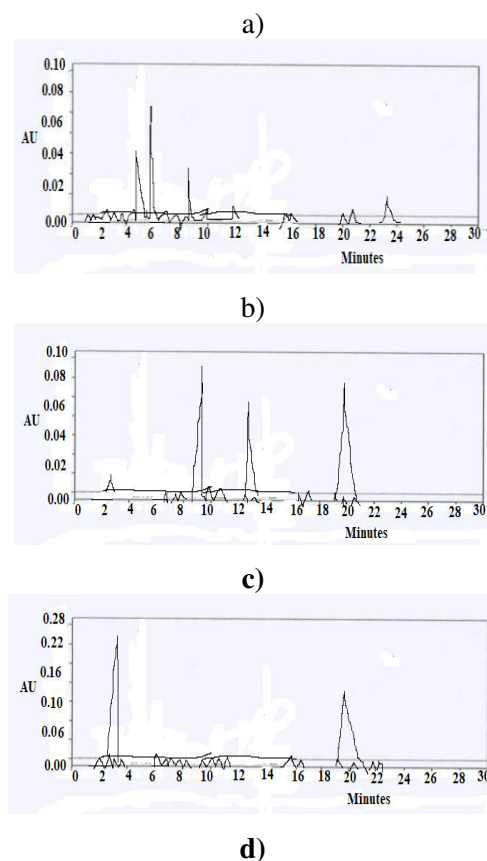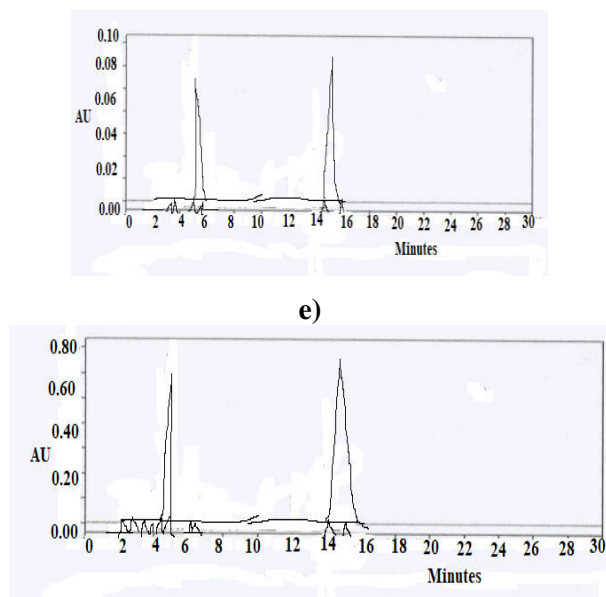
Fig. 7: HPLC chromatogram of Doxofylline and Theophylline obtained from degradation study

a) Acid stressed samples treated with 0.1 N HCI at 100°C for 5 hours

b) Alkali stressed samples treated with0.1 N NaOH at 100°C for 5 hours,

c) Peroxidestressed samples treated with 10% H2O2 for 5 hours at 80°C,

d) Experiment with a photo stressed sample,

e) A sample that has been thermally stressed.

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Studies on Physical Properties of Some Organochloro Pesticides in Methanol

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ABSTRACT

Several physical properties, viz. Solubility, density and viscosity of organochloro pesticides in methanol, have been determined at different temperatures (308 - 323K). Apparent heat of solutions of pesticides has been calculated from solubility data which are found in the order Phosphamidon < Endosulplan < 2,4-D Sodium salt. Viscosity and density data have been analysed using various equations and it has been concluded that solute-solvent interaction occurs in pesticide solution in methanol. The effects of temperature and concentration of pesticide on the fluidity of pesticide solutions have been discussed in the light of Arrhenius and Eyring equations and activation parameters of viscous flow viz. ΔH^*, ΔS^* and ΔG^* have been calculated. The non-linear variation of ΔG^* with concentration of pesticide confirms the observation of solute-solvent interaction.

INTRODUCTION

In our previous communication (1), the ultrasonic velocity of these pesticides has been studied and several parameters such as acoustic impedance, intermolecular free length, hydration number etc. have been evaluated in methanol at different temperatures. The present paper deals with the study of various physical properties such as solubility density and viscosity of these pesticides in methanol in order to have better understanding of these solutions.

EXPERIMENTAL

The organochloro pesticides were obtained from Hindustan Insecticides Ltd., Gurgaon (Haryana), India and purified by recrystallization in methanol. The melting points of pesticides are: Phosphamidon (120-123°C), 2,4-D Sodium salt (70-100°C) and Endosulphan (80-90°C). Methanol was distilled before its use.

The apparatus and procedure of solubility and viscosity measurements were the same as reported earlier (2, 3). Densities of solutions were measured by a pyrex dilatometer. The capacity of the reservoir was about 15 cm^3. The measuring section was in the form of a precisely bored graduated capillary tube. The apparatus was calibrated with conductivity water and the accuracy of results was checked by using test solutions of known density at 35°C.

The reproductibility of the solubility, density and viscosity data are +0.5%, +0.0002gcm^{-3} and !0.03% respectively. All the measurements were made at a constant temperature (±0.05°C) in a thermostat.

RESULTS AND DISCUSSION

Solubility. Solubility of pesticides increases with increase in temperature. The plots of solubility of pesticides vs. temperature **(Fig. 1)** show that the solubility of 2,4-D Sodium salt increases linearly with increase in temperature.
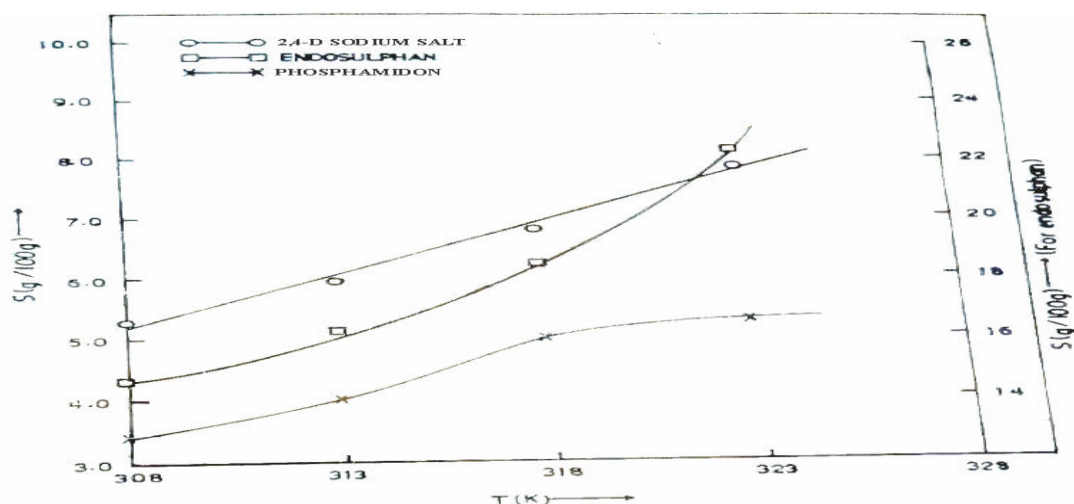
Fig. 1 — Plots of solubility S(g/100 g) vs. temperature (K) of Phosphamidon, 2,4–D Sodium salt and endosulphan

The solubility of endosulphan goes on increasing non-linearly with increase in temperature whereas Phosphamidon shows an abrupt change at 318K.

The apparent heat of solution, $-\Delta H_{sol}$ has been calculated (3) and the values found were : 27.32, 23.13 and 30.60 kJ mol^{-1}, respectively for Phosphamidon, 2,4-D Sodium salt and Endosulphan.

Since this process can be considered as an isothermal equilibrium reaction, the free energy, ΔG_{sol} is equal to zero. Therefore, the entropy of solution ΔS_{sol} can be calculated as follows:

$$\Delta S_{sol} = \frac{\Delta H_{sol}}{T} \qquad \cdots (1)$$

The values of $-\Delta S_{sol}$ are 88, 76 and 99 JK^{-1} mol^{-1}, respectively, for Phosphamidon, 2,4-D Sodium salt and Endosulphan.

Density. Density (g/cm^3) of pesticides increases with increase in concentration and the temperature of the solution. The plots of density vs. concentration are linear. The density data have been analysed using Roots' equation **(4)** which is represented as

$$d = d_0 + AC - BC^{3/2} \qquad \ldots (2)$$

where A is a measure of solute-solvent interaction and B refers to solute-solute interaction. The values of A and B have been obtained from the intercepts and slopes of the linear plots **(Fig. 2)** and are given in Table 1.

Table 1					
Values of A, B, ϕ_V° and S_v of pesticides in methanol					
Pesticides	Temp. (K)	A (Intercept)	B (Slope)	ϕ_V° (Intercept)	S_v (Slope)
2,4-D Sodium Salt	308	0.0451	0.0331	226.40	39.61
	313	0.0414	0.0305	231.90	37.66
	318	0.0381	0.0268	236.80	36.36
	323	0.0341	0.0233	244.00	31.16
Phosphamidon	308	0.0776	0.0296	285.4	58.6
	313	0.0740	0.0289	291.6	52.7
	318	0.0710	0.0248	298.0	46.8
	323	0.0661	0.0196	304.8	42.6
Endosulphan	308	0.1258	0.0246	369.40	98.6
	313	0.1180	0.0238	379.00	88.2
	318	0.1118	0.0206	387.60	84.6
	323	0.1046	0.174	396.80	81.5
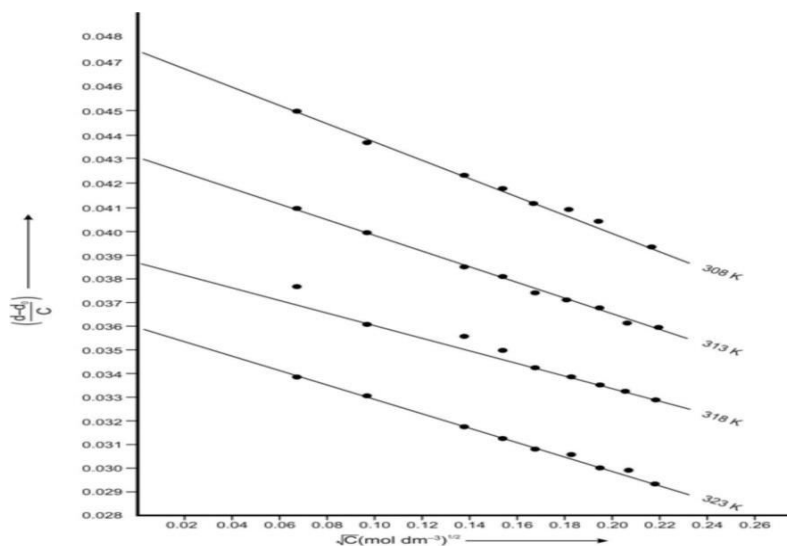
Fig. 2 – Plots of d-d$_0$/C vs. C$^{1/2}$ of 2,4-D Sodium Salt in methanol at different temperatures (308–323K)

The value of **constant 'A'** decreases and the slope of the plot i.e. **constant 'B'** also decrease with increase in temperature in all the three pesticides. This clearly indicates the sol vent interaction in the pesticide solution which decreases due to the effects on increasing temperature.**(5)**

Apparent molar volume, ϕ_v has been calculated and is found to obey the following equation**(6)**

$$\phi_c = \phi_V^{\circ} + S_V C^{1/2} \qquad \ldots(3)$$

Here ϕ_V°, the limiting apparent molar volume, is a measure of solute-solvent interaction and the experimental slope, S_v is the measure of solute-solute interaction. The values of ϕ_V° and S_v have been obtained **(Table 1)** from the linear plots of ϕ_v vs $C^{1/2}$. It is observed that ϕ_V° increases with increases in temperature but the values of S_v decrease with increase in temperature. This observation confirms the solute-solvent interaction in pesticide solution. The values of ϕ_V° at different temperatures for various pesticides are in the following order – Endosulphan > Phosphamidon > 2,4-D Sodium salt. The values of ϕ_V° and S_v also increase with increase in molecular weight of **Pesticides**.

Viscosity. The plots of viscosity vs. pesticide concentration are linear. Viscosity data of pesticide solutions in methanol have been satisfactorily represented in the wide range of concentration by the Vand**(7)** and Moulik**(8)** equations.

$$\text{Vand}(\mathbf{7}): \frac{1}{C} = (0.921 / \bar{V})^{-1} \ 1 / \log(\eta / \eta_0) + Q\bar{V} \qquad \ldots(4)$$

where $\bar{V}$ is the molar volume in $dm^3 mol^{-1}$ and Q is the interaction coefficient.

Moulik**(8)** : $(\eta/\eta_0)^2 = M + K'C^2 \qquad \ldots(5)$

where M and K´ are constants.

The values of molar volume, $\bar{V}$ have been calculated from the slope $(= \bar{V} / 0.921)$ of the plots of 1/C vs. $1/\log(\eta/\eta_0)$ and the results are given in Table 2. It has been observed that the value of $\bar{V}$ decreases with increasing temperature.

Table 2						
Viscosity parameters for organochloro pesticides in methanol						
Temp. (K)	Tested conc. Limit	Valid zone	$\bar{V}$	Q	M	K´
2,4-D Sodium Salt						
308	0.005-0.050	0.005-0.050	1.63	8.34	1.066	62
313	0.005-0.050	0.005-0.050	1.60	7.65	1.061	58
318	0.005-0.050	0.005-0.050	1.57	6.64	1.057	52
323	0.005-0.050	0.005-0.050	1.52	5.82	1.053	48
Phosphimidon						
308	0.005-0.050	0.005-0.050	1.74	9.19	1.075	70
313	0.005-0.050	0.005-0.050	1.69	8.28	1.073	65
318	0.005-0.050	0.005-0.050	1.64	7.32	1.070	61
323	0.005-0.050	0.005-0.050	1.59	6.29	1.064	53
Endosulphan						
308	0.005-0.050	0.005-0.050	1.78	11.24	1.078	72
313	0.005-0.050	0.005-0.050	1.75	10.57	1.076	69
318	0.005-0.050	0.005-0.050	1.71	10.23	1.074	64
323	0.005-0.050	0.005-0.050	1.63	9.51	1.072	58

A comparison of data shows that the values of $\overline{V}$ are in the following order: 2,4-D Sodium salt < Phosphamidon < Endosulphan.

The interaction coefficient Q, calculated from the intercept $(= Q\overline{V})$ decreases with increasing temperature.

It may be mentioned that Vand's equation contains perfectly defined parameters, $\overline{V}$ and the interaction coefficient, Q is only approximately obtained.**(9)** It appears that most probably Q is a specific property of a solute and it is not the general property.**(10)**

The value of constant M anf K´ is found to be decrease with temperature and increase with the molecular weight of pesticides.

Jones-Dole equation**(11)**:

$$\eta_{sp} / C^{1/2} = A + BC^{1/2} \qquad \ldots(6)$$

The values of intercept A and slopes B refer to the solute-solute and solute-solvent interaction, respectively. The slope B decreases slightly with increase in temperature but increase with increase in molecular weight of pesticides (Table 3).

Table 3			
Values of constant B of pesticides in methanol at different temperatures obtained from Jones-Dole equation			
Temperature	2,4-D Sodium salt	Phosphamidon	Endosulphan
308	1.278	1.375	1.425
313	1.2004	1.300	1.400
318	1.183	1.225	1.350
323	1.169	1.175	1.300

Plotting log η vs. 1/T, straight lines are obtained which show that the viscosity temperature function can be expressed by the Arrhenius equation :

$$1 / \eta = Ae^{E_\phi/RT} \qquad \ldots(7)$$

where A and E₋ are the Arrhenius coefficient and activation energy of viscous flow.

The values E₋ (=ΔH*) have been calculated from the linear plots of –log η vs. 1/T. It is observed that activation energy of viscous flow increases with increase in pesticide concentration, it may be pointed out that ΔH* measures energy barrier to fluid motion and the increase in –ΔH* with concentration indicates less fluidity. The values of –ΔH* are in the following order : 2,4-D Sodium salt < Phosphamidon < Endosulphan. The values of ΔH* increase with increase in molecular weight of pesticides.

The temperature dependence of 1/η (fluidity) has also been evaluated according to the theory of absolute reaction rates in terms of the Eyring equation.**(12)**
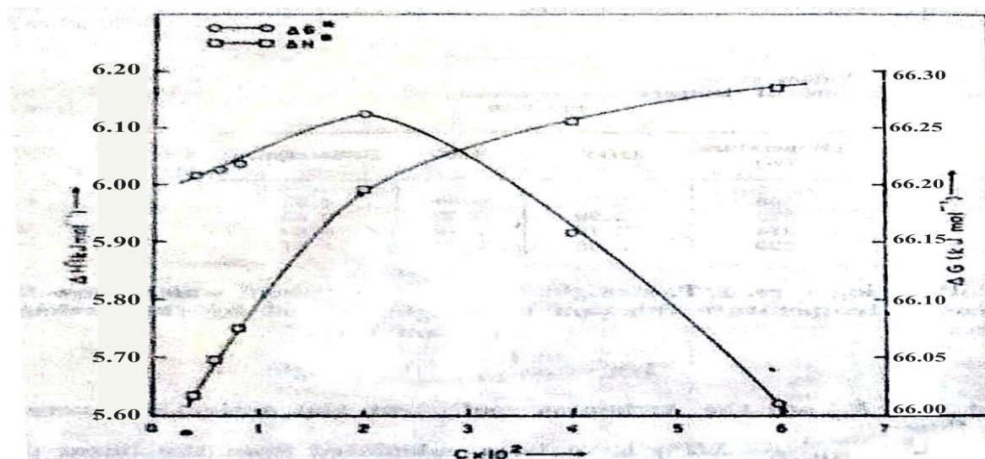
Fig. 3 – Plots of ΔH* and ΔG* vs. concentration of 2,4-D Sodium Salt at 308K

$$1/\eta = (V/hN)\exp(-\Delta H^*/RT)\exp(\Delta S^*/R) \qquad \ldots(8)$$

where V is the molar volume of the solvent, R is the gas constant in cal. deg^{-1} mol^{-1}, T is the absolute temperature and η is the viscosity in poise. N and h are the Avogadro number and Planck's constant respectively. ΔS^* and ΔG^* are the activation entropy and free energy of viscous flow, respectively. ΔG^* is calculated from **Gibbs equation** at 308K.

$$\Delta G^* = \Delta H^* - T\Delta S^*$$

The entropy $-\Delta S^*$ increase with increase in concentration, the free entropy ΔG^* decrease with increase in concentration. When temperature increases, $-\Delta S^*$ and ΔG^* increases. Since ΔG^* controls the rate of flow in the fluid process, the non-linear variation of ΔG^* with concentration of added pesticide becomes the indicative of the formation of solute-solvent aggregate **(13)** as the principle kinetic entity. Thus, the non-linear behaviour of ΔG^* (Fig. 3) confirms the solute-solvent interaction in the pesticide solutions in methanol.

Measurements of densities, ultrasonic velocities and viscosities has been carried out for binary mixtures of 2-methylAniline with 1-alcohols (1-propanol, 1-butanol, 1-pentanol, 1-hexanol, 1-heptanol, 1-octanol) and their pure liquids at 298.15K and 308.15K. **(14)** The experimental results have been used to discuss the nature of interaction between unlikes molecules in terms of hydrogen bonding, dipole-dipole interaction, specific-acid-base-interaction and dispersive foces. Ultrasonic velocity, density and viscosity of binary liquid mixtures of Acetone with Toluene, Chlorobenzene and nitrobenzene measured at 303K. (15) The studies on ultrasonic velocity, density and viscosity in binary liquid mixtures have been used to evaluate the different thermo acoustical parameters along with the excess properties for these parameters molecular interaction such as existence of strong molecular association and weak interaction among the liquids has been observed in present study. Studies of ultrasonic velocities and acoustic paramenters of trifloxystrobin at various concentration in ethanol-water system have been measured at 300K by using single crystal interferometer at a frequency of 3MHz. By using velocity, density, viscosity and concentration data various acoustic parameters are calculated and the result are interpreted in terms of solvents-solute and solute-solute interaction. (16)

Table 4				
Density and viscosity values of 2,4-D Sodium salt in methanol				
Conc.	Density		Viscosity	
	308K	318K	308K	318K
0.005	0.7786	0.7708	4.702	4.214
0.010	0.7788	0.7710	4.728	4.236
0.015	0.7792	0.7713	4.757	4.261
0.020	0.7794	0.7714	4.779	4.284
0.025	0.7796	0.7716	4.814	4.308
0.030	0.7798	0.7717	4.842	4.329
0.035	0.7799	0.7719	4.857	4.352
0.040	0.7801	0.7720	4.904	4.374
0.045	0.7803	0.7722	4.936	4.398
0.050			4.962	4.422

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Predicting Pyrazinecarboxamides Derivatives as an Herbicidal Agent: 3D Qsar by KNN-MFA and Multiple Linear Regression Approach

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ABSTRACT

Three dimensional quantitative structure-activity relationship (3D-QSAR) studies have been performed on a series of Pyrazinecarboxamides derivatives using the multiple linear regression method and kNN-MFA Approach (k-nearest neighbour molecular field analysis). The QSAR models were generated using 19 compounds. By using kNN-MFA approach, various 3D QSAR models were generated to study the effect of steric, electrostatic and hydrophobic descriptors on herbicidal activity. The kNN-MFA model generated from template based alignment showed q^2 (cross validated r^2) of 0.6161 and pred_r^2 of 0.8373 with four descriptors namely S_589, E_268, E_598 and E_539. The number nearest neighbours K of two was observed with this model. The multiple linear regression model showed a non cross validated r^2 of 0.9747, cross validated r^2 (q^2) of 0.9386, F value of 69.3490 and exhibited good external prediction r^2_pred of 0.7130. The descriptors contributing to the activity according to this model are E_539, E_510, E_385, S_677, S_264. The generated models provide insight into the influence of various interactive fields on the activity and, thus, can help in designing and forecasting the herbicidal activity of novel molecules.

Keywords: Pyrazinecarboxamides.3D QSAR. kNN-MFA, Multiple linear regression (MLR), Herbicidal.

INTRODUCTION

Herbicides are inhibitors of individual metabolic processes in plants, used in agriculture as a selective means of defence against weeds. Weeds compete with crops for sunshine, water, nutrients, and physical space and are thus capable of greatly influencing the growth of crops and undermining both crop quality and yield. Also, many weeds are the harbor or nest of pathogens, viruses, and pests, which may result in the occurrence and spread of plant diseases and insect pests in crops. Herbicides, as the main weed control tool, play a very important role in modern agriculture. Crop protection continually needs the discovery of novel herbicides. The agrochemical industry has successfully developed a wide array of herbicides with various chemical structures and modes of action [1]. However; an inevitable problem associated with the use of herbicides is the occurrence of herbicide resistant weeds [2]. Therefore, it is necessary to develop efficient herbicides with novel structures or modes of action to overcome the resistance of weeds. Analogues of pyrazinecarboxamides belong to the group of herbicides inhibiting the photosynthetic electron transport in spinch chloroplast. On the other hand, the pyrazinamide ring system has received much attention in biologically active molecules, such as potent inhibitors of mycobacterium and fungi.

In the present study we have performed the 3D QSAR analysis on a series of Pyrazine 2-Carboxamide derivatives using software Vlife MDS 4.1 version (Molecular Design Suite). There are numerous methods for performing 3D QSAR but most popular methods are comparative molecular field analysis CoMFA and antagonist's activity of the respective compounds under comparative molecular similarity analysis [3, 4].

Recently, the chloroplast obstruction drugs like pyrazine- 2-carboxamide analogues have got much importance as they are eco-friendly and have no toxicity for human being [5]. It was found that the herbicidal activity was concerned with inhibition of oxygen evolution rate (OER) in photosynthesis by pyrazine-2-carboxamide analogues [7]. The aim of this work is to find the structure activity relationship in the mentioned series, i.e. to continue the study of the substituent variability influence on the photosynthesis inhibiting or herbicidal activities, and to determine the importance of increased hydro/lipophilic properties for biological effect of the newly prepared substituted pyrazinecarboxamides.

The steps involved in 3D-QSAR studies are data selection, descriptor evaluation, structure alignment, selection of training and test set, variable selection, statistical methods, model evaluation and model interpretation. In the present study, we have reported Multiple linear regression method and the development of a new method (kNN-MFA) that adopts a k-nearest neighbor principle [6] for generating relationships of molecular fields with the

experimentally reported activity to provide further insight into the key structural features required to design potential drug candidates of this class.
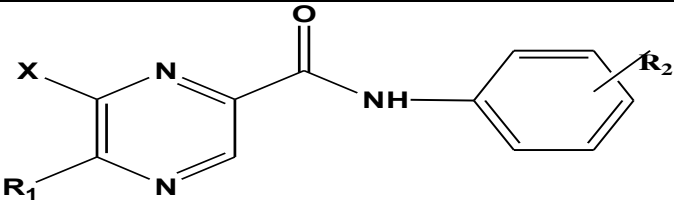
MATERIALS AND METHODS:
DATA SET:

The biological data used in this study are the OER (oxygen evolution rate) inhibition i.e inhibition of photosynthetic electron transport in spinach chloroplastsin (IC_{50}) of a series of pyrazine-2-corboxylic acid amides derivative. The synthesis and determination of the activity of these compounds have already been reported in literature [7]. Their study indicated that the pyrazinecarboxylic acid derivatives are interested in binuclear analogue with the –CO-NH bridge for herbicidal activity [8-10]. The general structure of these analogues and list of the structural features with herbicidal activity of the respective compounds under study is reported in Table 1. The biological data was converted to logarithmic scale (pIC_{50}) in mathematical operation mode of software to reduce skewness of data set and then used for subsequent 3D QSAR analysis as dependent variables.

METHODOLOGY:

The 3D-QSAR computations were carried out on VLife MDS 4.1 molecular modelling software [11]. The structure of each compound was drawn in 2D application mode of software and converted to 3D structure using the software. The molecular geometry is optimized using Monte Carlo conformational search [12], MMFF fields [13] and Gasteiger-Marsili charges followed by AM-1 (Austin Model-1). Hamiltonian method available with the software with the convergence criterion of 0.001 kcal/mol $A^°$. The position of each atom is important for kNN-MFA study because the descriptors calculation is based on the 3D-space grid. Thus, the method to determine the conformation of each molecule and the way to align molecules together are two sensitive input parameters to build a reasonable model. We hereby report the models, as generated by kNN-MFA in conjunction with stepwise (SW) forward-backward variable selection methods. In the kNN-MFA method, several models were generated for the selected members of training and test sets and the corresponding best models are reported herein. The variable selection methods along with the corresponding parameters are allowed to be chosen and optimum models are generated by maximizing q^2. K-nearest neighbor molecular field analysis (kNN-MFA) requires suitable alignment of given set of molecules. This is followed by generation of a common rectangular grid around the molecules. The steric and electrostatic interaction energies are computed at the lattice points of the grid using a methyl probe of charge +1. These interaction energy values are considered for relationship generation and utilized as descriptors to decide nearness between molecules. The term descriptor is utilized in the following discussion to indicate field values at the lattice points. The optimal training and test sets were generated using the Random data selection method. This method allows the software itself for construction of training and test sets. Once the training and test sets were generated, kNN methodology was applied to the descriptors generated over the grid. To derive the kNN-MFA descriptor fields, a 3D cubic lattice with grid spacing of 2 $A^°$ in x, y and z dimensions was created to encompass the aligned molecules. kNN-MFA descriptors were calculated using an sp3 carbon probe atom with a van der Waals radius of 1.52 A° and a charge of 1.0 with default cut-off energy 30 kcal/mol to generate steric field energies and electrostatic fields. The steric and electrostatic energy values were truncated at a default value of ±30 kcal/mol. The kNN-MFA steric and electrostatic fields thus generated were scaled by the standard method in the software.

Table 1: Structure and activities of Pyrazinecarboxamides Derivatives

Compounds	X	R$_1$	R$_2$	IC$_{50}$ (µmol/L)
1.	H	H	2-Cl-5-OH	722
2.	H	H	4-F	480
3.	H	H	2-CF$_3$	376
4.	H	H	3-CF$_3$	130
5.	H	H	4-CH$_3$	1475
6.	Cl	H	2-Cl-5-OH	624
7.	Cl	H	4-F	384
8.	Cl	H	2-CF$_3$	557

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9.	Cl	H	3-CF$_3$	229
10.	Cl	H	4-CH$_3$	1524
11.	H	(CH3)$_3$C	4-F	524
12.	H	(CH3)$_3$C	2-CF$_3$	55
13.	H	(CH3)$_3$C	3-CF$_3$	283
14.	H	(CH3)$_3$C	4-CH$_3$	164
15.	Cl	(CH3)$_3$C	2-Cl-5-OH	625
16.	Cl	(CH3)$_3$C	4-F	103
17.	Cl	(CH3)$_3$C	2-CF$_3$	205
18.	Cl	(CH3)$_3$C	3-CF$_3$	173
19.	Cl	(CH3)$_3$C	4-CH$_3$	73

Alignment Procedure:

In general, geometric similarity should exist between the modelled structures and the bioactive conformation for 3D QSAR. The spatial alignment of compounds under study is thus one of the most sensitive and determining factors in obtaining a reliable model also it is used to visualize the structural diversity in the given set of molecules. Alignment of all 19 compounds was done using the template-based alignment in MDS 4.1. The aligned structures were used for the study. This was followed by generation of common rectangular grid around the molecules. The template structure i.e. unsubstituted pyridazinecarboxamide was used for alignment by considering the common elements of the series as shown in Fig.1. The reference molecule 12 is chosen with highest herbicidal effect which made it a valid lead molecule and therefore was chosen as a reference molecule. After optimizing, the template structure and the reference molecule were used to superimpose all molecules from the series using the template alignment method (Fig. 2).
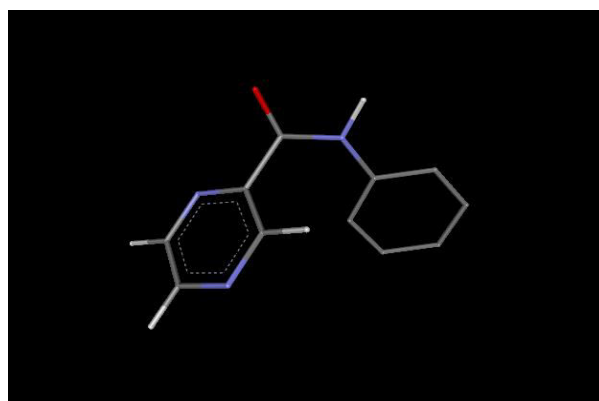
Fig. 1: Template Structure
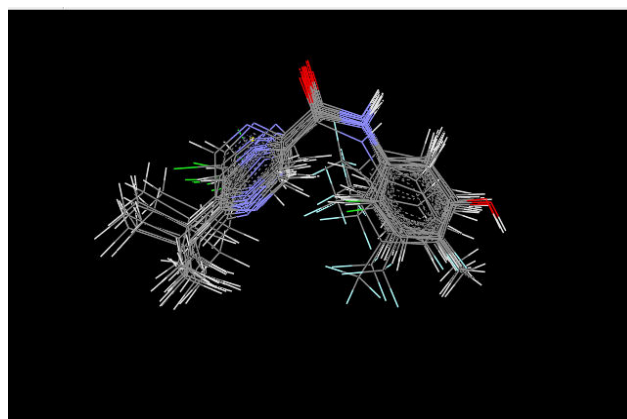
Fig. 2: Template-based alignment of molecules

CALCULATION OF DESCRIPTORS

For calculation of field descriptor values, using Tripos force field both electrostatic and steric field type with cut offs 10.0 and 30.0 Kcal/mol respectively were selected and charge type was selected as Gasteiger-Marsili .Dielectric constant was set to 1.0 considering the distance dependent dielectric function. Grid setting was done using methyl probe having charge +1.0. The 3D cubic lattice points with grid setting are shown in Table 2. This resulted in calculation of field descriptors (electrostatic, hydrophobic and steric) for all the compounds in

separate columns. Table 4 shows the descriptors which are used in generation of models. QSAR analysis was performed after removal of all the invariable columns, as they do not contribute to QSAR. The optimal test and training data set were generated using random selection method in which the software itself selects the test set molecules by entering the percentage of training set molecules to be selected. In this method selection of four compounds as test set and remaining others as training set was done. The kNN-MFA and Multiple linear regression technique were used to derive 3D-QSAR models of pyrazine 2- carboxamides derivatives as an herbicidal agent.

Table 2: Probe setting

	From	To	Interval
X	-9.98536	11.2052	2.000
Y	-8.82849	8.92967	2.000
Z	-8.53851	8.51738	2.000

Building K-Nearest-Neighbor (kNN-MFA) Models:

In the kNN algorithm, to classify a new pattern (molecule), the system finds the kNN among the training set.The kNN methodology relies on a simple distance learning approach whereby an unknown member is classified according to the majority of its kNN in training set. The nearness is measured by an appropriate distance metric (e.g. a molecular similarity measure, calculated using descriptors of molecular structures). Since there was a large pool of descriptors available to build models, stepwise variable selection methods were used along with kNN to find optimal subset of descriptors for the kNN-MFA model. Once the training and test sets are generated, kNN methodology is applied to the descriptors generated over the grid. The steric and electrostatic interaction energies are computed at the lattice points of the grid using a methyl probe of charge +1. The optimum models are shown in table 3a.

Table 3a: Best five models generated by KNN-MFA method

TRIAL	TEST SET MOLECULES	KNN	q^2	$Pred\_r^2$	$q^{2\,se}$	$Pred\_r^{2\,se}$	DOF
1	1,7,8,10,12	2	0.5678	0.6059	0.2358	0.3597	9
2	8,12,16	4	0.6753	0.5042	0.2091	0.4977	11
3	1,9,14,19	5	0.6177	0.5176	0.2499	0.3354	11
4	4,6,7,8	2	0.6161	0.8373	0.2689	0.1309	10
5	9,13,14,18,19	4	0.6339	0.7886	0.2518	0.2146	9

Bulding Multiple linear regression models:

MLR is a method used for modeling linear relationship between a dependent variable Y (pEC_{50}) and independent variable X (3D descriptors). MLR is based on least squares: the model is fit such that sum-of-squares of differences of observed and a predicted value is minimized. MLR estimates values of regression coefficients (r^2) by applying least squares curve fitting method. The model creates a relationship in the form of a straight line (linear) that best approximates all the individual data points. In regression analysis, conditional mean of dependant variable (pEC_{50}) Y depends on (descriptors) X. MLR analysis extends this idea to include more than one independent variable.

Regression equation takes the form

$Y = b1 * x1 + b2 * x2 + b3 * x3 + c$

Where Y is dependent variable, 'b's are regression coefficients for corresponding 'x's (independent variable), 'c' is a regression constant or intercept [14, 15].

The molecules are divided into training and test set using random data selection method. Once this is done MLR methodology is used to build the model using stepwise forward- backward variable selection method. The optimum models are shown in table 3b.

Table 3b: Best five models generated by multiple linear regressions (MLR)

TRIAL	TEST SET MOLECULES	r^2	q^2	$Pred\_r^2$	r^2 se	$q^{2\,se}$	$Pred\_r^2$ se	F TEST
1	4,11,12,13,19	0.9531	0.9218	0.3530	0.0912	0.1179	0.5075	45.7689
2	4,5,6,8	0.7356	0.6526	0.4508	0.2176	0.2494	0.3965	16.6888
3	6,12,17,19	0.9747	0.9386	0.7130	0.0701	0.1091	0.3577	69.3490
4	1,3,7,16,18,19	0.8090	0.7091	0.5452	0.1978	0.2440	0.2984	21.1749
5	8,10,11,14	0.8506	0.7755	0.4045	0.1741	0.2134	0.3939	20.8707

Step-Wise Variable Selection Method (SW):

The k-NN MFA and MLR models were developed using step-wise forward- backward method with cross correlation limit set to 0.5 and term selection criteria as q^2. Fischer value 'in' was set to 4.0 and 'out' to 3.99. Fischer's value (F), which represents F-ratio between the variance of calculated and observed activity and chance statistics assuring that the results are not merely based on chance correlations. Best models were selected on the basis of their statistical significance and F-test. As some additional parameters, variance cut-off was set as 2 Kcal/mol and scaling and auto scaling, additionally the k-nearest neighbour parameter setting was done within the range of 2-5 and prediction method was selected as distance based weight average.

METHOD OF VALIDATION:

The following statistical parameters were considered for comparison of the generated QSAR models: correlation coefficient (r), squared correlation coefficient (r^2), predictive r^2 for external test set (pred_r^2) for external validation.

The best way to evaluate quality of regression model is internal validation of QSAR model. Mostly leave-one-out (LOO) cross validation, one object (one biological activity value) is eliminated from training set and training dataset is divided into subsets (number of subsets = number of data points) of equal size. Model is build using these subsets and dependent variable value of the data point that was not included in the subset is determined, which is a predicted value. Mean of predicted will be same for r^2 and LOO q^2 (cross-validated correlation coefficient value) since all the data point will be sequentially considered as predicted in LOO subset. Same procedure is repeated after elimination of another object until all objects have been eliminated once.

Definitive validity of model is examined by mean of external validation also, which evaluates how well equation generalizes. Training set is used to derive an adjustment model that is used after to predict activities of test set members. The predicted power of equations was validated using cross-validated squared correlation coefficient (q^2) and by predictive squared correlation coefficients pred_r^2 which is used as a diagnostic tool.

The predicted r^2 (pred_r^2) [4] value was calculated using Eq.1, where y and yˆ are the actual and predicted activities of the ith molecule in the test set, respectively and y is the average activity of all mean molecules in the training set. Both summations are over all molecules in the test set. The pred_r^2 value indicates the predictive power of the current model for the external test set as follows:

$$pred\_r^2 = 1 - \frac{\Sigma(y_i - \hat{y}_i)^2}{\Sigma(y_i - y_{mean})^2} \qquad\qquad 1$$

To validate the generated QSAR models, the leave one- out method was used, indicated as the value of q^2 (cross-validated explained variance), which is a measure for the internal predictive ability of the model. The cross validation run returns the optimum number of components for which it has the maximum cross-validated r^2 (q^2) values and the minimum standard error of the prediction pred_r^{2se}. The cross-validated r^2 (q^2) value was calculated using Eq. 2, where y and yˆ are, respectively, the actual and predicted activities of the ith molecule and y is the average activity of all the molecules in the training set.

Both summations are over all the molecules in the training set. Because the calculation of the pair wise molecular similarities and hence the predictions, were based on the current trial solution, the q obtained indicates the predictive power of the current model.

$$q^2 = 1 - \frac{\Sigma(y_i - \hat{y}_i)^2}{\Sigma(y_i - y_{mean})^2}$$

2

RESULTS AND DISCUSSION:

Selecting training and test set by spherical exclusion method, Unicolumn statics shows that the max of the test is less than max of train set and the min of the test set is greater than of train set which is prerequisite analysis for further QSAR study. The above result shows that the test is interpolative i.e. derived within the min-max range of the train set. The mean and standard deviation of the train and test provides insight to the relative difference of mean and point density distribution of the two sets. In this case the mean in the test set higher than the train set shows the presence of relatively more active molecules compared to the inactive ones. Also the similar standard deviation in both set indicates that the spread in both the set with their respective mean is comparable. The activity were converted to $-\log IC_{50}$, was used as dependant variable. Relative alignment of all the energy minimized molecules was then carried out by using two techniques namely atom and template based for better results and better assessment between both. The kNN-MFA models were generated by using test set of four compounds and remaining compound using a trainingt set. Newly reported method k Nearest Neighbor

Molecular Field Analysis (kNN-MFA) adopts a k-Nearest Neighbor principle for generating relationship of molecular fields with the experimentally reported activity. This method utilizes the active analogue principle that lies at the foundation of medicinal chemistry [16-18]. 3D QSAR the kNN-MFA of pyrazinecarboxamode derivatives with reported herbicidal activity was performed, stepwise variable selection method resulted in several statistically significant models, of which corresponding best model 1 and 2 is reported herein. The model selection criteria being the value of q^2, the internal predictive ability of the model and that of pred_r^2, the ability of model to predict the activity of external test set. As cross-validated correlation coefficient (q^2) is used as a measure of reliability of prediction, the correlation coefficient suggests that our model is reliable and accurate. The predicted versus the experimental selectivity values for the training and test sets are depicted in (Fig.4a, 4b, 5a and 5b). Thus, our model displays good predictivity in regular cross validation.

Model 1: KNN-MFA method

pIC_{50} = -0.3004 (S_589) -0.1347 (E_268) + 1.4132(E_598) + + 0.4334 (E_539)

K Nearest Neighbour = 2, N= 15, Training Set Size = 15, Test Set Size = 4, Degree of Freedom = 10, q^2 = 0.6161, $q^{2\ se}$ = 0.2689, pred_ r^2 = 0.8373, pred_ r^{2se} = 0.1309.

Selected descriptors: S_589, E_268, E_598, E_539

For 3D QSAR a kNN-MFA of Pyrazinecarboxamides derivatives with reported herbicidal activities was performed. The stepwise variable selection method resulted in several statistically significant models, of which the corresponding best model is reported herein. The model selection criterion is the value of q^2, the internal predictive ability of the model and that of pred_r^2, the ability of the model to predict the activity of external test set.Model-1 (Fig.3a) the template based alignment shows a q^2 (cross validated r^2) of 0.6161 with four descriptors namely S_589, E_268, E_598 and E_539.Steric and electrostatic field energy of interactions between probe (-CH$_3$) and compounds at their corresponding spatial grid points of 589,268,598 and 539. Best QSAR model leads us to explain the effect of steric and electrostatic fields on different substituents of pyrazinecarboxamides moiety. Number nearest neighbors *k* of 2 were observed with this model. i.e. two values are proved statistically significant and exhibited good external prediction with r^2_pred of 0.8373. The external predictability of the QSAR models generated on test sets is characterized by pred_r^2 and pred_r^2se. The standard error value is very less i.e 0.1309 which shows the high acceptance crieteria of the model. In Model 1 the steric and electrostatic points considered is shown in the figure (3a) given above and it is observed that electrostatic field with positive coefficient (E_268) is far from the Pyrazinecarboxamides structure and possibly it has hardly any effect on the substituent nature. However presence of electrostatic field with positive coefficient (E_598) suggests that electro-positive substituent (electron withdrawing groups like halogen moiety) may be favorable on the R$_2$ position of ring for producing better herbicidal activity. Electrostatic descriptor with positive coefficient (E_539) (R$_2$) positions of the pyrazinecarboxamide ring corroborates that positive electrostatic potential is favorable for increase in the activity and hence less electronegative groups are preferred in this positions. Steric descriptors with negative coefficients such as S_589 at R$_2$ position of the pyrazinecarboxamides ring suggest that the favourability of less bulky groups in these regions for producing potent herbicidal compounds.

The plot of observed versus predicted activities for the training and test compounds is represented in Fig. 4a and 5a. The model is statistically significant as all the points are very close to regression line (Fig.4a). Also the software graphs (Fig. 5a) shows that there is a perfect fit in the values of experimental and predicted activities for training and test set compounds. From Table 5 it is evident that the predicted activities of all the compounds in the test set are in good agreement with their corresponding experimental activities and optimal fit is obtained.
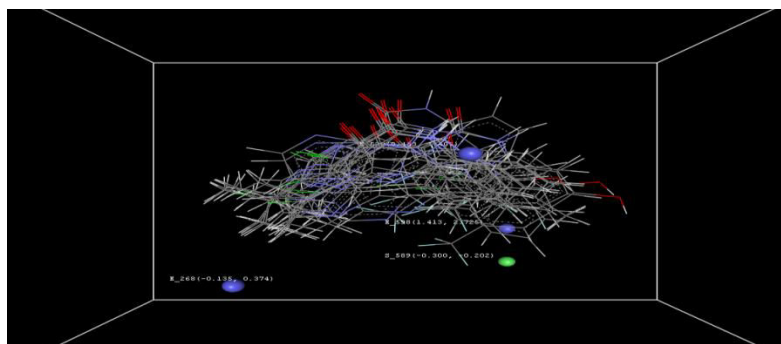
Fig. 3a: Contour plots of model obtained by kNN-MFA Method Model 1
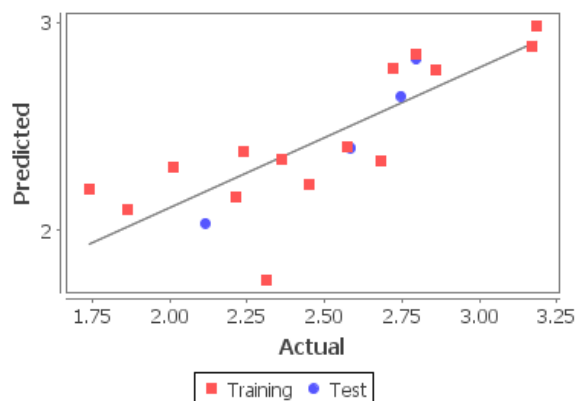
Fig. 4a: Actual versus predicted activities according to the model 1

Training set   **Test set**
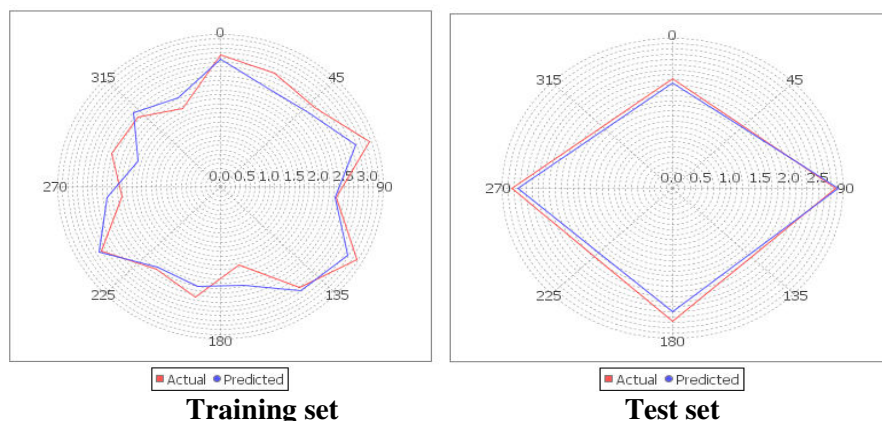
Fig. 5a: Software graph of Actual versus predicted activities according to the model 1

Model 2: Multiple linear regression method

pIC_{50} = -0.3485(E_539) + 0.2327 (E_510) – 0.0528(E_385)- 4.6514 (S_677)- 1.1917(S_264) + 2.3817

N= 15, Training Set Size = 15, Test Set Size = 4, Degree of Freedom = 9, F test = 69.3490 r^2= 0.9747, q^2 =0.9386, r^2 se= 0.0701, q^2 se =0.1091, pred_ r^2 = 0.71300, pred_ r^{2se} = 0.3577

Alpha Rand Q^2 =0.0000, alpha Rand Pred R^2 = 0.0000

Selected descriptors: E_539, E_510, E_385, S_677, S_264.

For 3D QSAR a Multiple linear regression of Pyrazinecarboxamides derivatives with reported herbicidal activity was performed. The stepwise forward backward variable selection method resulted in several statistically significant models, of which the corresponding best model is reported herein.

The model selection criterion is the value of q^2, the internal predictive ability of the model and that of pred_r^2, the ability of the model to predict the activity of external test set.Model-2, (Fig. 3b) the template based alignment shows a q^2 (cross validated r^2) of 0.9386 with five descriptors namely E_539, E_510, E_385, S_677, S_264.Steric and electrostatic field energy of interactions between probe (CH) and compounds at their corresponding spatial grid points of 539,510,385, 677 and 264. Based QSAR model leads us to explain the effect of steric and electrostatic fields on different substituents of pyrazinecarboxamides moiety.

In the QSAR model 2, a non-cross-validated r^2 of 0.9747 with r^2_pred of 0.7130 proves that all the values are statistically significant and exhibited good external prediction. Statistical significance of the model is further indicated by F test value. The F test value of 69.3490 is observed which is far greater than the tabulated value which means the probability of failure of the model is 1 in 10,000. The low standard error of r^2_se =0.0701 demonstrates accuracy of the model and low q^2_se = 0.1091 value reflect good internal predictive power of the model. The external predictability of the QSAR models generated on test sets is characterized by pred_r^2 and pred_r^2se. Also the randomization test showing value as 0.000 proves that the model is not random and hence chosen as best model.

Model 2 the steric and electrostatic points considered is shown in the figure (2) given above and it is observed that electrostatic field with positive coefficient (E_510) is far from the pyrazinecarboxamide structure and possibly it has hardly any effect on the substituent nature. However presence of electrostatic field with negative

coefficient (E_539) suggests that electro-negative substituent (electron donating groups) may be favourable on the R_2 position of ring for producing better herbicidal activity. Electrostatic descriptor with negative coefficient (E_385) (X) position of the pyrazinecarboxamide ring corroborates that electronegative groups (electron donating) are preferred in this positions. Steric descriptors with negative coefficients such as S_264 at R_1 position of the ring suggest that the favourability of less bulky groups in these regions for producing potent herbicidal compounds. Negative coefficient of steric descriptor S_677 at R_2 position of the ring suggest that the favourability of less bulky groups in these regions for producing potent compounds. The plot of observed versus predicted activities for the training and test compounds is represented in Fig. 4b and 5b. From Table 5 it is evident that the predicted activities of all the compounds in the test set are in good agreement with their corresponding experimental activities and optimal fit is obtained. The former descriptor contributes 80 % and the later contributes 20 % towards activity.
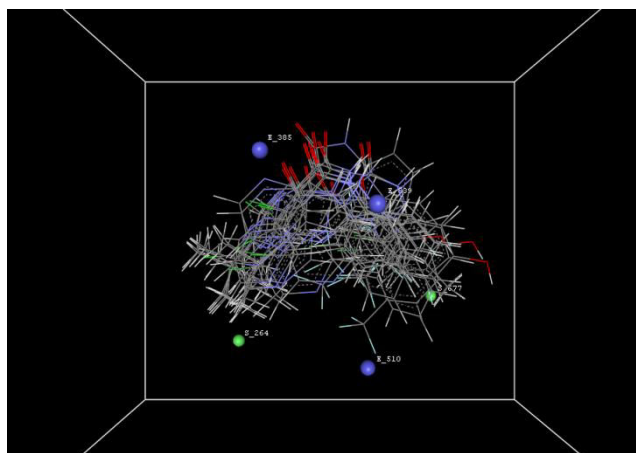
Fig. 3b: Contour plots of model obtained by Multiple Linear Regression Method Model-2
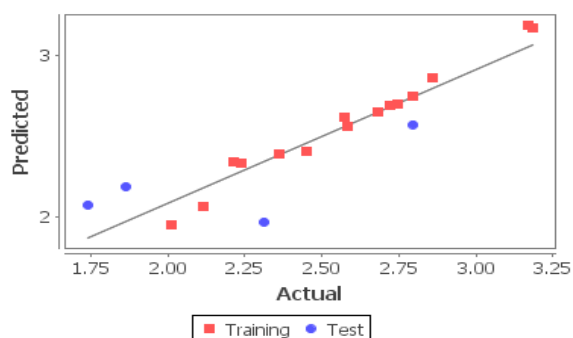
Fig. 4b: Actual versus predicted activities according to the model- 2

| Training set | Test set |
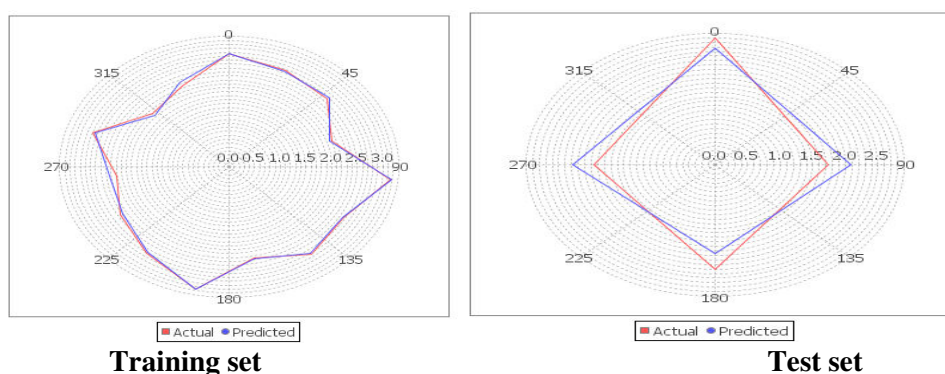
Fig. 5b: Software graph of Actual versus predicted activities according to the model- 2

Table 4: 3D descriptors required for herbicidal activity

S_589	E_268	E_598	E_539	E_539	E_510	E_385	S_677	S_264
-0.31563	2.689	8.19275	0.9061	0.9061	0.678834	-7.6971	-0.039104	-0.039975
0.10277	1.7919	-10	1.5654	1.5654	-0.07257	-10	-0.05501	-0.038033
-0.41320	-0.0250	0.8501	2.39529	2.3952	3.303055	-0.979794	-0.03489	-0.07670
-0.3889	0.23771	6.2472	1.6559	1.6559	-1.20254	-3.7546	-0.049547	-0.096114

-0.20234	0.37354	1.4132	0.43336	0.4333	-0.08208	-10	-0.089503	-0.029812
-0.29176	1.7813	10	1.3105	1.31050	0.2418886	-4.9839	-0.06268	-0.031872
-0.06957	1.9462	-10	1.874030	1.8740	0.11733	-10	-0.04844	-0.042807
2.52223	0.5701	-1.287	2.16703	2.16703	2.71102	-1.1136	-0.062980	-0.079041
30	0.84081	10	1.1119	1.11198	-1.544564	-1.75735	-0.1289574	-0.0535
-0.0865	0.5712	1.4686	-0.42558	-0.42558	0.5489055	-3.8493	-0.063521	-0.014747
-0.1741	0.05469	-3.0296	1.581102	1.581102	-0.010485	-7.5378	-0.045717	-0.214863
-0.23761	0.10965	2.4838	3.415	3.415462	1.4933	-0.35741	-0.040603	-0.276024
8.82802	-0.129	-7.1327	2.1592	2.15921	0.04151	-2.8473	-0.080967	-0.200873
-0.30043	-0.1346	2.7253	1.40685	1.40685	0.02348	-4.258761	-0.0372765	-0.0417
-0.32199	1.0998	9.9338	0.835741	0.83574	1.319955	-0.6041	-0.06002	-0.032564
7.02426	1.1566	-10	2.598	2.59859	0.24361	-0.295399	-0.07894	-0.033762
-0.2368	0.3340	2.8147	3.7339	3.7339	1.698458	-0.1739	-0.03959	-0.25268
7.85100	0.1335	-7.4915	2.53128	2.5312	0.399894	-2.89791	-0.083020	-0.171587
-0.28987	0.1089	2.8622	1.8150	1.81501	0.25831	-4.51590	-0.03833	0.031245

Table 5: Actual and predicted activities of statistically significant models

ACTUAL ACTIVITY	PREDICTED ACTIVITY KNN MFA MODEL 1	PREDICTED ACTIVITY MLR MODEL 2
2.85853	2.77186	2.86002
2.68124	2.33754	2.64869
2.57518	2.40055	2.62108
2.11394	2.03482	2.068024
3.16879	2.88761	3.191669
2.79518	2.82594	2.574111
2.58433	2.39864	2.560498
2.74585	2.64723	2.70334
2.35983	2.34492	2.391116
3.18298	2.98761	3.174168
2.71933	2.7818	2.695102
1.74036	2.20261	2.075547
2.45178	2.22118	2.405227
2.21484	2.1611	2.344973
2.795880	2.8508	2.747535
2.012837	2.30355	1.95575
2.311753	1.76426	1.9701
2.23804	2.38381	2.336276
1.86332	2.10079	2.188861

CONCLUSION

The 3D-QSAR study of pyrazinecarboxamide derivatives which inhibits with herbicidal activity was carried out using kNN-MFA and Multiple linear regression method with the template base alignment methods. We find that the models generated are statistically significant also it showed good correlation with biological and predictive ability. Steric and electrostatic fields were found important for herbicidal activity as exemplified by the higher predictive power of the 3D QSAR models. The effects of the steric field around the aligned molecules on their activities are clarified by analyzing the models. The information obtained in this study provides the tools for predicting the affinity values of structurally similar analogs and for guiding further structural modifications and synthesizing potent herbicidal activity. The developed QSAR models allow for an understanding the molecular properties/features that play an important role in governing the variation in the activities. In addition, this 3D QSAR study allowed investigating the influence of simple and easy to compute descriptors in determining biological activities that could highlight the key factors and may aid in the design of novel and potent molecules.

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Development and Characterization of Tenofovir Dixoproxil Fumarate Loaded Nanoparticles

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ABSTRACT

Nanotechnology is the science and technology of precise manipulation in the materials, devices or systems at nano meter scale. Nanoparticulate drug delivery systems have gained a lot of attention because of their size-dependent properties. Nanoparticles have been extensively utilized in enhancing the oral bioavailability of different classes of drugs having low solubility, poor permeation and chemical instability. Tenofovir Disoproxil Fumarate is a nucleotide reverse transcriptase inhibitor, which is used for the treatment of HIV-AIDS, Hepatitis B. The main objective of study is to develop the Tenofovir Disoproxil Fumarate loaded polymeric nanoparticle. The rational for selection of Polymeric nanoparticles as the target approach to resolve the underlying problem of Tenofovir Disoproxil Fumarate like Enhancement of bioavailability of the incorporated drugs, particle size. Tenofovir Disoproxil Fumarate loaded polymeric nanoparticles were prepared by High pressure homogenizer method using Chitosan as polymer, Glacial acetic acid as a solvent, and sodium tri-polyphosphate (STPP) as a cross-linking agent. All the prepared formulation showed satisfactory organoleptic properties. No uncountable peaks were observed in FT-IR analysis which indicate purity of formulations. All formulation showed good flow property. SEM photograph indicate spherical structure with porous surface. The entrapment efficiency was found to be 85.53%±1.66. The drug excipient compatibility study did not show any changes in the physical properties. In-vitro drug release study showed that Tenofovir Disoproxil Fumarate nanoparticles retard the release up to 12 hrs. It was observed that the ultra-probe and hot homogenization method was a useful method for the successful incorporation of the poor water-soluble drug Tenofovir Disoproxil Fumarate with high entrapment efficiency.

Keywords: Tenofovir Disoproxil Fumarate, nanoparticles, Chitosan

INTRODUCTION

Nanotechnology is the science and technology of precise manipulation in the materials, devices or systems at nano meter scale (usually less than 100 nm). The last several decades have witnessed the emergence of nanomedicine as one of the major field of academic research providing direct benefit to human health through clinical and commercial development. The ever-growing field of development of nanoscale delivery systems for biotherapeutics represents a major sector of academic research and is beginning to contribute to the future progress in modern health care in terms of disease diagnosis, treatment, and prevention. Polymeric nanoparticles term generally use for those substance which has 100- 200 nm diameter particle size and the drug substance is incorporated by polymeric substance.[1,2] The ideal requirements for designing nano-particles delivery system are to effectively control particle size, surface character, enhancement of permeation, flexibility, solubility and release of therapeutically active agents in order to maintain the target and specific activity at a predetermined rate and time. Tenofovir Disoproxil Fumarate is a nucleotide reverse transcriptase inhibitor, which is used for the treatment of HIV-AIDS, Hepatitis B. Tenofovir Disoproxil Fumarate is practically soluble in water, soluble in methanol, very slightly soluble in dichloromethane. Tenofovir Disoproxil Fumarate is firstly hydrolysed in the intestinal walls by carboxylesterase after oral administration, and eventually hydrolysed by phosphodiesterase during its first passage through the liver to form Tenofovir. Tenofovir enters cells through organic anion transporters 1 and 3. Once inside the cell, Tenofovir is phosphorylated by adenylate kinase to form Tenofovir monophosphate (TFV-MP). A second conversion occurs by nucleotide diphosphate kinase to form Tenofovir diphosphate (TFV-DP) from TFV-MP. TFV- DP is the active antiviral agent that competes with the naturally occurring nucleotide counterpart deoxyadenosine 5-triphosphate to inhibit viral reverse transcriptase. The rational for selection of Polymeric nanoparticles as the target approach to resolve the underlying problem of Tenofovir Disoproxil Fumarate like Enhancement of bioavailability of the incorporated drugs, particle size.[3,4]

EXPERIMENTAL
Material: Pure Tenofovir Disoproxil Fumarate was obtained from Mylan laboratories ltd.

Nashik. Chitosan, Sodium tripoly- phosphate, Methanol was obtained from Modern science, Nashik.

Formulation of Tenofovir Disoproxil Fumarate loaded nanoparticle:
Tenofovir Disoproxil Fumarate loaded nanoparticle were formulated using Chitosan as polymer, Glacial acetic acid as a solvent, and sodium tri-polyphosphate (STPP) as a cross-linking agent. Chitosan was dissolved in 20 ml of 1% Glacial acetic acid solution. Solution of drug (40 mg) by using 5 ml 1% Glacial acetic acid as a solvent. Chitosan containing solution added to drug solution. 20 ml of sodium tri-polyphosphate aqueous solution was added at definite rate (3-4 ml/min) to the above mixture of solution under high pressure homogenization (speed and duration of homogenization was 10000 to 15000). The formed complex solution was then ultra-sonicated by ultra-probe sonicator (The duration and amplitude of probe sonicator was 1-5 min and 40% respectively). dispersion of Tenofovir Disoproxil Fumarate loaded nanoparticles were obtained. That nanoparticles were then washed and centrifuged three times. The washed Tenofovir Disoproxil Fumarate loaded nanoparticles were re-suspended in de-ionised water and stored at -20 ^{0}C for 24 hours. Subsequently Tenofovir Disoproxil Fumarate loaded nanoparticle were freeze dried in lyophilizer with 5% mannitol. Mannitol is used as a cryoprotectant. The Lyophilized powder was then stored in sealed glass vial at 2 - 4 ^{0}C until use.[4,5,6]

Table 1: Composition for formulation of different batches

Sr. No	Formulation code	Amount of chitosan (X1) in mg	Amount of STPP(X2) in mg	Time for ultra-sonication (X3) in min
1	F1	40	10	1
2	F2	40	17	3
3	F3	40	25	5
4	F4	70	10	1
5	F5	70	17	3
6	F6	70	25	5
7	F7	100	10	1
8	F8	100	17	3
9	F9	100	25	5

Evaluation of formulated batches of prepared nanoparticles.[4,7,8]
PHYSICAL APPEARANCE:
Physical appearance of prepared nanoparticles was observed visually.

Drug entrapment efficiency:

$$EE = \frac{W \text{ (initial drug)} \times W \text{ (free drug)} \ W \text{ (initial drug)}}{W \text{ (initial drug)}} \times 100$$

Particle size determination:
Mean particle size and size distribution of polymeric nanoparticles was determined by Nanoplus 3 at room temperature. Before measurement, batches were diluted with filtered double distilled water until the appropriate concentration of particles was achieved to avoid multiscattering events. Colloidal mixture (NP) was added to the sample dispersion unit with a slight shaking so as to minimize the particulate aggregation by inter-particle interaction.

Bulk density: Bulk density was calculated using formula

$$\text{Bulk density} = \frac{\text{Mass of sample in gram}}{\text{Volume occupied by sample}}$$

TAPPED DENSITY:
The tapped density was calculated using the formula

$$\text{Tapped density} = \frac{\text{Mass of sample (gm)}}{\text{Volume occupied by sample (ml)}} \times 100$$

Hausner's ratio:
Hausner's ratio was calculated by the following formula

$$\text{Hausner's ratio} = \frac{\text{Tapped density}}{\text{Bulk density}}$$

Carr's Index:
Carr's index was calculated by the following formula

$$\text{Carrs Index} = \frac{\text{Tapped density - Bulk density}}{\text{Tapped density}} \times 100$$

Angle of repose:
Angle of repose was calculated by using formula

$\tan \theta = h/r$

FTIR:
The FTIR spectrum of Tenofovir Disoproxil Fumarate loaded Nanoparticles formulation batch was recorded in the wavelength range of 4000 to 400 cm-1 The characteristics IR absorption peaks of Tenofovir Disoproxil Fumarate were studied

Determination of Drug Loading:
Ten milligrams were weighed of the Tenofovir Disoproxil Fumarate loaded Nanoparticles prepared and were dissolved in 10 ml of methanol centrifuged, filtered and then the filtrated was analyzed at 260 nm using a UV-Visible spectrophotometry.[9,10]

$$\text{Drug loading} = \frac{\text{Weight of drug loaded in NP}}{\text{Weight of nanoparticle}} \times 100$$

Particle size and Poly Dispersibility Index (PDI) value:
The mean particle size analysis and PDI value was done with the help of Nanoplus 3 to evaluate the effect of concentration of polymer on size. [4,5]

Zeta potential:
Zeta potential was measured using nanoplus 3, (particulate system). [4,5,11]

Scanning Electron Microscopy (SEM):[4,12,13]
Shape and surface morphology of TDF loaded NP was observed by scanning electron microscope. SEM study was carried out using ZEISS ,Japan and sample was coated by gold ion and the coating was performed for 5-6 min and sample was analyzed at 1,000 and 1,500X.

Differential Scanning calorimetry:
DSC was performed to characterize the physical state of prepared TDF loaded NP's. about 3-4 mg of prepared NP's was weighed, crimped into aluminum pan and analyzed at scanning temperature range from $50\,^0\text{C}$ to $400\,^0\text{C}$ at heating rate of $10\,^0\text{C/min}$.

In vitro Drug kinetic study (Dissolution study)
For dissolution study drug release of TDF loaded NP by using basket type dissolution test apparatus. Freshly prepared phosphate buffer saline pH has been used as a dissolution medium. An accurately weighed amount of TDF loaded NP containing the drug equivalent to 40 mg was transferred to a jar which is already filled with phosphate buffered saline (PBS) pH 7.4, up to 900 ml. Protocol was set as per requirement which include drug name dissolution medium and volume, temperature which is $37\,^0\text{C} \pm 0.5$. Rotation per minute is 100 rpm. As per the specific time interval specified volume of dissolution medium had been withdrawal from jar and again re-filled that jar with fresh PBS for maintaining sink condition. Temperature was maintained at $37\,^0\text{C}$ throughout the study. Study was carried out over a period of 12 hrs at regular intervals. Samples were withdrawn and analyzed spectrophotometrically at 260 nm.[8,14,15]

Stability study: Stability study was performed as per ICH guidelines Q1A (R2) to determine the effect of presence of formulation additives on the stability of the drug and also to determine the physical stability to the formulation under accelerated storage conditions. The batch was subjected to elevated temperature and humidity condition of 40 ± 20^0C / 75±5% RH respectively. Samples were withdrawn at the end of 0, 30, 60 and 90 days and evaluated for active drug entrapment and physical appearance (ICH guidelines, 2003).[7,16]

RESULT AND DISCUSSION:

PHYSICAL APPEARANCE:

Prepared nanoparticles were analyse visually for appearance. It was white in colour.

Micrometric parameters of nanoparticles of Tenofovir Disoproxil Fumarate:

The nanoparticles were evaluated for parameters like Bulk density, Tapped density, Hausner's ratio, Carr's index & Angle of repose.

Table 2: Flow properties parameters of Tenofovir Disoproxil Fumarate loaded formulated nanoparticles.

Formulation Code	Bulk density	Tapped density	Hausner's Ratio	Carr's index
F1	1.15±0.01	1.22±0.01	1.06±0.090	5.73±0.02
F2	1.16 ±0.015	1.20±0.01	1.03±0.1	3.33±0.01
F3	1.15 ±0.01	1.26±0.01	1.09±0.06	8.73±0.02
F4	1.21±0.01	1.31±0.01	1.08± 0.06	7.63±0.01
F5	1.25±0.01	1.33±0.01	1.06±0.04	6.01±0.02
F6	1.27± 0.01	1.39±0.01	1.09±0.09	8.63±0.01
F7	1.480±0.01	1.51± 0.01	1.02± 0.01	1.98±0.01
F8	1.49±0.01	1.54±0.01	1.03± 0.1	3.24±0.03
F9	1.50±0.01	1.60±0.01	1.06± 0.08	6.25±0.03

Bulk density of F1 to F9 batches was in range from 1.15 to 1.50 gm/ml. Hausner's ratio of F1 to F9 batches was observed 1.02 to 1.09, that indicates flow property of NP's was found to be excellent. Tapped density of F1 to F9 batches was in range from 1.20 to 1.60 gm/ml. The Carr's index and angle of repose of F1 to F9 batches was observed in range from 1.98-8.73 and 30.79-49.46 respectively, which indicate flow property was excellent.

Entrapment efficiency: Drug entrapment efficiency of formulated entrapped NPs containing Tenofovir Disoproxil Fumarate ranged from 85.53±1.36 to 10.5±1.86 respectively. It was found that drug content and entrapment efficiency of NPs entrapped Tenofovir Disoproxil Fumarate was increased with increase in polymer and surfactant concentration.

Table 3: Characterization of Drug entrapment efficiency

Batch code	Entrapment efficiency (%EE)
F1	10.5±1.86
F2	25.40±1.26
F3	31.90±1.63
F4	47.1±1.55
F5	51.60±0.25
F6	54.89±1.15
F7	69.54±1.55
F8	78.53±1.63
F9	85.53±1.36

Particle size determination:

Table 4: Particle size of formulated batches

Formulation code	Chitosan	STPP	Particle size (nm)
F1	40	10	326.3±1.45
F2	40	17	346.9±1.36
F3	40	25	321.4±0.22
F4	70	10	320.33±1.87
F5	70	17	290.25±0.36
F6	70	25	356.2±1.25

F7	100	10	312.25±0.81
F8	100	17	369.28±1.33
F9	100	25	263.3±0.22

The data shows that particle sizes of all formulations (F1 to F9) were found to be in range of 326.3nm-263.3nm, the results also clearly depict that there was a gradual decrease in particle size with increase in surfactant concentration.

FTIR:
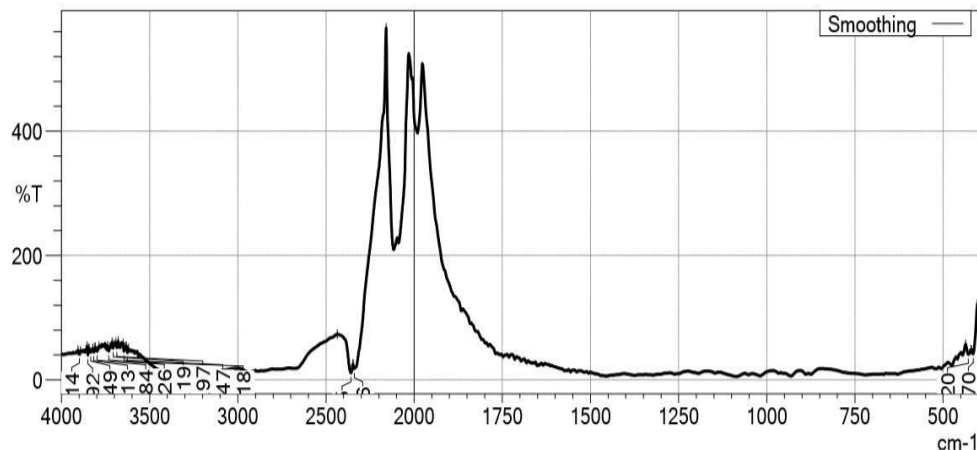
Fig.1 FTIR of Nanoparticles's batch F9

Table 5: FTIR Spectroscopy of NP's batch F9 formulation

Functional Group	Observed IR Peak(cm^{-1})	Stander range cm^{-1}
R-NH$_2$ stretching	3597.84	3400-3500
CH stretching	2985.18	2850-3000

FTIR shows characteristic peak which indicate purity and identity of sample.

Particle size and determination:
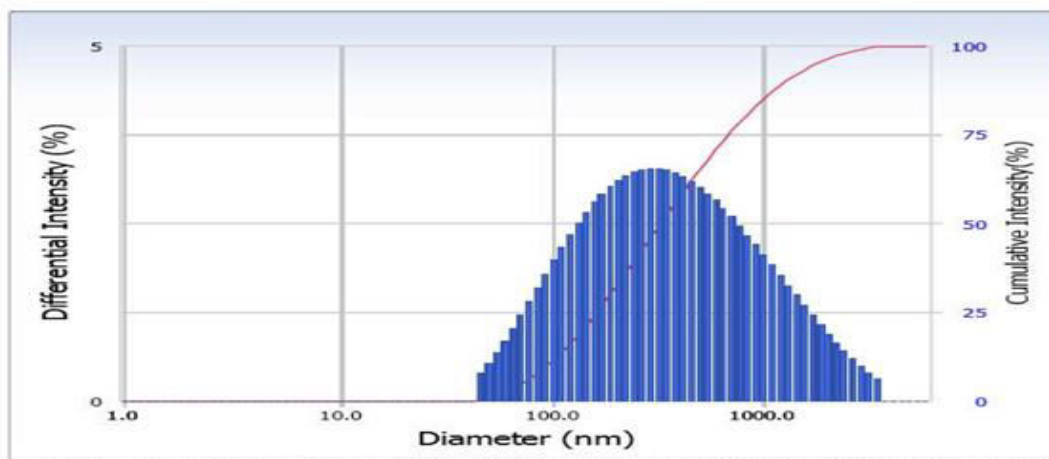
Fig.2: Histogram of particle size distribution of NP's batch F9

Table 6: Particle size and Polydispersity Index of F9 batch

Formulation	Particle Size (nm)	Polydispersity Index (PDI)
NP's	263.3	0.39

It was found that the presence of surfactant reduces the surface tension between the polymer and solvent and facilitates solid particle formation during the cooling phase of NP preparation. With the increase in the amount of STPP, the number of phosphate ions of STPP available to bind the amide groups of Chitosan will increase which leads to an increase in the rigidity of the complex formed between STPP and Chitosan. It was suggested that PDI should be less than 0.5 for successful development of formulation. Polydispersibility index was found to be 0.39

Zeta Potential Measurement: Nanoparticles consist cross linking of polymers. Zeta potential of NP's was found to be 36.50 mv.

Scanning Electron Microscopy:
Scanning electron microscopy is a technique used to determine the shape and morphology of nanoparticles. Nanoparticles were smooth and porous in appearance, with average particle size 200-300nm.
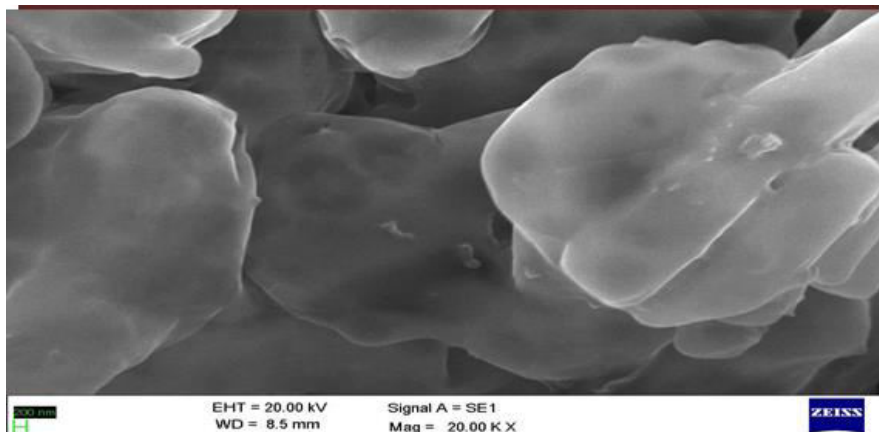
Fig.3: SEM of NPs batch F9

Differential Scanning calorimetry of F9 Formulation:
DSC study shows sharp endothermic peak at 159° C
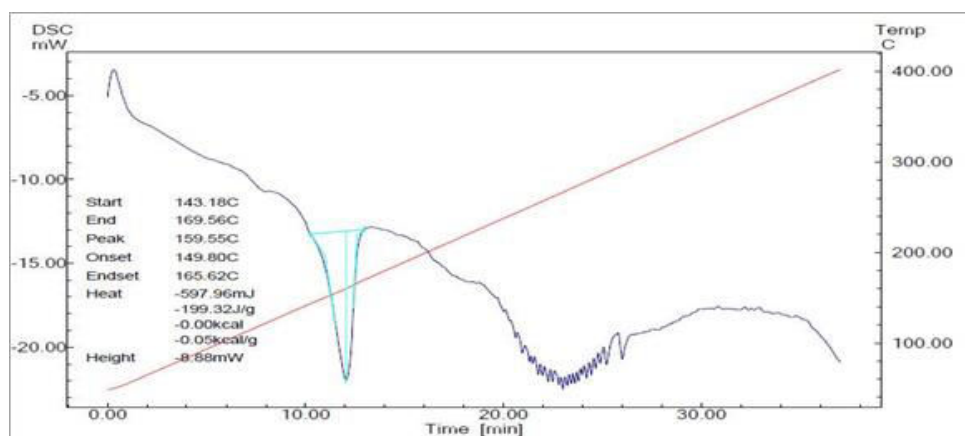
Fig.4: Thermogram of optimized F9 formulation

In vitro drug release Profile:
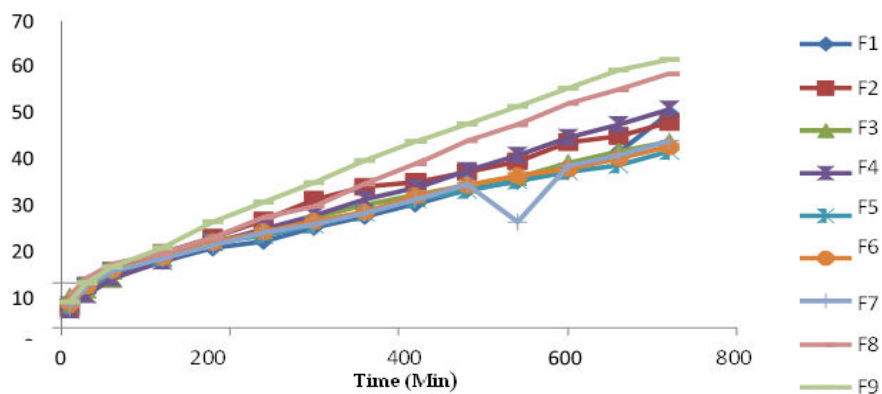
Fig.5: Invitro drug release of Nanoparticles

Highest drug release was obtained for F9 batch at the end of 12 Hrs. All formulation retard the drug release upto 12 Hrs.

STABILITY TESTING:

Stability study shows that no significant change was observed for physical appearance, Entrapment efficiency and In vitro drug release study.

Sr. No.	Parameters	Before stability testing	After stability testing
1	Colour	White	White
2	Visual appearance	Powder	Powder
3	Entrapment Efficiency	85.53±1.36	84.96±1.36

Table 7: Stability study of NP's of batch F9

All the prepared formulation shows satisfied organoleptic properties. As no uncountable peaks were observed in FT-IR analysis, so it confirmed the purity of developed formulation and no interaction of excipients with drug. It was observed that the ultra-probe and hot homogenization method was a useful method for the successful incorporation of the poor water-soluble drug Tenofovir Disoproxil Fumarate with high entrapment efficiency.

CONFLICT OF INTEREST: No

ABBREVATIONS: PDI- Polydispersity Index, STPP- sodium tri-polyphosphate, FTIR-Fourier transformer infrared spectroscopy

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Herbs with their Mechanism of Action on Metabolic Disorder

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ABSTRACT

Diabetes mellitus (DM), of both types Type-I (insulin-dependent diabetes Mellitus) and non-Type-II (Non-insulin dependent diabetes mellitus) is a very critical metabolic disorder in the world. The symptoms of diabetes include polydypsia, ketosis, hyperglycaemia, ketosis, nephropathy and cardiovascular disorders. Throughout the world, a vast numbers of traditional plants have been used for the treatment of diabetes. In clinical studies, it was founded that, many plants or plants parts are helpful in controlling diabetes. Besides this, they have fewer or have not side effects as compared to allopathic medicines. The present paper, is an attempt to reveal like plants with antidiabetic effects, from different parts of the world. Plants like Ginkgo biloba, Swertia chirayta, Aloe vera, Cucurbita pepo, Trigonella foenum, Urtica dioica, Glycin max, Tribulus terrestris, Eclipta elba, Ocimum sanctum, Gymnema sylvestre, Panax ginseng, Andrographis paniculata etc. has been used traditionally, to treat the diabetic patients around the world as reported in various studies. The medicinal activity of plants, for the treatment of diabetes is mostly due to phenolic compounds, alkaloids, falvanoids, terpenoids, coumarins, glycosides, minerals, vitamins, saponins, peptidoglycans and many others which have a property to lower down the blood glucose level. The plants having these type of phytoconstituents, has been active against diabetes mellitus are discussed in this paper.

Keywords: Diabetes,Phytoconstituents, Herbs, Flavanoids, Alkaloids, Insulin etc.

INTRODUCTION

Diabetes is a metabolic disorder of carbohydrate, fat and protein affecting a large number of populations on the globe [1]. It is a chronic disease that occurs either when the pancreas does not produce enough insulin; a hormone which regulate the blood glucose level or when the body cannot use the availabe insulin effectively. Now, Diabetes Mellitus had become the most common metabolic syndrome in the world [2].

The incidence of diabetes mellitus is approximate 6.4% globally affecting 285 million adults in 2010 and 415 million in 2015 in the world and south-east Asia region and will rise to 439 million by 2040. There were about 69.1 million cases of diabetes mellitus in 2015, an alarming rise in prevalence of diabetes [3].

This dramatic rise is largely due to lack of physical activity, sedentary lifestyle and increasing occurrence of obesity, which is associated with rapidly growing urbanization and industrialization. Occupational stress is a prime risk-factor for many workers caused by increased workloads, downsizing, overtime, shift work and hostile work environments. To manage this condition stress hormones are secreted for longer duration which may cause hyperglycemic condition. The numbers of diabetes mellitus cases are rapidly increasing worldwide and its complications are major cause of disability and hospitalization, posing a financial burden.

The Diabetes word is generally derived from the greek word 'Diab' and mellitus is the latin word for 'sweetened with honey'. Greeks has the knowledge of this disease by symptoms polyurea and wasting of body whereas Aretaeus od Cappadocia mentioned this disease characterized by thirst and polyurea. Subsequently this knowledge is spreaded to Iran, China, Arab and Spain as a disease characterized by sympotoms like polyurea, polydepsia with sugary flavored urine [4]. In ancient time, the 'Madhumeha' is described by hindu phycians, a disease in which patient passes sweet urine and exhibit sweetness all over the body. The sweet urine of patient was surrounded by the ants, which has symptoms of diabetes [4].

Diabetes mellitus is a chronic metabolic disorder, results from the insulin insufficiency or insulin dysfunction.

Table-1: The normal blood glucose values in normal or diabetic person as follows:- [5]

Category of Person	Fasting Value		Post- Prandial
	Minimum Value	Maximum Value	Value 2 h after consuming glucose
Normal	70 mg /100ml	100 mg/100ml	Less than 140 mg/100ml
Early Diabetes	101 mg/100ml	126 mg/100ml	140 mg/100ml to 200 mg/100ml
Established Diabetes	More than 126mg/100ml	-	More than 200

This disease is commonly of two types: Type-1 diabetes and Type-2 diabetes. Type-1 diabetes is due to insulin insufficiency, which is further due to lack of functional beta cells. In this condition patients are totally depended on external source of insulin. But on the other hand type-2 diabetes is totally insulin independent, the patients are unable to respond to insulin and patient can be treated by exercise, dietary changes and medication. From the total diabetic population around 90% population is suffering from Type -2 diabetes. The symptoms of diabetes are (a) high blood glucose level (b) frequent urination and presence of sugar in urine (c) Polythirst (d) Loss of weight and extreme hunger (e) blurred vision (f) weakness and fatigue (g) irritability (h) mood changes [6].

The drugs, both chemicals and hormones are used for treatment of diabetes [7, 8]. Besides conventional oral and injectable medication, diabetes treatment includes diet modification, regular exercising, lifestyle changes, weight regulation or other therapies like herbal therapy [9, 10]. The herbal drugs are widely selected because of their better effectiveness, lesser side effects and better availability. The exploitation of plant based resources is the time and money saving [11]. Inspite of prevention and management of management of diabetes and identification of active phytoconstituents with no or minimal adverse effects is a great challenge to research community. To achieve this challenge, researcher utilize different types of model whether in-vivo or in-vitro [12, 13], to understand the metabolic pathways. They also used different types of screening test to find out the efficacy and toxicity of those active compounds and to minimization of adverse effects [14].

This review article discuss about plants and their active phytoconstituents responsible for antidiabetic effect with mode of action, which help us in designing noval cost effective interventions. This article is a compilation of previous, current knowledge and future expectations of various plants and chemical categories of phytoconstituents with antidiabetic activity. We have searched the literature using PubMed, SCOPUS, MEDLINE and Google scholar with keywords Diabetes, antidiabetic herbal plants, antidiabetic phytoconstituents and their mode of action on metabolic pathways to prepare this review article. The list of all references, were searched manually to obtain relevant knowledge and additional information. The selection of all plants and phytoconstituents in this review were on the basis of their antidiabetic activity.

Pathophysiology of Diabetes mellitus

Diabetes mellitus showed adverse effects on quality of life in terms of social, psychological well-being as well as physical health. Diabetes indications are mainly mediated through oxidative stress such as increased production of ROS or impaired antioxidant defense systems. Other factors which cause diabetes are enhancement of lipid peroxidation, alteration in antioxidant enzymes and impaired glutathione metabolism [15]. The Production of free radicals is also involved in the development of various type of disease including diabetes mellitus [16]. The accumulation and formation of advanced glycation products are also involved in diabetic complications like neuropathy, retinopathy and renal dysfunction [17]. Insulin and glucagon are the hormones which involved in the regulation of blood glucose level and when there is imbalanced occurs in the level of these hormones, then sugar starts to accumulating in blood and passes through the urine along with minerals [4]. Mostly in diabetic cases, primarily T-cell mediates pancreatic islet β-cell destruction and as th e90% of pancreatic β-cells destroyed, it becomes clinically symptomatic. In fasting hyperglycaemia, serological markers such as glutamic acid decarboxylase (GAD), IA-2, IA-2 or insulin antibodies are present in 85-90% of individuals. Many time,enviormental factors like chemical or viral initiate pancreatic β-cell destruction, which further leads to cause in diabetes. From the study it was found that entero virus infection is also associated with the development of diabetes mellitus [18].

Causes of Diabetes mellitus

The cause of Type-1 diabetes mellitus is β-cell destruction, mediated through either immune mediated or idiopathic, whereas cause of Type-2 diabetes is insulin resistance or relative insulin deficiency. Diabetes is also concerned with lifestyle factors and genetics [18]. The other factors which cause diabetes are genetic material such as chromosomal and mitochondrial DNA mutation. Rabson-Mendenhall syndrome, Leprechaunism and lipoatrophic diabtes is associated with genetic defects in insulin action. The viral infection of congenital rubella and cytomegalo virus also leads to diabetes mellitus. The chemicals or drugs like nicotinic acid, glucocorticoids, thyroid hormone, pentamidine, thiazide, α-interferon etc, can also cause diabetes. The defects in pancrease like pancreatitis, neoplasmia, pancreatomy, cystic fibrosis, fibrocalculous pancreatopathy can also cause diabetes. Some other factor related to immune system like stiff-man syndrome and anti-insulin receptor antibodies, involved in development of diabetes. The pancreatic disease like aromegaly, cushing's syndrome, phaeochrocytoma, hyperthyroidism and aldosteronoma also cause diabetes. In other factors, geneic syndromes such as Down syndrome, Klinefelter syndrome, Turner syndrome, Wolfram syndrome, Friedreich's ataxia,

Huntington's chorea. Laurance-Moon-Biedl syndrome, Myotonic dystrophy, Prader-Willi syndrome were also involved in the development of diabetes in some individuals [18].

Management of Diabetes Mellitus

Antidiabetic drugs: Antidiabetic drugs are the drugs, which are used in the treatment of diabetes since the reporting of this disease and even today and research is going on for developing newer drugs. These drugs are less or highly effective but are costly and many are associated with serious side effects. Beside this, availability in developing or underdeveloped countries is either lacking or negligible. Insulin constitutes one of the main antidiabetic treatment protocols. They can be obtained naturally from humans or animals or synthetically prepared in vitro. Though insulin is essential for treatment of type 1 diabetes but in the treatment of Type-2 diabetes those drugs are used which helps in in insulin secretion o rlower glucose levels. Commonly used antidiabetic drugs are mainly belongs to sulfonylureas, biguanides, glucosidase inhibitors and glinides with hypoglycemic effect. They are used as single drug therapy or in combination theearpy to achieve better glycemic regulation. However lifelong requirement pose threat of side effects.

Antidiabetic drugs can be used parentally or orally based on method of administration.

Parental antidiabetic drugs

Insulin: A hormone secreted by beta cells of Islets of Langerhans through pancrease, has been used for treatment of diabetes [20-22]. Usually in injectable form [22].

On the basis of duration of action, insulin are divided in: Very rapid acting insulins (30min absorption, 1-2h peak action); rapid-acting (short-acting) insulins (30-60min absorption, 6-8h peak action); intermediate-acting insulins (3-4h absorption, 7-9h peak action); long-acting insulins (10-12h absorption, 16-18h peak action) or premixed insulins [21,23-26,30]. Injectable insulins have many limitations, hence novel insulin formulations and innovative insulin delivery methods, like oral or inhaled insulin, have been developed. The aim of these delivery methods is to reduce or control insulin associated hypoglycaemia, lower intraindividual pharmacokinetic and pharmacodynamic variations and also to improve the limitation of physiological insulin release [27,28]. As the insulin is peptide hormone, so it easily destroyed by gastric acid present in stomach, when taken orally. Beside this, intradermal absorption of insulin cannot mimic the physiological insulin secretion, hence it is not reliable. The subcutaneous route is preferred mostly, due to ease of self administration rather than other parenteral routes like i.m or i.v etc but it causes pain at injection site, lipodystrophy and noncompliance by the patients [29]. The aim of newer insulin delivery methods is to deliver the insulin in an accurate manner and to reduce patient burdem [29]. The recent class of insulin are inhaled insulin, that are inhaled rather than injectable[21], for example technosphere insulin human (Afrezza), a recombinant regular human insulin inhalation powder , which is approved by FDA, June 2014, in the treatment of Type-1 and Type-2 diabetes mellitus. In this method, when the insulin is inhaled, through the device the powder is aerosolized and delivered to lungs. The Afrezza drug should be administered at each meal time and used as an alternative to injectable short acting insulin [31,32]. Other insulin preparations used through nasal, oral, buccal, transdermal, intraperitoneal, ocular and rectal route. Each of route and delivery method has its own advantages and disadvantages. It is necessary to find out the successful alternative route, for the treatment of diabetes [21].

ORAL ANTIDIABETIC DRUGS:

These are the drugs which helps in insulin secretion from beta cells of pancreas like sufonylureas, meglinitides and papetide analogues and glucose uptakers or metabolizers like thiazolidinediones, α-glucosidase inhibitors (miglitol, acarbose) and biguanides. These all drugs either help in glucose uptake and utilization in cellular tissues or metabolism of glucose [23, 33-37].

Now recent approaches contributed th ediscovey of new clas of therapeutics like incretin mimetics, amylinn analogues, gastric inhibitory polypeptide (GIP) analogs, peroxisome proliferator activated receptors and dipeptidyl peptidase-4 inhibitor (DPP-4) in the treatment of diabtes [25]. These drugs help in stimulation of insulin secretion through glucagom like peptide (GLP) analogues like exenatide and liraglutide [38,39], compensate for beta cell defects (insulin injections), Sitagliptin, inhibits DPP-4 and increased islet survival [40,41] and islet cell regeneration through islet neogenesis associated protein (INGAP) peptide therapy aiming at islet cell regeneration among others [42].

In curing diabetes at pancreatic level, current researches focused on the extra pancreatic or indirect pancreatic approaches involving organs or mechanisms. Proteins like sodium Glucose Cotransporter-2 (SGLT-2) inhibitors, found in the proximal convoluted tubule of the kidneys and reabsorb approximate

90% of glucose, which filtered through the kidneys [43], hence their inhibitors promote glucose excretion through the urine [44].

Hormones like incretin, Glucagon-Like Peptide-1 (GLP-1), are secreted by the cells in the small intestine during an oral nutrient load. In hyperglycaemia, GLP-1 causes the release ofinsulin from pancreas, shuts down glucagon secretion, slows down gastric emptying and acts on the hypothalamus to increase satiety. Currently four GLP-1 drugs ar eapproved by FDA which are exentide, albiglutide, dulaglutide and liraglutide [44].

Anti-hyperglycaemic drugs Dipeptidyl peptidase-4 inhibitors (DPP-4), are used for improving glyacemic control in patients with Type-2 diabetes. They slow down the inactivation and degradation of GLP-1. The DPP-4 inhibitors act by inhibiting glucagon release, which in turn increases insulin secretion; decreases blood glucose levels [45]. Other new advance approaches in the diabetes treatment include stem cell therapy [46], nanotechnology [47, 48] and gene therapy [49].

The issues with antidiabetic drugs include high cost, prolonged requirement, less availability and side effects. The common side effects of these drugs are related to cardiovascular, gastrointestinal, urinary, hematopoietic, nervous system or skin. Sulfonylureas cause low blood sugar, stomach upset, skin rashes or itching and weight gain. Biguanides/metformin causes sickness with alcohol, kidney complications, stomach upset, tiredness, dizziness, metal taste and clotting defects whereas α-glucosidase inhibitors cause gas bloating and diarrhea [50,51]. Besides these problems, these drugs are still being used all over world in huge amount. Such side effects pose threat on population health, so it is very important to paid attention towards natural remedies and traditional methods for the treatment of diabetes, with emphasis on utilization of medicinal plants.

Antidiabetic medicinal plants: Concerns regarding efficacy and safety of oral hypoglycemic agents [52], cost and availability of insulin[53] have prompted research in alternative fields. Medicinal plants are widely used in treatment of diabetes because of lack of side effects, cheapness, ease of availability, safe and efficacious nature. The antidiabetic activity of these plants is due to the presence of number of phytoconstituents like saponins, tannins, flavanoids, alkaloids, coumarins, anthraquinones, carbohydrates, cardiac glycosides, vitamins and minerals etc. these plants show antidiabetic activity through different mechanism of action such as insulin like action or secretion, regeneration of β-cells of islets of langerhans, hypoglycaemic effect, hepato-pancreatic protective effect, reduced glucose absorption, glycogenolysis or reducing carbohydrate absorption., inhibition of aldose reductase activity, reduction of lactic dehydrogenase and increasing the creatinine kinase levels in tissues, inhibition of glucose-6-phosphate system [23,42,54,55-62] beside these antioxidants and immunomodulators [54,58]. Phenolic compounds have also shown insulin mimetic property [63], biomolecule protector action [64] besides being antidiabetic [65]. Flavonoids also have antidiabetic potential [66,67]. Some plants have immunomodulatory, antioxidant and hepato-protective action with adtnidiabetic effect [54, 48]. These phytoconstituents helps in improving glucose metabolism, lipid profiling, regulating hormones and enzymes in human body and further in protecting the human beings from various disease like diabetes and its complications [68]. Terpenoids and saponins shows antihyperglycemic activity and helps in uptake of the glucose in the muscle and the inhibition of the glucose absorption in the gastrointestinal tract, insulin release activity, antioxidant activity and insulin mimetic property [58,63,69,70]. Alkaloids have antidiabetic and antioxidant property [57]. Anthraquinones are antidiabetic, antioxidant and alpha glucosidase inhibitory action [71]. They suppress chemokine-mediated leukocyte migration towards pancreatic islets leading to a decline in autoimmune diabetes development[72]. Similarly various phytoconstituents from medicinal plants like tannins, glycosides, minerals, have been evaluated for antidiabetic potential through different mechanisms like hypoglycemic effect, insulin release activity, hepato-pancreatic protective action, glucose uptake and utilization in muscles, inhibition of glucose absorption in intestines, antioxidant and immunomodulatory effect[54,48,23,26-33,]. Along these activities, phytoconstituents isolated from medicinal plants has been also used by pharmaceutical companies for development of new drugs.

Though the medicinal plants have been beneficial in management of diabetes but the issues related to safety and efficacy need to be evaluated as there are reports of toxicity and inefficacy of some antidiabetic plants[72-79]. Some antidiabetic plants may contain phyconstituents that pose health risks and may affect vital organs like liver and kidney [78] or cause cardiovascular and neurological disturbance[79-80]. The list of antidiabetic plants is presented in Table 2.

Targets of antidiabetics: Different targets have been used for ameliorating diabetes by antidiabetic drugs or medicinal plants [81,82] as shown Table-2. Some drugs focused on reducing blood sugar while others,

increasing insulin secretion from beta cells of islets of Langerhans [83,84]. Initially antidiabetic drug focused primarily on pancreatic approach with emphasis either on insulin secretion or glucose reduction. Then approaches through glucose uptake and metabolism were explored. Presently besides conventional approaches extra pancreatic and indirect pancreatic approaches are being investigated [44,82,86,87]. Various novel targets have been identified and recently various therapeutic leads successfully completed their different phases of clinical trials such as GLP-1 agonist, DPP-IV inhibitors, SGLT-2 inhibitors and are going to be the next generation therapy for management of diabetes [44,82]

New emerging classes of antidiabetic drugs, include the SGLT-2 inhibitors, 11-hydroxysteroid dehydrogenase type 1 inhibitors, glycogen phosphorylase inhibitors; protein tyrosine phosphatase 1B inhibitors, G protein-coupled receptor agonists and glucokinase activators hold the potential of providing benefit of glucose lowering, weight reduction, low hypoglycemia risk, improve insulin sensitivity, pancreatic β-cell preservation and oral formulation availability. However, further studies are needed to evaluate their safety profile, cardiovascular effects and efficacy durability in order to determine their role in type 2 diabetes management [89].

Impairment in insulin secretion from beta cells, increased glucose production in liver and decreased utilization of glucose in peripheral tissues are the main defects responsible for the development and progression of diabetes mellitus and further pathophysiology involves adipocyte insulin resistance (increased lipolysis), reduced incretin secretion/sensitivity, increased glucagon secretion, enhanced renal glucose reabsorption and brain insulin resistance/neurotransmitter dysfunction[90], therefore, current research on management of diabetes involves considering these alterations during drug development. GLP-1 receptor agonists, long-acting DPP-4 inhibitors, insulin secretagogues: TAK-875, SGLT-2 and SGLT-1 inhibitors, New Met (Metformin-delayed release), insulin sensitizers, mitochondrial target of TZDs, pyruvate dehydrogenase kinase inhibitors, protein tyrosine phosphatase 1B inhibitors, fibroblast growth factor-21, 11-$- hydroxysteroid dehydrogenase-1 inhibitors, diacylglycerolacyl transferase-1 inhibitors, anti-inflammatory therapies, glucagon receptor antagonists, glucokinase activators, fructose-1,6- bisphosphatase inhibitors, acetyl-CoA carboxylase inhibitors, other oral antidiabetic therapies (bile acid sequestrants, activators of the bile acid farnesoid X receptor, AMPK activators, modulators of the gut microbiota, activators of glycogen synthase, inhibitors of glycogen phosphorylase and ranolazine), anti-obesity medications [(Qsymia (combination phentermine/topiramate XR) and Belviq (lorcaserin)] are under focus for research in present times[90].

Some have explored blood glucose-lowering medicinal herbs that have the ability to modulate one or more of the pathways that regulate insulin resistance, cell function, GLP-1 homeostasis and glucose reabsorption [81]. However there are around 410 experimentally proven medicinal plants having antidiabetic properties but the complete mechanism of action is available only for about 109. There are several medicinal plants whose extract modulate glycolysis, Krebs cycle, gluconeogenesis, HMP shunt pathway, glycogen synthesis and their degradation, cholesterol synthesis, metabolism and absorption of carbohydrates and synthesis and release of insulin [91,83]. So there is enough scope for exploration and evaluation of novel therapeutic modalities with special emphasis on newest target specific interventions for better management of diabetes.

Table-3: List of Antidiabetic Plants with phytoconstituents and their Mechanism of Action

Sr No.	Herb name	Phytoconstituent present	Mechanism of Action	Reference
1	Abelmoschus moschatus	alpha-Cephalin, myricetin-3'-glucoside, ambrettolide	Insulin secretion	92-93
2	Abies Pindrow Royle	Volatile oil	Insulin secretagogue activity	94
3	Abroma augusta Linn	Fixed oil , alkaloid	Lowering blood sugar	95
4	Achryanthus aspera	Betaine, achyrantine, beta-ecdysone	carbohydrate digestion and absorption	96
5	Aegle marmelos	aegelin, marmesin, marmelosin	Regeneration of pancreatic beta cells regeneration	97,98
6	Agaricus campestris	Furfural, caprylic acid, alpha-Terpineol, hexanol	Insulin secretion, glycogen synthesis	99,100
7	Alium sepa	S-methyl cysteine sulfoxide, S-allyl cysteine sulfoxide	Glycolysis, Cholesteroll synthesis	101-102

8	**Allium Cepa**	Protein, carohydrate, Vitamin A, B, C, Allyl propyldisulfide	Stimulating effects on glucose utilization and antioxidant enzyme	103
9	**Allium sativum**	Allylpropyl disulfide,Allicin, apigenin, allin	Glycogen synthesis ,insulin secretion,Cholesterol synthesis, glycogen synthesis	101,104-106
10	**Aloe barbadensis Miller**	barbaloin, isobarbaloin, resin	Stimulating synthesis and release of insulin	107
11	**Aloe vera**	Glucomanan,Glucosamines,Zinc, Leucine, isoleucine, alanin,Cellulose, Mannose, aloin ,barbaloin, isobarbaloin, aloetic acid, aloe-emodin, emodin	Insulin secretion and synthesis, carbohydrate digestion and absorption	108-110
12	**Cassia tora**	Cinnamic acid crysophanic acid	Insulin secretion and synthesis	109
13	**Alpinia galangal, Aloe vera, Ocimum sanctum**	Protein based polysaccharides	Insulin secretion, carbohydrate digestion and absorption	108
14	**Andrographis paniculata**	Diterpenoid lactone andrographolid	Increase glucose metabolism, Regenration of pancreatic beta cells and insulin secretion	111
15	**Arctostaphylos uvaursi**	Arbutin	Insulin secretion, glycogen synthesis	112
16	**Areca catechu**	Nitrosamines	Carbohydrate digestion and absorption	113
17	**Artemisia Pallens**	Allo-aromadendrene, T-cadinol, alpha-gurjunene, beta-eudesmol, beta-ubebene, aromadendrene	Regenration of pancreatic beta cells and insulin secretion	114
18	**Artemisia pallens**	Essential oil, davanone	Hypoglycaemic, increases peripheral glucose utilization or inhibits glucose utilization or inhibits glucose reabsorption	115
19	**Asparagus adscendens**	3-Hepatadecanone, 8-hexadecenoic acid, hexadecanoic acid	Regenration of pancreatic beta cells and insulin secretion	116
20	**Aureobasidium pullulans**	Fructo-oligosaccharide	Decrease glycouria and AGEs	117
21	**Azadirachta indica**	Nimbidin, nimbin, nimbidol, nimbosterol	Glycogenolytic effect due to epinephrine action was blocked	118
22	**Azorella compacta**	Muinol, azorellanol, mulin-11,3-dien-20-oic acid, mulinolic acid	Regenration of pancreatic beta cells and insulin secretion	119-121
23	**Bauhinia candicans, Bauhinia forficata**	Kaempferitin	Glycolysis	122-123
24	**Biophytum sensitivum**	Shamimin	Insulin secretion	124-125
25	**Boerhaavia diffus**	Punarnavaine, Punarnavoside	Increase in hexokinase activity, decrease in glucose-6-phosphate and fructose bis-phosphatase activity, increase plasma insulin level	126
26	**Brassica juncea**	Isithiocyanate glycoside singrin, protein, fixed oil	Food adjuvants for diabetic patients	127
27	**Caesalpinia bonducella**	fatty oil	Free radical scavanging	128
28	**Camellia sinensis**	Polyphenolic constituents (EGCG), Cytrus bioflavanoids (hesperidin, naringin), Naringenin	Increase insulin secretion,Glycogen synthesis, glycolysis	129-131

29	**Punica granatum, Satureja khuzestanica, Bauhinia forficata**	Epigallocatechin-gallate, gallocatechin, epicatechin, (+) catechin, (-) epicatechin	Free radical scavanging activity, insulinonematic activity	130,132-134
30	**Capsicum frutescens**	Capsaicin, pritein	Increase insulin secretion and reduction of insulin binding on the insulin receptor	135
31	**Caralluma adulis, Syzygium cumini, Acacia arabica**	Mallic acid, chlorogeic acid	Krebs cycle	136
32	**Cascinium fenestratum**	Berberine, glycoside , protein	increase enzymatic antioxidants	137
33	**Casearia esculenta**	Leucopelargonidin, dulcitol	Insulin secretion	138
34	**Cassia auriculata**	Bis (2-ethyl hexyl) phthalate (DEHP)	Insulin secretion, glycogen synthesis	139
35	**Cassia Tora**	Torachrysone, toralactone, rhein, alaternin	Insulin secretion	140
36	**castanospermum austral**	castanoapermine, australine	DPP-IV inhibition	141-142
37	**cataranthrus roseus, Vinca rosea**	Catharanthine, vindoline, vindolinene, vinblastine, vincristine	free radical scavanging action	143-145
38	**Cifrullus colocynthis**	citullol, colocynthin, elaterin, elatricin B, colosynthetin	Insulin secretion, glycogen synthesis	146-147
39	**Cinnamomum zeylanicum**	L-arabino-D-xylan, cinnzeylanin, cinnzeylanol, D-glucan, Volatile oil, tanin, mannitol, calcium oxalate	Carbohydrate digestion and absorption, Elevation in plasma insulin	126, 148
40	**Cryptolepis sanguinolenta**	Cryptolepine	Increase glucose uptake by 3T3-L1 cells	149
41	**Cucurbita pepo**	Vitamin A, E	Free radical scavanging activity	117
42	**Curcuma longa**	ferulic acid, Curcumin, turmerone, germacrone, zingiberene	free radical scavanging actvity, insulin secretion, carbohydrate digestion and absorption	150
43	**Eclipta elba**	Wedelolactone, dimethyl wedelolactone, Ecliptin alkaloid	Insulin secretion, carbohydrate digestion and absorption, Decrease activity of glucose-6-phosphatase and fructose-1-,bisphasphatase	151
44	**Enicostemma littorale**	Swertiamarine glycoside	Decrease glycosylated Hb & glucose 6 Phosphatase	152-154
45	**Eucalyptus globulus**	Essential oil, cineol	Increase insulin secretion from clonal pancreatic beta line	155
46	**Ficus bengalensis**	Leucocyanidin, pelarogonidin	Insulin secretion, glycogen synthesis	156-158
47	**Garcinia cambogia**	(-) Hydroxycitric acid	Insulin secretion	159-160
48	**Gentiana olivier**	Iso-orientin, C-glycoside	Lower plasma glucose level	161
49	**Ginkgo biloba**	Ginkgolides	Insulin Secretion	162
50	**Ginkgo biloba**	Kaempferol, isorhamnetin	free radical scavenging activity	163
51	**Glycerrhiza glabra**	Triterpenoid, saponin, glycerrhizin	Lower plasma glucose level	164
52	**Glycin max, Curcuma longa**	Soy isoflavones(genistin, diadzein)	Lipid and glucose metabolism, PPAR activation	165-166
53	**Grape seed**	Procyanidins	Antihyperglycaemic	167
54	**Gymnema sylvestre**	Gymnemic acid, gymnemosides,Gurmarin, betaine, choline, triethylamine,	Regenration of pancreatic beta cells and insulin secretion	159, 168

		Stigmasterol, quercitol, gymnemic acid IV		
55	**Helicteres isora**	Cucurbitacin B, isocucurbitacin B,Saponin, tanin lignin	Insulin secretion, glycogen synthesis, Decrease plasma triglyceride level and insulin sensitizing activity	122, 169
56	**Hericium erinaceus**	D-threitol, D-arabinitol, Palmitic acid	Carbohydrate digestion and absorption	170-171
57	**Hibiscus rosa sinensis**	Vitamin B, C, fat	Stimulate insulin secretion from beta cells	172
58	**Ipomoea aquatica**	Carotene	Reduce fasting blood sugar level and serum glucose level	173
59	**Lactuca indica**	Lactucain C	Regenration of pancreatic beta cells and insulin secretion	174
60	**Lagerstroemia speciosa, Acacia Arabica**	Ellagic acid, corosolic acid, 4-hydroxybenzoic acid, 3-O-methylprotocatechuic acid, caffeic acid, p-coumaric acid, kaempferol	Insulin secretion, carbohydrate digestion and absorption	175
61	**Luffa aegyptiaca**	Fatty oil	Lactigogue activity	176
62	**Luffa cylindica**	momordin-A, luffin-A	Insulin secretion, glycogen synthesis	122
63	**Lupinus albus**	Alkaloid, fatty oil, asparagines	Lower serum glucose level	177
64	**Mangifera indica**	mangiferin	Reduction of intestinal absorption of glucose	178
65	**Momordica charantia**	Momordin, momordicine, charantin, momorcharaside A and B, momorcharin A and B, Polypeptide-P, Vicine	Insulin secretion, glycogen synthesis, Glucose secretion	179-180
66	**Morus alba**	Astragalin, scopolin skimmin, roscoside II, Chrysin, isoquercitin	Regenration of pancreatic beta cells and insulin secretion	181-182
67	**Morus insignis, Myrtus communis**	Ursolic acid, mulberrofuran-U	Regenration of pancreatic beta cells and insulin secretion	183
68	**Myrcia multiflora**	Myrciaphenones A and B, myrciacitrins I and II	Insulin secretion	143, 184
69	**Myrtus communis**	3-O-beta-D-glucopyranoside, Volatile oil mirtii oleum	Regenration of pancreatic beta cells and insulin secretion	185-186
70	**Nelumbo nucifera**	Nuciferin, nornuciferin	Reduce blood sugar level	187
71	**Ocimum canum, Coriandrum sativum, Artemisia roxburgghiana, Syzygium aromaticum**	Camphor, eugenol, trans-beta-ocimene, p-cymene, limonene, alpha-pinene, 1,8-cineole, thujone	Insulin secretion, regeneration of pancreatic beta cells	188-190
72	**Ocimum sanctum**	Carvacrol, linolool	Insulin secretion, carbohydrate digestion and absorption	188, 190
73	**Ocimum sanctum, syzgium aromaticum**	Caryophylline	Insulin secretion, carbohydrate digestion and absorption	191
74	**Olea europia**	Oleuropeoside	Potentiation of glucose, induced insulin released an dincrease peripheral uptake of glucose	192
75	**Opuntica ficus indica**	Mucopolysaccharide	Carbohydrate metabolism and cholesterol synthesis	193
76	**Panax ginseng**	Ginosenosides Rg2, panaxan A,B,C,D,E,I ,J,K & L	Regenration of pancreatic beta cells and insulin secretion	119, 194-196
77	**Panax notoginseng**	Flavanols, flavones, flavanones	Insulin secretion	198-199

78	**Panax quinquefolium**	Vin alpha-ginsenoside R3,Quinquenoside L3 and L9	Regenration of pancreatic beta cells and insulin secretion	197
79	**Pandanus odorus**	Essentail oil	Decrease plasma glucose level	199
80	**Phylanthus emebelica, Acacia arabica, Pterocarpus marsupium, Phylanthus embelica**	(+) Catechin, (-) epicatechin, chiorogenic acid, liquiritigenin, isoliquiritigenin	Insulinomematic activity	136, 145, 191, 200
81	**Phyllanthus amarus**	Brevifolin carboxylic acid, ethyl brevifolin carboxylate	carbohydrate digestion and absorption	201-202
82	**Potentilla candican, Phyllanthus niruri, Caesalpinia ferrea, Arctostaphylos uvaursi**	Ellagic acid and its derivatives	Insulin secretion, carbohydrate digestion and absorption	203
83	**Punica granatum**	Vitamin C, protein, tanin, gallic acid, pelletierine	Reduce blood sugar level	204
84	**Salacia**	mangiferin	alpha-Glucisidase inhibiting activity	205
85	**Salacia oblongqa, Croton cajucara**	Kotalagenin-16-acetate, diterprne, triterpenes	Carbohydrate digestion and absorption	119, 206-207
86	**Salacia reticulate, salacia oblonga**	Kotalanol, salacinol,e-glucoside, amngiferin, salacinol, kotalanol, epigallocatechin	Insulin secretion, glycogen synthesis,Regenration of pancreatic beta cells	208-209
87	**Silybum marianum**	Silymarin, silybin, silychristin, silidianin	HMG Co A Suppression	210
88	**Swertia chirayita**	Amarogentin, swerchirin, chirantin, gentiopicrin	Insulin secretion, free radical scavenging activity	191
89	**Syzygium aromaticum**	Tannins, gallotannic acid	Regenration of pancreatic beta cells and insulin secretion	188
90	**Taraxacum officinale**	Inulin, laevulin,Taraxacin,Gluten, taraxacerin	Insulin secretion,Glucose transport, carbohydrate digestion and absorption	109, 190
91	**Tinospora cordifolia, Tinospora crispa**	Tinosporine, cordifolide, tinosporide, cordifole, columbin	Cholesterol synthesis, glycolysis	145, 191, 211-212
92	**Tiospora cordifolia, barberisaristata**	Berberin	Glucose Transport, carbohydrate digestion and absorption, DPP-IV inhibition	213-214
93	**Tribulus terrestris**	Harmine, pinoline,Tribulusamide A and B, Kaempferol-3-beta-D-(6'P-coumarouyl)glucoside, kaempferol-3-glucoside	free radical scavenging activity, Insulin Secretion and beta cell regeneration	215-216
94	**Trigonella foenum graceum**	Sotolon [4,5-dimethyl-3-hydroxy-2(5H)-furanone], trigonelline,gentianine, carpaine compounds,Fenugreekine, C-glycosides,4-hydroxyisoleucine, n-hydroxyisoleucine	Glucose Transport, carbohydrate digestion and absorption	206, 217-219
95	**Citrus Sinesis, Coccinia indica**	Guar gum, Pectin and Pectin fibres, mucilaginous fibre	Glucose transport, carbohydrate metabolism, stabilizing agents	145, 220
96	**Bauhinia varigtla, Ginkgo biloba**	Quercetin, querecetrin, apigenin, rutin, apigenin-7-O-glucoside	Insulin secretion	163, 189
97	**Urtifca dioica**	Fatty oil	Increase insulin secretion	221
98	**Viscum album**	Lectins mistletoe lectin I, II, III, viscotoxin B, cycliton	Insulin secretion , glycogen synthesis	222-224
99	**Vitis vinifera**	Raisin,Proanthocyanidins	Insulinonematic activity	167, 225-226

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100	**Xanthium strumarium**	Phenolic compound, caffeic acid	Increase glucose utilization	227
101	**Xanthocercis zambesiaca**	Castanoapermine, epifagomine, fagomine	carbohydrate digestion and absorption, insulin secretion	228
102	**zizyphus sativa**	Tanin	Dose dependent reduction in blood glucose level	229

CONCLUSION

Diabetes mellitus, a disorder of carbohydrate, fat and protein metabolism attributed to less or no production of insulin or mounting resistance to its action. Herbal treatments for diabetes are utilized in patients with insulin-dependent and adult-onset diabetes mellitus, diabetic retinopathy, diabetic peripheral neuropathy, etc. Scientific validation of several Indian plant species has proved the efficacy of the herbs in reducing the sugar level.

There are several plants known for their antidiabetic activity, with different mode of action and phytoconstituents. This is often an endeavor to streamline the phytoconstituents of specific family with specific mode of action to scale back plasma glucose. Keeping visible from the reports on their potential effectiveness against diabetes, it's assumed that the herbs have a significant role to play within the management of diabetes, which needs further exploration for necessary development of medication and nutraceuticals from natural resources.

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Tourist Satisfaction about Tourist Destination: A Study of Guhagar Taluka

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ABSTRACTS

Guhagar is a beautiful and attractive destinations in Ratnagiri district of Maharashtra. It is known for its clean and sandy beaches, coconut trees, betel nuts and mango trees. This paper aims to find out tourist satisfaction about Guhagar Taluka as tourist destination. For the study purpose 128 tourists visiting Guhagar in the month of December were taken as sample size. Physical questionnaire was given them to collect the data. Findings of study state that tourists are very satisfied with environmental quality, climate condition and attractiveness of natural environment. Tourist are satisfied with accommodation facility and personal safety and security. But Tourist are dissatisfied with most of the factors like signage (directions), local transportation price, road connectivity, followed by shopping facility, price charged by local shop keepers, cultural programme and network of local transport service.

Keywords: Guhagar Taluka, Tourism, Satisfaction level, Konkan, Tourist

1. INTRODUCTION

Nowadays Tourism has become a local to global level phenomenon in the last three decade. Tourism industry has become fastest growing industry in the Maharashtra, India and world. It is a development road of economic growth, foreign exchange and employment opportunity without pollution for the public and local people. Near about 50 employment opportunity created for every ten lakh of investment in this sector. Tourism industry created jobs in India 12.95 percent. India has large tourism resources but international tourism arrival was only 1.24 percent in the year 2018. In India 88.72 million jobs, 12.95 % of its total employment created by tourism.

Tourism sector is emerging in the state of Maharashtra. Konkan belt is favorable tourist destinations in Maharashtra. In this belt Ratnagiri district is more attractive destination for tourist. On one side the rising hills of Sahyadri on east and the depths of Arabian Sea on the west contribute to the unparallel beauty of Ratnagiri district. In the Ratnagiri district, Guhagar taluka is prominent and the most diverse attractions for the tourists. Guhagar taluka is highly blessed with beautiful beaches, natural beauty, two creeks, historical temples, forts, calm environment, coconut garden, hospitable, religious people, great food and rich traditional culture. In spite of tourism potential, Guhagar is depend upon on Mumbai for earning purpose because of no developement for employment. Guhagar is looking pearl of ocean but tourism industry has not developed properly. Tourist satisfactions are the main important factor of the development of tourism. If the tourists satisfy tourism industry will help for the development of Guhagar taluka economy.

2. REVIEW OF LITERATURE

The study titled "**A critical analysis of tourist satisfaction and destination loyalty**" aims to assess destination loyalty by examining the influence of satisfaction and image factors on international tourists who had visited Penang. Findings of study indicated that there was a strong relationship between satisfaction, image and destination loyalty. The found that 'friendliness of people' was significant for foreigners while 'cleanliness of environment' was not significant. It was also found that foreigners who were satisfied with image factor were willing to recommend Penang to others. **(Som, et.l, 2011)**

The paper titled "**A Study on Development of Tourism in Maharashtra**" attempts to focus on to find out purpose to visit Maharashtra and understand travel behavior of tourist visiting Maharashtra. Research revealed that tourists prefer Maharashtra for holiday for leisure and recreation while religious activity was next preferred. Study also revealed that tourist visit atleast once in a year and they had mixed opinion about choosing Maharashtra as tourist destination. **(Deshpande & Deshpande, 2016)**

The study titled "**Exploring Konkan Tourism : A study of tourist's preferences and factors influecing tourists' satisfaction**" aims to study inter-relationship beween tourist perception, expectations and factors influencing tourists' satisfaction in Konkan Belt. The study reveals that international, domestic overnights and international travelers of both the genders visit frequently to the Konkan region and both the genders prefer to travel as an individual traveler or with the spouse and also in a group of friends and family members. Similarly tourist from all the categories travels with various tourism motives such as religion, leisure, holiday as well as sports. It is also observed that people visiting Konkan largely come here for leisure and pleasure as it is the highest rated tourism type followed by holiday and recreation. The study concludes that The study

showcases that Konkan has tremendous untapped potential for growth and need to be developed as quickly as possible. **(Kalkar et.l, 2020)**

This paper titled "**Tourists' satisfaction about tourism places : A study of Sindhudurg and Palghar districts of Maharashtra**" aim to study he tourists satisfaction regarding tourism place. The findings of study reveals that the tourists are satisfied with transportation facility, tourists site scenes, tourists places (Cultural/Historical), attitude/behaviour of local people, parking facility, safety and security and cleanliness at tourist's places. Tourists are dissatisfied with facilities like Drinking water, Toilet blocks and Guide facility. **(Deshpande et.l, 2016)**

This study titled "**Rain Tourism: A Progressive Opportunity and Challenges for Konkan Tourism**" aim to study the possibility of rain tourism as a progressive opportunity in Konkan and identify the challenges that needs to meet to convert the concept of Rain Tourism into reality. The research data reveals that majority of respondents showed their keen interest in the fun activities packages in Konkan during rainy season. The 96% respondents were very affirmative about their enjoyment level associated with green caped mountains, waterfalls, natural beauty and rain associated activities. The respondents preferred to visit to Konkan during monsoon to enjoy rains with their families and friends hence the packages should be developed keeping in mind the family enjoyment or a same age group friends. The study further reveals that during monsoon, the prime concern of the tourists is safety and security along with safe transportation. The safety and security is in reference to quick help in case of emergency, safety from natural calamities arising due to heavy rains. Food variety, 24 hours hot water & electricity, control of waterborne illness can be categorized into very important parameter while rain activities and mobile network into important necessity as per the tourists evaluation. The data clearly conveys that the perception of the respondents is a strong belief and support to the success of the Rain Tourism concept. **(Naik & Garge, 2021)**

3. RESEARCH GAP

The review of literature makes it clear that researches are done on tourism in Maharashra and Konkan. But no research is done on tourism in Guhagar Taluka of Ratnagiri. So the present research is an attempt to fill up this gap.

4. OBJECTIVES OF THE STUDY

1) To study the satisfaction level of tourist visiting Guhagar Taluka tourist destinations.

2) To study problems faced by tourist at Guhagar Taluka tourist destinations.

3) To suggest suitable marketing strategy for the tourist companies to design tour package for Guhagar Taluka.

5. HYPOTHESIS STATEMENTS

1) H_0 = There is no significant difference between age and reason for visiting Guhagar taluka tourist destination

H_1 = There is significant difference between age and reason for visiting Guhagar taluka as tourist destination

2) H_0 = There is no significant difference between with whom tourist accompany for tour and their intention to re-visit Guhagar in future

H_1 = There is significant difference between with whom tourist accompany for tour and their intention to re-visit Guhagar in future

6. RESEARCH METHODOLOGY

6.1 TYPE OF RESEARCH:

Present study is a qualitative research design to understand opinion and experience of tourist satisfaction about Guhagar Taluka tourist destination.

6.2 AREA OF STUDY:

The research was conducted in at tourist destinations of Guhagar Taluka.

6.3 SAMPLING METHOD

The sampling technique followed was convenience sampling method where the sample is taken from a group of tourist who were easy to contact or to reach.

6.4 Target Population and Sample size:

128 tourist visiting Guhagar Taluka tourist destinations in the month of december were taken as a sample for research.

6.5 Type and Source of Data:

The present study is based on primary data and secondary data. The primary data was collected by structured questionnaire. Open and close ended questions were asked in the questionnaire to get the answers of those questions, which were related to the objectives laid down in the study. The tourist (respondents) were given physical copy of questionnaire and requested to fill the same. Secondary data is collected from various websites and research papers.

6.6 Statistical Tools Use:

Graph is used to organize data and are intended to display the data in a way that is easy to understand and remember. Chi-square test is used for hypothesis testing.

7. DATA ANALYSIS AND FINDINGS OF THE STUDY

Tourists are important stakeholder for the development of tourism industry. Without tourists' satisfaction tourism cannot development. The success of tourism is depending upon satisfaction of tourist. Total 128 respondents have been selected belonging to various destinations of Guhagar taluka with a structured questionnaire to get their tourism related information.

Fig. 7.1 Age of Respondents
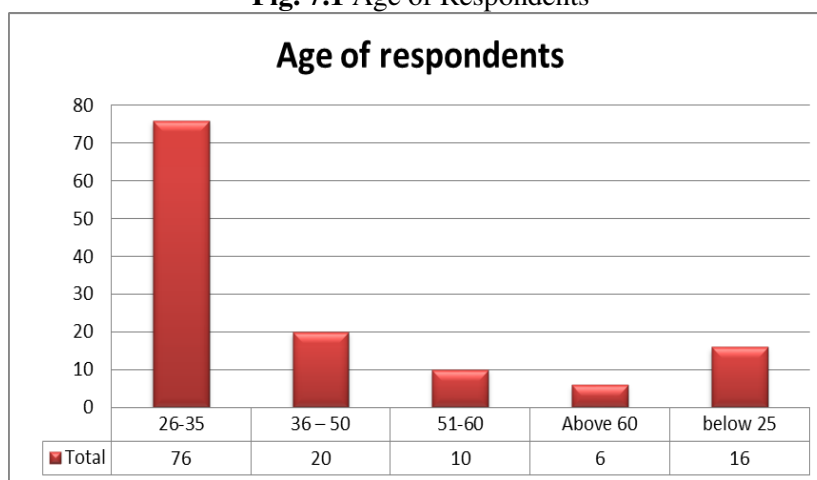
Source: Primary Data

The above graph shows that there were 16 respondents from age group of 25 years, 70 respondents were from the age group of 26-35 years, 20 were from 36-50 years of age group, 10 from 51-60 years of age group, 6 were from above 60 years of age. Most of the respondents (tourist) were from 26-35 years of age.

Fig. 7.2 Gender of respondents
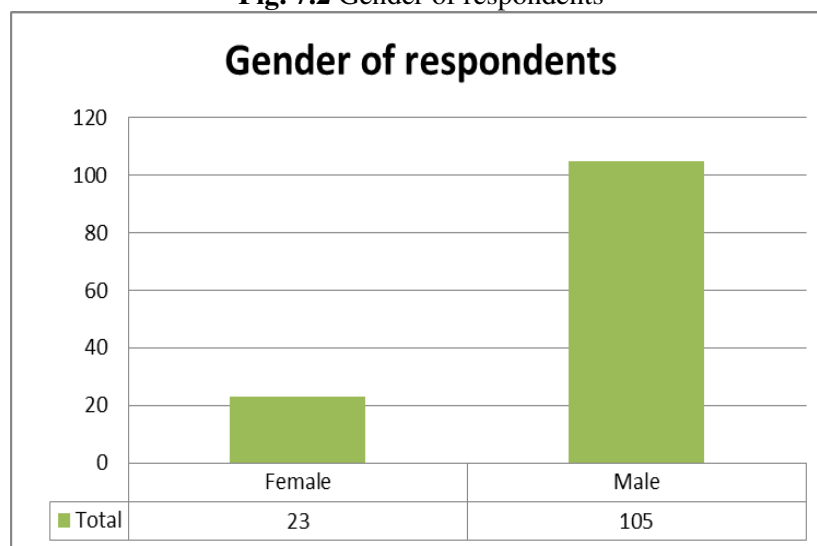
Source: Primary Data

The above graphs represent the gender of respondents. Amongst 128 respondents 105 were male respondents and 23 were female respondents (tourists).

Fig. 7.3 Annual Income of respondents

Annual Income of respondents

	Above Rs. 15 Lakhs	Rs 10.00 lakhs – Rs. 12.50 Lakhs	Rs 2.5 lakhs-Rs 5.00 Lakhs	Rs 7.5 lakhs – Rs 10.00 Lakhs	Rs. 12.5 lakhs- Rs. 15.00 Lakhs	Rs. 5.00 lakhs- Rs 7.5 Lakhs	Upto Rs.2.5 Lakhs
Total	6	9	38	6	4	47	18
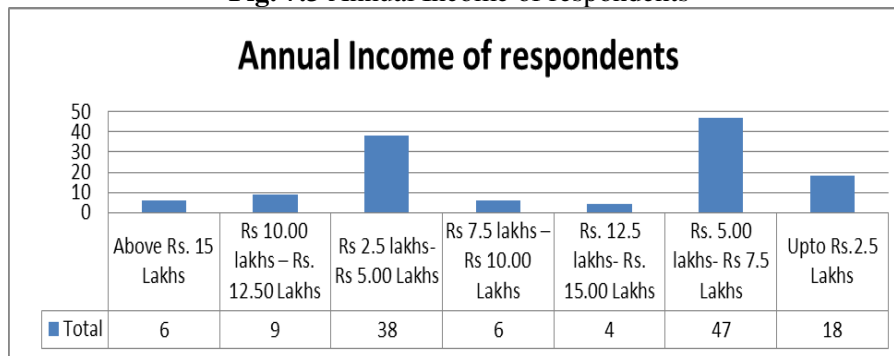
Source: Primary Data

The above graph represents that 18 respondents has annual income upto Rs.2.5 lakhs, 38 were from income group of Rs.2.5 lakhs to Rs.5 lakhs, 47 were from income group of Rs.5 lakhs to Rs.7.5 lakhs, 6 were from income group of Rs.7.5 lakhs to Rs.10 lakhs, 9 were from income group of Rs.10 lakhs to Rs.12.5 lakhs, 4 were from income group of Rs.12.5 lakhs to Rs.15 lakhs and 6 respondents were from income group of above Rs. 15 lakhs. Most of the respondents were from annual income group of Rs.5 lakhs to 7.5 lakhs and 2.5 lakhs to 5 lakhs.

Fig. 7.4 Educational Qualification of respondents

Educational Qualification

	Below SSC	Graduation /Diploma	HSC	Post-Graduation	SSC
Total	2	96	14	11	5
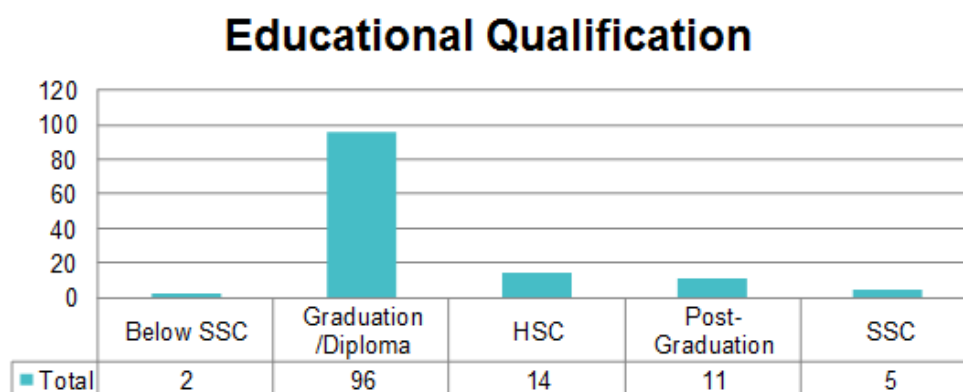
Source: Primary Data

The above graph states that 2 respondents studied below SSC, 5 upto SSC, 14 upto HSC, 96 Graduate/Diploma and 11 studied upto Post Graduation. Most of the respondents (tourist) were studied upto Graduation / Diploma.

Fig. 7.5 Length of stay of respondents

Length of stay

	1 days	2 –3 days	More than 3 days
Total	83	35	10
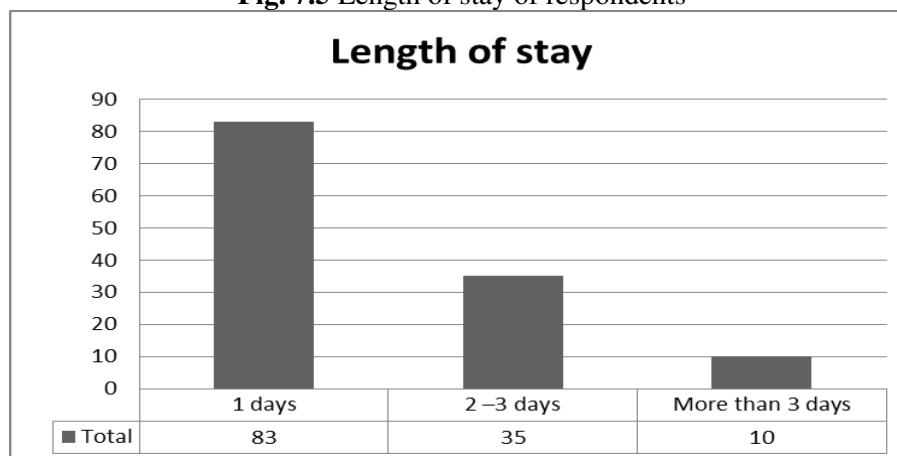
Source: Primary Data

The above graphs shows that 83 respondents said they will stay for 1 day, 35 said 2-3 days and 10 said that they will stay for more than 3 days. So mostly the length of stay of tourist at Guhagar taluka is upto 1 day.

Fig. 7.6 Respondents accompanied by for Guhagar Tour

Accompanied by

	Colleagues	Family	Friends
■ Total	22	76	30
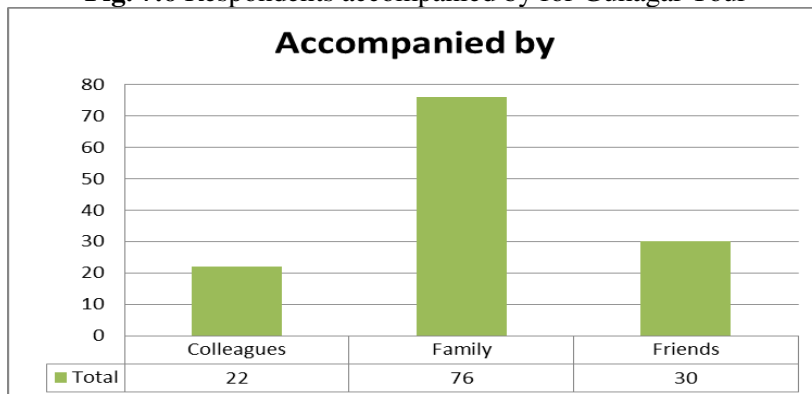
Source: Primary Data

Above graph states 22 respondents were accompanied by their colleagues, 76 said accompanied by family and 30 said accompanied by friends. So most of the respondents (tourist) were accompanied by their family members.

Fig. 7.7 Accommodation preference of respondents

Accomodation

	Home stay	Hotel
■ Total	65	63
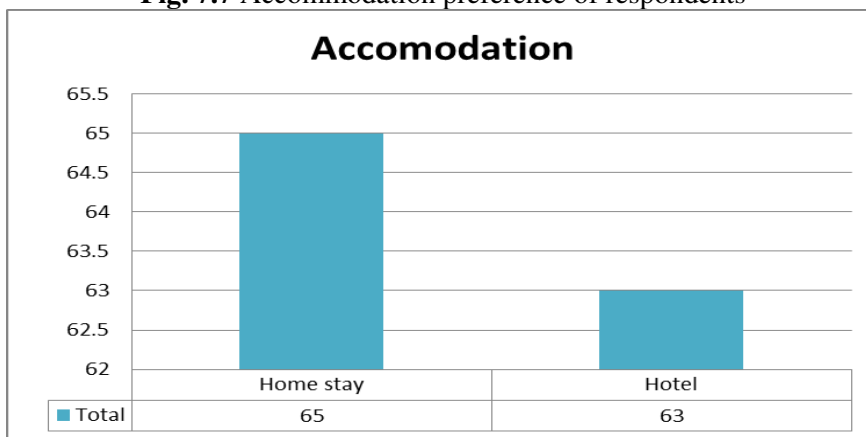
Source: Primary Data

Above graph makes it clear that 65 respondents said that they preferred home stay and 63 respondents said they preferred hotels for accommodation. So almost equal preference is given to home stay and hotels.

Fig. 7.8 Where did you hear about Guhagar Taluka as tourist destination?

Where did you hear about Guhagar Taluka as tourist destination?

	Books and guides	Fairs and/or exhibitions	Friends and relatives	I already knew of it	It was part of the travel package	Media	The Internet	Travel agency
—♦—Total	1	2	54	21	5	15	20	10
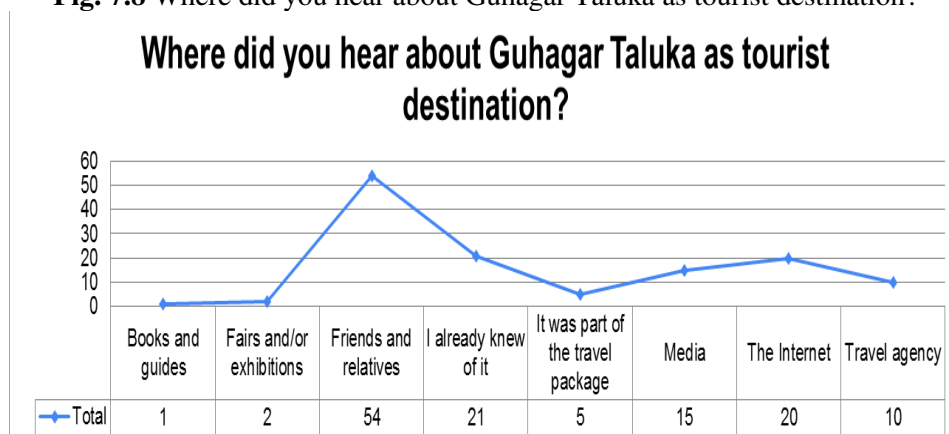
Source: Primary Data

Above graph makes it clear that, 54 respondents said that they heard about Guhagar Taluka as tourist destination from their friends and relatives, 21 said they already knew about Guhagar Taluka and 20 said internet. So most of the respondents heard about Guhagar Taluka as tourist destination from their friends and relatives.

Fig. 7.9 What is the main reason for you to visit Guhagar Taluka?

What is the main reason for your visit to Guhagar Taluka tourist destination?

	Business reasons and Attending a conference	Experience Culture	Health	Historical purpose	Religious reasons	Rest, relaxation and fun	Sports and Adventure	Testination wetting	Visiting relatives and friends
Total	2	14	2	1	12	81	9	1	6
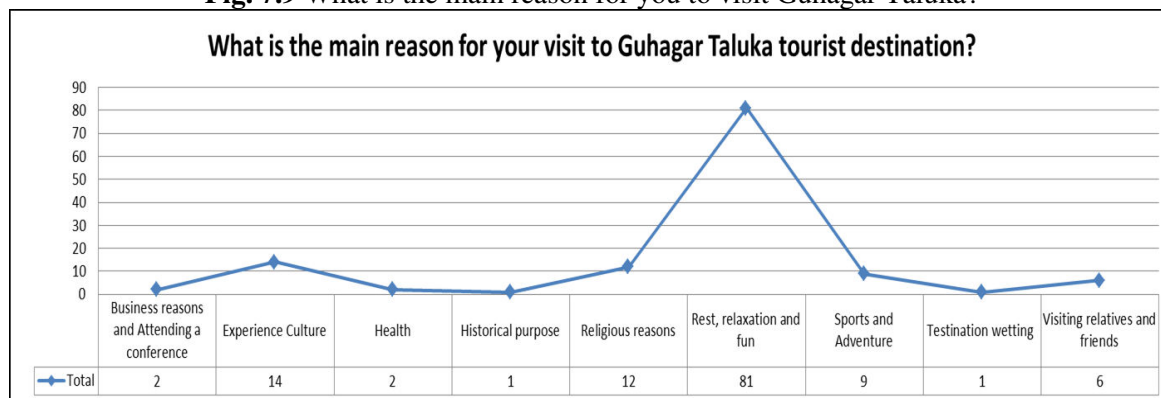
Source: Primary Data

The above graphs shows that 81 respondents said that their visit to Guhagar Taluka is for rest, relaxation and fun, 14 said experience culture and 12 said religious reasons. So most of the tourist visit Guhagar for rest, relaxation and fun.

Fig. 7.10 Main reasons for visit to Guhagar Taluka tourist destination?

Particulars	Very Dissatisfied	Dissatisfied	Somewhat Satisfied	Satisfied	Very Satisfied
Accommodation facility	5	33	24	46	20
The offer of local cuisine	6	37	33	35	17
Boating and Adventures	11	60	17	30	10
Personal safety and security	10	40	19	47	12
Friendliness of local residents	16	42	28	32	10
Price charged by local shopkeepers	13	54	27	27	7
Availability of shopping facilities	11	55	28	28	6
Value for money for shopping	12	54	24	31	7
Cultural Programmes	26	46	21	27	8
Level of hygiene and sanitation	11	41	25	33	18
Network (accessibility) of local transport services	22	45	22	24	15
Environmental quality	3	14	13	33	65
Climate condition	3	9	15	39	62
Attractiveness of natural environment	1	11	19	46	51
Attitude of local drivers	15	53	30	24	6
Level of local transportation prices	9	71	20	23	5
Signage (directions)	14	76	16	18	4
Road Connectivity	14	71	19	22	2
Overall satisfaction	7	73	15	31	2

Source: Primary Data

Above table states that tourist are satisfied with accommodation facility and personal safety and security at Guhagar. Tourists are very satisfied with environmental quality, climatic condition and attractiveness of natural environment. But Tourist are dissatisfied with most of the factors like signage (directions), local transportation price, road connectivity, followed by shopping facility, price charged by local shop keepers, cultural programme and network of local transport service.

Fig. 7.11 Was your trip to Guhagar tourist destination organized by a travel agency?

Yes 16%
No 84%
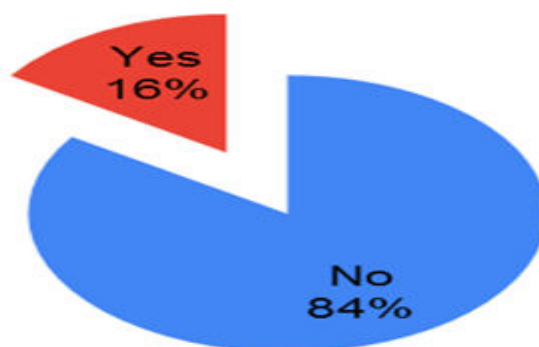
Source: Primary Data

The graph states that 84% respondents (tourist) said their trip is not organized by travel agency and only 16% said their trip is organized by travel agency. So most of the respondents said that their trip is organized by themselves.

Fig. 7.12 Would you like to re-visit Guhagar again in future?
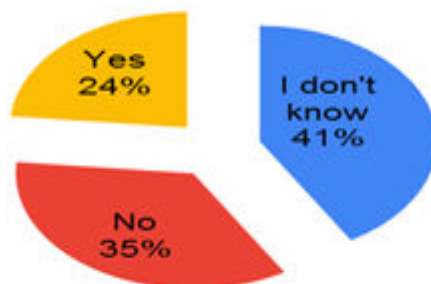
Source: Primary Data

The graph makes it clear that 41% respondents said that they don't know whether they will visit Guhagar again, 35% said NO and 24% said YES to visit Guhagar again in future. So due to dissatisfaction from various factors tourist are neutral or saying NO to re-visit Guhagar in near future.

Fig. 7.13 Would you recommend Guhagar as tourist destination to your known people?
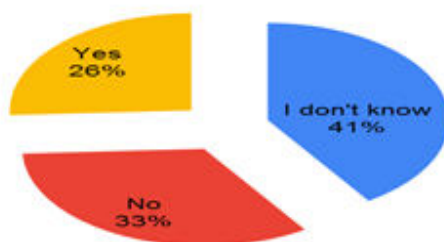
Source: Primary Data

The graph makes it clear that 41% respondents said that they don't know whether they will recommend Guhagar destination to their known people, 33% said NO and 26% said YES that they will recommend Guhagar as tourist destination to their known people. Here also due to dissatisfaction from various factors tourist are neutral or saying NO to recommend Guhagar as tourist destination to their known people.

8. HYPOTHESIS TESTING
H_0 = **There is significant difference between age and reason for visiting Guhagar taluka as tourist destination**

Chi-Square Test

		Business and Attending conferences	Experience Culture	Health	Historical purpose	Religious reasons	Rest, relaxation and fun	Sports and Adventure	Testination wetting	Visiting relatives and friends	Total
26-35	Observed	1	8	1	0	7	49	4	1	5	76
	Expected	1.19	8.31	1.19	0.59	7.13	48.09	5.34	0.59	3.56	76.00
36 – 50	Observed	0	1	0	0	3	15	0	0	1	20
	Expected	0.31	2.19	0.31	0.16	1.88	12.66	1.41	0.16	0.94	20.00
51-60	Observed	1	0	1	0	2	6	0	0	0	10
	Expected	0.16	1.09	0.16	0.08	0.94	6.33	0.70	0.08	0.47	10.00
Above 60	Observed	0	1	0	0	0	4	1	0	0	6
	Expected	0.09	0.66	0.09	0.05	0.56	3.80	0.42	0.05	0.28	6.00
below 25	Observed	0	4	0	1	0	7	4	0	0	16
	Expected	0.25	1.75	0.25	0.13	1.50	10.13	1.13	0.13	0.75	16.00
Total	Observed	2	14	2	1	12	81	9	1	6	128
	Expected	2.00	14.00	2.00	1.00	12.00	81.00	9.00	1.00	6.00	128.00

41.05 chi-square
32 df
.1311 p-value

The chi-square test was applied and the results showed that the chi-square value is 41.05 and p value = 0.1311, which is more than 0.05 therefore H_0 is accepted which states that there is no significant difference between age and reason for visiting Guhagar taluka tourist destination. **All age group tourists have same reason for visiting Guhagar taluka tourist destination**

H_0 = There is no significant difference between with whom tourist accompany for tour and their intention to re-visit Guhagar in future

Chi-Square Test

		I don't know	No	Yes	Total
Colleagues	Observed	5	13	4	22
	Expected	9.11	7.73	5.16	22.00
Family	Observed	34	22	20	76
	Expected	31.47	26.72	17.81	76.00
Friends	Observed	14	10	6	30
	Expected	12.42	10.55	7.03	30.00
Total	Observed	53	45	30	128
	Expected	53.00	45.00	30.00	128.00

7.38 chi-square
4 df
.1169 p-value

The chi-square test was applied and the results showed that the chi-square value is 7.38 and p value = 0.1169, which is more than 0.05 therefore H_0 is accepted which states that there is no significant difference between with whom tourist accompany for tour and their intention to re-visit Guhagar in future. **Whomsoever tourist accompany with for tour that doesn't affect their revisit to Guhagar in future.**

8. LIMITATIONS

1) Sample size of 128 is a limitation; the findings may differ with higher sample size.

2) The study is limited to Guhagar Taluka tourist destinations.

3) Responses given by respondents may be biased.

9. CONCLUSION AND RECOMMENDATIONS

The study concludes that the tourists are very satisfied with environmental quality, climatic condition and attractiveness of natural environment. But Tourist are dissatisfied with most of the factors like signage (directions), local transportation price, road connectivity, followed by shopping facility, price charged by local shop keepers, cultural programme and network of local transport service.

Most of the tourists were neutral about revisiting to Guhagar and about recommending Guhagar as tourist destination to their known people. Significant number of respondents said NO to revisit to Guhagar and about recommending Guhagar as tourist destination to their known people.

There are some prominent problems that tourist faced at Guhagar tourist destinations are getting good quality hotels, poor quality of roads, tourist information centre, poor facility on beaches, not availability of entertainment park and some respondents stated that there was no much variety of food and food was costly.

To overcome dissatisfaction of the tourist, researcher would like to recommend tie up of tour companies and local residents to provide better accommodation, local transportation, food and entertainment to the tourist visiting Guhagar. This will develop tourism at Guhagar. Further tourist companies and local residents can have good business out of tourism.

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Controversy Detection of Social Media Comments Survey through Machine Learning Approach

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ABSTRACT

The online social media is rapidly spread across the world, in terms of news, political gathering news, comments on different news and associations and news of sources are utilize with the large amount of controversy on it. So that, from the no. of sources the information is collected as determination of individuals on the different social media sites there may be controversy on that determination. Now a day the social media changed their way to setup people's opinion and how they are processed it. Thus the user need to perform the different action on the social media i.e. view of data which is mostly presented on social media and pick up the general overview of the topic before coming as any conclusion and evaluation. In every single application the major still testing task that should be appropriate is it inherently order whether a topic is controversial or not. In this Machine Learning Classification Algorithms are used for divide opinions into sub-classes i.e. Positive, Negative, and Neutral. The most used classifiers in Sentiment Analysis are Naïve Bayes and the Support Vector Machine (SVM).

Keywords: Controversy Detection · Sentiment Analysis · Machine Learning · Survey

INTRODUCTION

The communications of people on different platform is being performing and sometimes the people's opinion or people's sentiments on different issues, events, products, particular topics and their characteristics. The analysis of people's sentiment is performing vastly in recent years. Analysis on different topics of peoples on different platform using their sentiments, such sentiment analysis is considered as the branch of data mining, natural language processing and machine learning. The content which are presented or posted on social media is analyzing and monitoring. After that such process gives some important aspects in it and also the typical media means weren't able to transmit. The entertainment or elementary social relation has overreach limit in social media. By using social media, it seems to be review as a creature that has structure and soul. The Social media now reply the opinions of the people over the social media it knowledge their feelings, opinions and emotions. This paper undertakes the approach of public opinions and thoughts to find within social media means specially twitter and face book. Using social media, the people creates the virtual community group to perform communication or different social activity to be provided different source of information regarding impression of knowledge and communication. The development of sentiment analysis on information of individuals in social media is growing vastly. The researchers have been refining into different aspects of the application.

In the commercial viewpoint the online opinions and advice is given to both the customers and dealer by the sentiment analysis. So the e-commerce platform is using this commercial viewpoint and analyzing the services as well as products and performing preferences on sentiment analysis data.

In the political viewpoint, the huge demand for information regarding politics, it is a demanding and important aspect. It is sentiment analysis of people's viewpoint on different political scenario on the online social media. For example, in the India, the "exit poll" produces the controversy in people's as well as political party.

The no. of methods has been evolved and regulates to perform sentiment analysis operational in different sector. Although the sentiment analysis is not in overdue stage so suffer changes. But some of the reviewers are performing well in this filed and giving the progressive shape. In this research paper, the author performing surveys on detection of controversy which are arise in the different field. The analysis is detected by sentiment analysis using machine learning approach.

2   PROPOSED METHODOLOGY

In the proposed methodology, the information which is present on social media is gathered but it will be one side; unruly what's more has scores of different issues. But the impression of these issues can be reduced by taking information on a separate topic from the different sources and single groups comments as well as posts. So we can perform the analysis of different users information as well as communication with contents which are processed by writers from different sources one sided towards different topics. The analysis is mainly performed on a social media as like Facebook and twitter. In statements related to Covid 19 pandemic, Suresh

Raina rejected in IPL, farmers Act. Bill and currently on the Ukraine-Russia war. The following diagram shows the sentiment analysis of social media content using machine learning approach.
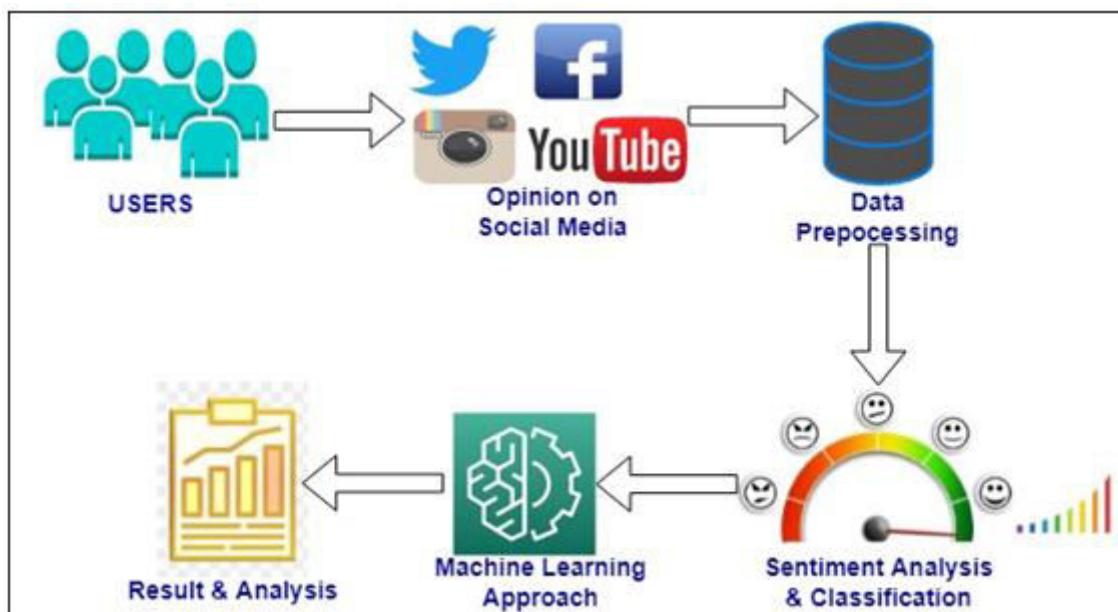
Fig.: Sentiment Analysis using Machine Learning Approach

In this paper we are able to analysis the different information which can accurately arranged as well as it is presented on social media, whether it's controversial or not. The post studies have find out a some parts of these comments, posts and other new contents of social media, but it seems that the maximum time it choice normally to be re-tweets. Overall the previous work can be outlined as contextual analysis or inspection where argument is determine in a diligently curate dataset, the information which is gathered then it utilize the large space learning and helper are form the specific sources. Our objective is to recognize the controversy in the topic which is not primarily know the topic or nay domain related knowledge about that topic in question. So we are compliment these result by sentiment analysis on the same topic using user's opinion that include news magazine, news paper (i.e. print media), radio, television (i.e. Broadcast news) and blogs, online news, social media post, comment, etc (i.e. on Internet).

They has their own websites for publication, the editors of newspaper publishes an editorial article on many news or events which provide accurate and important information about news and events .it helps to find out controversy of news and event. We fetch editorial articles, blogs by scientist and researchers regarding news or event from different standard newspapers, online scientific blogs, websites and magazine [11].

Table 1. Dataset of Comments

Sr. No.	Event / News	No. of comments
1	Covid 19 Pandemic	3977
2	Farmers Act. Bill	1194
3	Suresh Raina rejected in IPL	974
4	Ukraine-Russia War	15443

2.1 Program Code

i.e. CFS=(SCC+CSS)/2

Where, CFS=Controversy of the Event or News final score SCC= Score of Controversy Comments

CSS = Here questions comes of different controversy score that will be the value of K, we prefer a table method of percentage method of polarity.

Algorithm of Controversy Detection approach showing below

//Input and output:

A (Articles),

T (Topic), t (tweets),

ConsumerKey,

ConsumerSecret Token_ Access, Token_Access_Secret

Output: Score of Controversy

//In article A while steps, tweet in t do

r ← reactions

s ← share

c ← comments

ar ← average reactions

as ← average share

ac ← average comments

sent ← sentences

sent_con ← article.sentences with vocabulary of controversial sentences

sent_ com ← All sentences in all comments of an article.

sent_com_con ← sentences in comments with articles of controversial vocabulary.

sent_ tweet ← In topic T all tweets of total sentences

sent_tweet_con ← the controversial tweets of vocabulary of topic T in sentences.

pos ← positive comments

neg ← negative comments

i ← (r/ar + s/as + c/ac) / 3

l←(sent_con/sent)+(sent_com_con/sent_com) +(sent_ tweet_con/ sent_ tweet)

if 1.5 pos<neg then article_ sentiment ← (pos − neg)/(pos + neg)

tweet_sentiment ← (pos − neg)/(pos + neg)

else article_ sentiment ← 1 − (pos − neg)/(pos + neg)

tweet_ sentiment ← 1 − (pos − neg)/(pos + neg)

*end if article_ controversy_score ← i * l * article_ sentiment*

*tweet_ controversy_score ← i * l * tweet_ sentiment if article_ controversy_score> 0.7 then*

article.label ← controversial

arcticle_final_score ← article_final_score + 1else

article.label ← non controversial

end if

if tweet_ controversy_score> 0.7 then tweet ← controversial tweet_final_score ← tweet_final_score + 1

else

tweet ← non controversial

end if

end while

if article_final_score/len(A) > 0.5 then

T.label ← controversial else

T.label ← non controversial

end if

if tweet_ final_score/len(t) > 0.5 then

t.tweet ← controversial

else

t.tweet ← non controversial

end if

returnT.label, t.tweet

3   RESULT

Table 2. Controversy Result of all event

News or_Events	Percentage_of_Negative_Comments	Mean_of_Negative_Polarity_Comments	Percentage_of_Negative_Sentences	Mean_Negative_Polarity_Sentences	Controversy_Score_Comments	Controversy_Score_Sentences	Final_Controversy_Score
Covid 19 Pandemic	**25.390244**	**-0.30204**	**18.70504**	**-0.1883**	**0.565254**	**0.268527**	**0.4168905**
Farmers Act. Bill	**23.947368**	**-0.28409**	**18.87755**	**-0.17798**	**0.768716**	**0.291332**	**0.530024**
Suresh Raina rejected in IPL	**47.036697**	**-0.12633**	**17.94872**	**-0.1655**	**0.957074**	**0.329974**	**0.643524**
Ukrain-Russia War	**29.613963**	**-0.31823**	**27.38095**	**-0.29333**	**0.522**	**0.6081**	**0.56505**
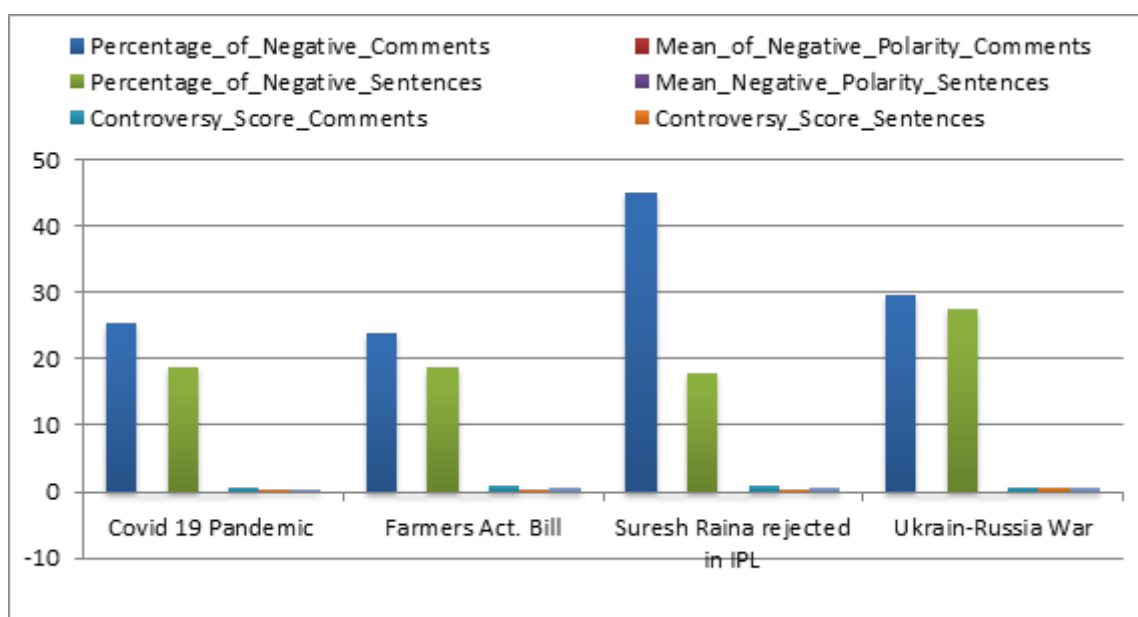
Fig: - Controversy Score Comment Result

4   CONCLUSION

In this research paper, we study and analysis on social media activity on the various subject or issues and on desire news sources from different types with special approach on polarity of the user reaction. In this we are

performing the collective study of text which is posted on social media as well as their sentiment & performing analysis on such controversial date and gives result. Other than our study determine that our research domain process is not dependent on any other domain i.e. it is fully independent and it is uses any dataset. Controversy score can be used to generate recommendations for trending or hot topics in news feeds on social media. With the above bar chart the output table shows the different types of comments which are posted on social media get highest range on the negative side of news. In future side of work research we are intend to investigate these parameters in other different domain and find out the controversial data and probability of post being fake or not.

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Contactless Attendance System (CAS) Based on Face Recognition

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ABSTRACT

Another alarming reality in recent days is the rapid spread of pandemic sickness (COVID'19). To avoid the use of biometric identification after education institutions reopen, a security precaution of applying an AI-powered contactless system must be taken. If students employ the biometric method, they will become infected. To address the aforementioned issues, an efficient Contactless Attendance System (CAS) is presented in given paper. This system will automatically record the pupils' attendance as they seated in the classroom by recognizing their faces. The pupils' count also kept track on a regular basis. The entire time of presence of the pupils inside the class can be readily calculated using this technique.

Keywords: RFID card, CAS, PCA, LDA. hybrid approach, etc.

INTRODUCTION:

There are a number of automated attendance methods available in the market that allow students to indicate their attendance into the class room. The following are some of them: RFID card, using Bluetooth device, fingerprint recognition but as we know they have drawbacks such as using RFID card fraud attendance, misplace of card, lost of card while in case of using GPS technology, mobile presence is mandatory instead of student also in case using finger print recognition, touch system having the chance of caught infection, hard to install and also expensive, can`t use for physically disabled person or having the issues while finger scanning[1].

Face recognition technology has advanced significantly in recent years as the world has changed. Smarter attendance using real-time face recognition is used to take attendance using facial biometrics by detecting people's faces. In films or photographs acquired by a surveillance camera, computer systems can detect and recognize faces precisely and fast [2]. To detect the faces of students, you don't need to install any special cameras or gear. Instead, students' faces will be recognized by CCTV cameras installed in class-room.

PROPOSED SYSTEM:

We've submitted our ideas for constructing a "Contactless Attendance System (CAS) Based on Face Recognition," which can be used for a variety of purposes. The proposed automated attendance system should be able to work with either still photos or video streams in a closed classroom [3]. Many still photographs with a little time delay should be used to maximize the possibilities of identifying and recognizing all students [4]. The teacher should install the detection and recognition program on the computer system and run it at the start of each session [5, 6]. Figure [1] depicts the system's layout.
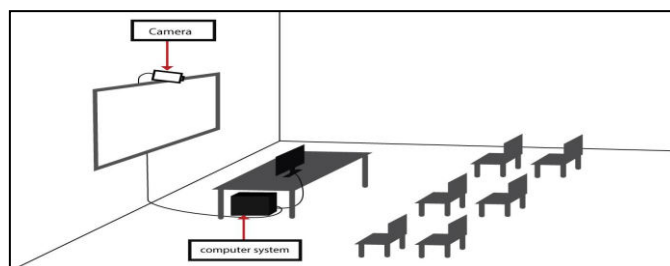
Fig.1. Layout of proposed system[Source: Google Image].

METHODOLOGY:

Face recognition is divided into two phases: processing before detection, that includes face detection and alignment (localization and normalization), and recognition, which includes feature extraction and matching phases [5]. The photos for each student will be captured and converted into grayscale first. The photograph was then saved in the database along with the Roll Number. A face detection technique will be utilized to identify local aspects of the face by dividing the image into pixels throughout the face detection phase. The Region of Interest (ROI) is an area of the face from which features are extracted and information about the gradients in the face is recorded during the feature extraction process. After the face has been detected and processed, the data in the SDB (Student DataBase) will be compared to the face present. When the camera detects a face, it

compares the current visible face's related values to values stored in the database. If the figures are right, then the face is recognized[7].

EXPERIMENT :

In a single lesson, the system will be able to handle a maximum of 30 pupils. The resolution of the USB camera used in class should be proportional to the class size and number of pupils. It should have a minimum resolution of 2 megapixels (our camera resolution is 1.3 megapixel). The latency in input images is expected to be roughly 10 seconds with 10 input shots[7,8].

I suggest that, a hybrid strategy in this research that uses SVM as a classifier. I use a variety of datasets for the experiment, including the FERET (ORL- AT& T) Face dataset, the Yale dataset, and our own face dataset, SDB with real-time faces (Student DATABASE). To conduct the experiment, I carried out the experiment using a HP laptop with 4GB RAM, 128 GB HDD, HP laptop camera, and Intel core i3 2.10 GHz processor, Matlab 2013a as a software[7,8].

RESULT ANALYSIS :

The Hybrid approach beats other algorithms in ideal lighting settings, but in really poor lighting, all algorithms fail [7,8]. It can successfully identify up to 30 children under normal circumstances. The False Rejection Ratio (FRR) is a measure that indicates the possibility of a face recognition system rejecting a correct effort by an authorized image wrongly. The FRR is calculated by dividing the number of false rejections by the number of recognition shots; however, we address this issue by increasing the amount of samples per individual in the training data set. Table 1 show that as number of sample per pupil increase the recognition rate also increased, kindly note that if we take samples per person more than 8 or 10 the recognition rate goes down. Table 2 shows that, accuracy rate for PCA, LDA and Hybrid approach.

Table 1. Accuracy rate with FRR for PCA, LDA and Hybrid approach.

No. sample per pupil	No. of pupils	No. of pupils recognized by PCA	No. of pupils recognized by LDA	No. of pupils recognized by Hybrid Approach	FRR in % for PCA	FRR in % for LDA	FRR in % for Hybrid Approach
4	10	6	7	8	96.90	97.89	98.50
6	20	15	17	18	75	87.5	90.53
5	30	22	24	26	66.67	83.33	91.67
4	50	29	41	42	75	91.67	92.33
3	60	50	52	55	83.33	91.67	95.23

Table 2. Training set of lighting condition as centre and vary in facial expressing.

No. sample per person	No. of person	No. of person recognized by PCA	No. of persons recognized by LDA	No. of persons recognized by Hybrid Approach	Face recognized rate in % for PCA	Face recognized rate in % for LDA	Face recognized rate in % for Hybrid Approach
4	2	2	2	2	88	92	95
8	8	6	7	8	75	87.50	90
8	12	8	10	11	66.67	83.33	91.67
10	12	9	11	12	75	91.67	96
12	12	10	11	12	83.33	91.67	92
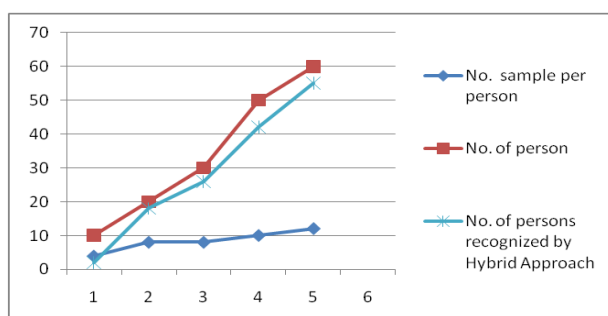
Fig.2. Comparative analysis of no. of sample per person for PCA, LDA and Hybrid approach algorithm.
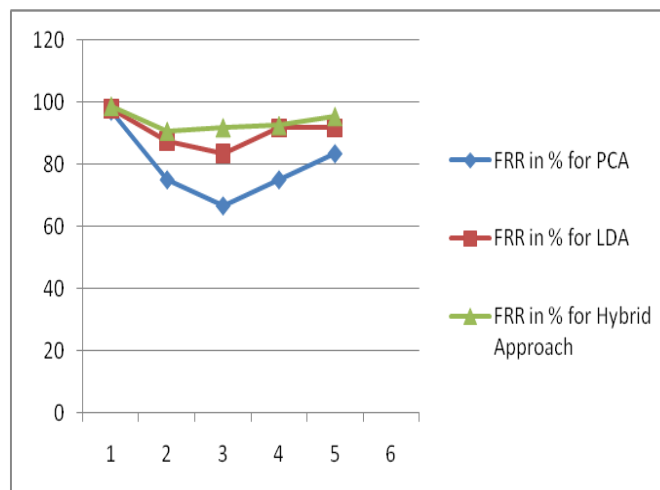
Fig.3. Comparative analysis of FRR result for PCA, LDA and Hybrid approach algorithm.

Time Complexity: The **time complexity** of an algorithm is the number of actions it executes to achieve its objective (considering that each operation takes the same amount of time). In terms of complexity, the algorithm that completes the task with the fewest actions is deemed the most efficient [9,10]. Table 3 shows time complexity for PCA, LDA and Hybrid approach.

Table 3. Comparison for computational time of PCA, LDA and Hybrid approach using FERET, SDB dataset with graphical representation (in microseconds).
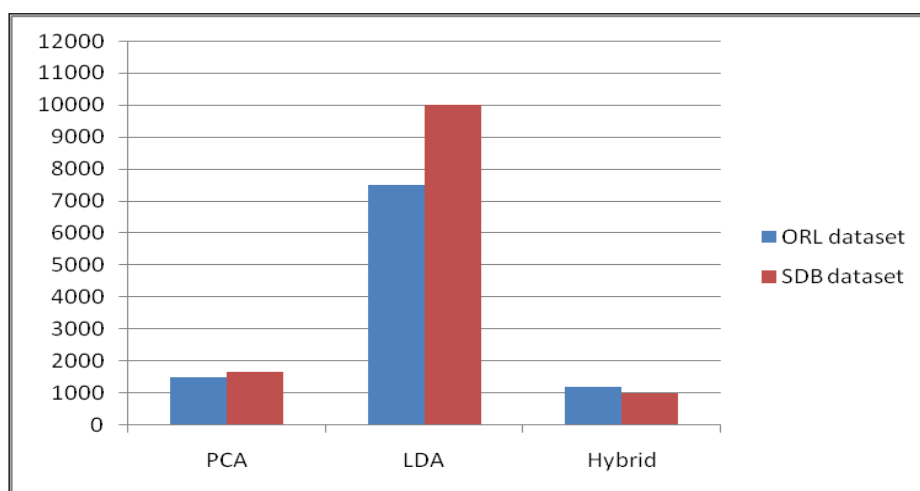
CONCLUSION:

Since they are focused on single person identification systems, i.e. one to many relationship, there are numerous automatic attendance system that employ facial recognition on the market these days. In this research, I focus on the many-to-many connection, which indicates where we can recognise a large number of individuals with a single click, even if the camera resolution seems low. With adequate lighting, I acquired a 98 percent accuracy rate using the hybrid technique, which leads to strong feature extraction. The identification rate was always impacted by lighting conditions because the method is based on real time. Different head poses, as well as differences in characteristics like as someone wearing glasses or a cap with various hairstyles, may impact on RR (Recognition Rate).

FUTURE SCOPE:

Although, if the face is frontal and the illumination is excellent, the current technology yields 92 percent accurate findings. If students' seating arrangements were adjusted in such a manner that all of their features were not recorded by the camera, the outcome would be influenced by up to 25%. As a result, we will be able to enhance it in the future.

Furthermore, one camera is unable to produce a clean image in which all faces can be easily identified. In this case, we may utilize many cameras in a classroom depending on the capacity of the class, or we can install a rotating camera that will capture the entire class image row-by-row or column-by-column.

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Analysis of Deep Learning LSTM, Arima and Prophet Model for Predicting Agriculture Commodity Market Prices

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ABSTRACT

In this research paper, mainly we focused on predicting wheat and rice prices of agriculture commodity market. Our proposed approach is to improve the quality output of agriculture commodity market for which, historical data of wheat prices and rice prices are implement in different algorithms like., ARIMA, Facebook Prophet and LSTM. The performance was assessed by using root mean square error (RMSE), which tells us the best line fit around the centered data. Finally, a comparative study is performed to find the algorithm that gives us best prediction model so it can be a helpful in upcoming future.

Keywords: Deep learning, LSTM, ARIMA, Facebook Prophet, prediction.

1 INTRODUCTION

Agriculture and farming has been a part of human civilization for centuries and has evolved along with technology to create smart farms. The agricultural sector is the backbone of the national economy and prosperity [1]. A forecast is essentially an estimate calculated from historical records and facts. Many other factors such as social, trade, industry conditions, political issues, rumors, and media plug-in that affect the forecast. Professional traders have attempted to make predictions and have developed many technical, basic and quantitative methods [2].

Time series forecasting plays an important role in agriculture markets. The volatility of commodity prices makes it difficult to make timely decisions based on your intuition. Based on this work, you can make decisions that support the best economic outcome. Judging by several previous works, statistical methods have prevailed in predicting price movements. However, in this study, LSTM was found to be the best model for predicting agricultural product prices [3].

2 RELATED WORKS

While there has been a lot of work done on forecasting commodity and stock prices using time series analysis techniques, using deep learning models to predict prices is new. Crop prices are highly volatile, necessitating prediction methods that are more accurate than previous methods.

Traditional econometric approaches mostly utilized previously, such as Auto regressive integrated moving average (ARIMA) which has been popular in researches observing the behavior of foreign exchange and stock market [4, 7].

Many people have chosen ANN and regression prediction algorithms based on the lowest error percentage [8]. Kumar et al. proposed a system for applying prediction by analysing past soil and rainfall datasets [9], whereas Aakunuri proposed crop prediction using weather forecasting, pesticides, and fertilizers[10].

The neural network forecasting problems are based on analyzing the explored parts, which primarily focus on interval forecasting of agricultural commodity futures prices [11]. Firstly, the emphasis is on interval prediction, and the point forecasting of agricultural commodity futures prediction in neural network fields has been overlooked [11]. Secondly, because of gradient vanishing, these existing methods fail to capture very long-term information [11]. Further on, the dynamic dependencies among multiple variables are not being taken into consideration [12]. Deep neural networks, an approach derived from neural networks, can mainly be separated into three categories. First category is to identify statistically significant events, second is to find and predict inherent structure and third is to do accurate prediction on numerical value[13]. Studies have shown that LSTMs are on average 85% more accurate than ARIMA predictions[7].

LSTM is a model derived from RNN architecture that addresses the loss gradient problem, which allows long term dependencies. It was designed in order to be more accurate than CNN[4]. This method not only has the ability of analyzing the time series with a long range of prediction, but also to solve difficulties in missing gradients in data. The LSTM model has been proven to be best[5]. The data used in price forecasting may be

large and, more than likely, nonlinear. Therefore, a good forecasting requires models like LSTM which can investigate hidden patterns and dynamics within large datasets[4,7].

The ARIMA-LSTM hybrid performs much better than Prophet and is accepted as the final algorithm for implementation[14]. In the paper [15], Researcher proposes an approach that uses MAPE to select the best of five predictive models (MA, KNN, ARIMA, Prophet, LSTM), with a focus primarily on stock price analysis. doing. The values of different models are compared. There are six shares from the logistics industry that have individual 1232 records between January 1, 2015 and December 31, 2019. After testing with training sets of different sizes, the performance of the five models will also be evaluated. The calculated MAPE is the lowest in the LSTM, regardless of what type of training ratio is obtained. Overall, LSTMs show more stable and accurate predictions than other models [15].

3. PREDICTIVE MODELS

The characteristics and specifications of the predictive models (ARIMA, Prophet, LSTM) used in this experiment are summarized below.

3.1. Auto Regressive Integrated Moving Average Model (ARIMA)

The SARIMA model has a limitation—the user must select a proper model using autocorrelation function (ACF) and partial autocorrelation function (PACF) plots, as well as calculate the Akaike information criterion (AIC) or the Bayesian information criterion (BIC). To resolve this problem, the auto_arima method was developed, which automatically selects an optimal model [16]. In our implementation, we used the auto_arima function provided by the Python pmdarima library.

The auto_arima function fits the best ARIMA model to a time series according to a given information criterion (either AIC, BIC, or the Hannan–Quinn information criterion (HQIC)). The function performs a search (either stepwise or parallelized) for the possible model and the seasonal orders within the constraints provided, then selects the parameters that minimize the given metric. The auto_arima function itself operates a bit like a grid search, as it tries various sets of p and q (also P and Q for seasonal models) parameters, then selects the model that minimizes AIC or BIC. To select the differencing terms, the auto_arima function uses tests of stationarity (such as an augmented Dickey–Fuller test) and seasonality (such as the Canova Hansen test) for seasonal models [16].

3.2. Facebook Prophet Model (FB)

A variety of time series techniques can be applied to the stock prediction dataset, but most of them necessitate extensive data preprocessing prior to fitting the model. Prophet is a time series forecasting library created and pioneered by Facebook that requires no data preprocessing and is extremely easy to use. Prophet takes two columns of data as input: date and target (ds and y)[17].

Prophet is a time series data forecasting procedure based on an additive model that fits non-linear trends with yearly, weekly, and daily seasonality, as well as holiday effects. It works best with time series with strong seasonal effects and historical data from multiple seasons. Prophet is resilient to missing data and trend shifts, and outliers are typically handled well [18].

3.3 Long Short-term Memory Model (LSTM)

The problem of gradient disappearance, which is common in traditional RNNs, is primarily addressed by LSTM model so that it can analyze longer time series data [19]. The operational principles of LSTM includes; (i) processing the input information at prescribed time, (ii) select useful information with a certain probability, and finally, as the state of the final retention layer, extract useful information through the output gate.and (iii) then participate in the calculation of the next time [19]. The entire process in mathematical form can be stated as

$$i_t = \sigma(W_i h_{t-1} + U_i x_t + b_i)$$

$$f_t = \sigma(W_f h_{t-1} + U_f x_t + b_f)$$

$$o_t = \sigma(W_o h_{t-1} + U_o x_t + b_o)$$

$$C_t = \tan h \ (W_C h_{t-1} + U_C x_t + b_C)$$

$$C_t = C_{t-1} \odot f_t \ + i_t \odot \overrightarrow{C_t}$$

$$h_t = o_t \odot \tan h(C_t)$$

Where

W_i, W_f, W_o, W_C are the weights of h_{t-1},

U_i, U_f, U_o, U_C are the weights of x_t,

b_i, b_f, b_o, b_C are bias factors respectively;,

σ represents the sigmoid function making ensuring that the values of i_t, f_t, o_t are between 0 and 1,

and $\tan h$ represents the hyperbolic tangent function.

The above equation demonstrates that the size of h_t is jointly affected by the present condition of the cell C_t and the information h_{t-1} contained in the hidden state at the previous moment. W_C is the main cause of the disappearance of the gradient, which has no influence on the calculation of the current cell state. As a result, adding a gating structure effectively reduces the issue of the gradient disappearing during the training process, improving the prediction model's accuracy [19].

4   DATASET DESCRIPTIONS

Data used in this work is international prices for two agriculture commodities (wheat, rice): All prices are observed to be of daily data acquired from 02/01/2012 to02/06/2020 and all of the data comes from the Yahoo fiancé [20] commodity prices dataset. We divide the dataset into two parts, the machine learning set and the prediction set, and in the experimental phase, we use the trained parameters to perform prediction tests on new, unknown data. The data set is usually divided into a training set and a test set. To see if the identified patterns still have a predictive effect on unknown data, we added a set of predictions. We split the dataset into two parts during the experimental testing phase of the commodity market: the machine learning dataset from January 2, 2012 to November 30, 2015, and the forecast set from December 1, 2015 to June 30, 2020.

4.1 Root Mean Square Error (RMSE)

Calculate the residual (difference between prediction and truth) for each data point, the norm of the residual for each data point, the mean of residuals, and the square root of that mean to get the RMSE. Because RMSE uses and requires true measurements at each predicted data point, it is commonly used in supervised learning applications[21].

Root mean square error can be expressed as

$$RMSE = \sqrt{\frac{\sum_{i=1}^{N} \|y(i) - \hat{y}(i)\|^2}{N}},$$

where N is the number of data points, y(i) is the i-th measurement, and $\hat{y}(i)$ is its corresponding prediction.

5 RESULTS AND DISCUSSION

The values for RMSE were calculated from the obtained while evaluating the different predictive models as shown in table1. It is because of LSTM is very effective in modeling time-series data. In Table 2 we can see the comparison of actual and predicted values comparisons of ARIMA, Facebook Prophet and LSTM model's prediction for the closing price (green line) compared to the actual closing price (blue and orange line)[22] of Wheat and Rice respectively.

Table 1: RMSE values for Different Predictive Models

Agriculture Commodity→ Predictive Model↓	Wheat	Rice
ARIMA	38.79193	5.41118
Prophet	1.71877	13.03537
LSTM	**0.48710**	**0.61051**

Agriculture Commodity→ Predictive Model↓	Wheat	Rice

Actual Closing Price		
ARIMA		
Prophet		
LSTM		
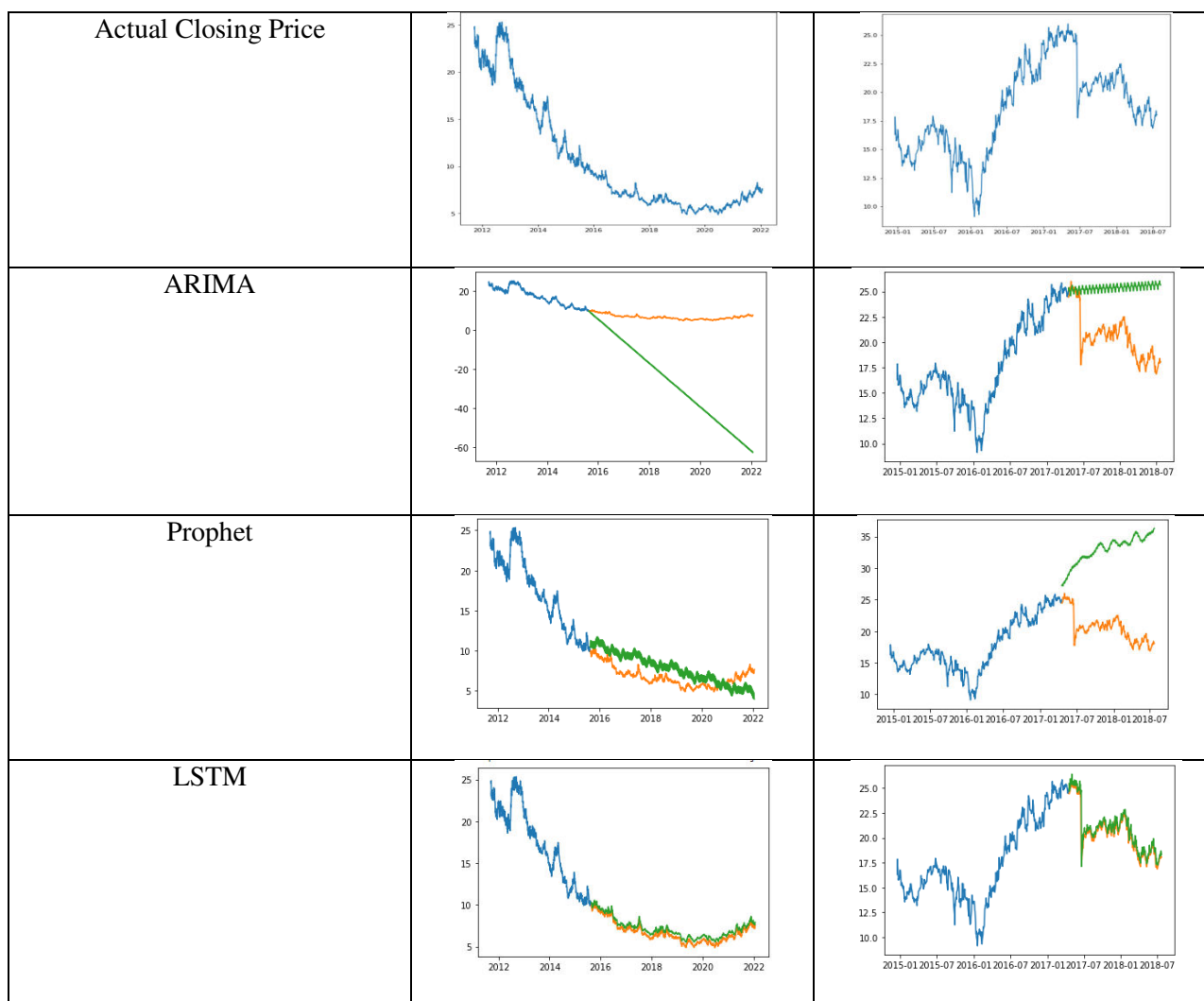
Table 2: Comparison of actual and predicted Wheat and Rice price of different models. Date at X-axis. Closing price and predicted price at Y-axis

6   CONCLUSIONS

In this research paper, we found a way to predict wheat and rice prices using the ARIMA model, the Facebook Prophet model, and the deep learning LSTM model. The results of this study show that LSTM perform much better than other Prophet and ARIMA models. LSTM offer more promising options for use in predictive analytics and predictive analytics. This study opens up new spaces for scientists and scholars to discuss and suggest better ways to improve scientific predictive models. On the downside, as you know, fluctuations in commodity prices are not necessarily associated with changes over time, but they do affect economic, socio-political and other factors.

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Pointwise MLP and Convolution-Based Methods of 3D Shape Classification for DL

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ABSTRACT

Varied formats, such as point clouds, depth pictures, meshes, and volumetric grids, are commonly used to represent three dimensional images. Point cloud representation, as a widely used format, preserves the original geometrical information in three dimensional spaces without any discrete transformations. As a result, it is the representation of choice for a wide range of scene understanding applications, including autonomous driving and robotics. DL algorithms have recently dominated numerous fields of research, including speech recognition, HCI and NLP. 3D point clouds with DL, on the other hand, still faces several important obstacles, such as small dataset sizes, higher dimensions, and the unstructured character of 3D point clouds. Thus, our paper lays stress on analyzing available methods of DL that have been implemented for cloud point processing in 3-dimensional environment.
Keywords: Deep Learning (DL), MLP, CNN, Point Cloud.

1 INTRODUCTION

DL on point clouds has gotten a lot of press recently, particularly in the previous five years. ModelNet, ScanObjectNN, ShapeNet, PartNet, S3DIS, ScanNet, Semantic3D and ApolloCar3D [1], [3] are among the publicly available datasets. These datasets have boosted DL research on 3D point clouds, with more methods being suggested to tackle different point cloud processing issues, such as segmentation, object tracking, object detection, pose estimation and reconstruction.

To examine the performance of DL techniques for various 3D cloud data applications, a significant number of datasets were collected. Table 1 shows some of the most common datasets for segmentation, object tracking, object detection, pose estimation and reconstruction. There are two types of datasets for 3D form classification: synthetic datasets, and real-world datasets. The synthetic datasets' objects are full, with no occlusion or backdrop. Objects in real-world datasets, on the other hand, are occluded at various levels while few contain noise. There are two types of datasets for object tracking & detection: indoor sceneries and outdoor urban settings [5].

Table 1. Existing datasets for 3D object identification, shape classification and object tracking, and 3D point cloud segmentation are summarized in TABLE 1. 1 The amount of annotated classes and total classes utilized for evaluation.

3Dimensional Shape Classification Datasets							
Name and Reference	**Year**	**Samples**	**Classes**	**Training**	**Test**	**Type**	**Representation**
McGill Benchmark	2008	456	19	304	152	Synthetic	Mesh
Sydney Urban Objects	2013	580	12	430	-	Real-World	Point Clouds
ShapeNet	2015	51190	55	-	-	Synthetic	Mesh
ScanNet	2017	12281	18	9670	2606	Synthetic	RGB
ScanObjectNN	2019	2902	15	2320	585	Real-World	Point Clouds
Model Net 10	2015	4899	10	3991	605	Synthetic	Mesh
Model Net 40	2015	12311	40	9843	2468	Synthetic	Mesh

2 METRICS FOR EVALUATION

To assess these approaches for diverse point cloud interpretation tasks, multiple evaluation criteria have been developed. Overall accuracy (OA) and mean class accuracy (mAcc) are the most commonly utilised performance measures for 3D shape classification. The mean for all cases is 'OA,' while the mean for all shape classes is 'mAcc.' Average Precision is the commonly used criterion for 3D object detection. The area under the precision-recall curve is used to compute it. The terms precision and success are frequently used to assess a 3D single object tracker's overall performance. The most commonly used criteria for tracking multiple 3D objects are AMOTA and AMOTP for the segmentation of 3D point clouds. [6][7]

3 CLASSIFICATION OF 3D SHAPE

Techniques for shape typically learn the how each point is embedded initially, then use an aggregation method to mine a global form from the entire cloud. Finally, the embedding is fed into numerous fully linked layers to achieve classification [9]. Existing 3D methods of classification may be categorised into point, volume and

multi-view based methods based on the data type of input for neural networks. Fig. 1. depicts a number of milestone strategies. Multi-view approaches turn an unstructured cloud into two-dimensional shapes, whereas volumetric approaches transform a cloud into a three-dimensional volumetric representation. Then, to achieve shape classification, well-known 2D or 3D convolutional networks are used. Point-based approaches, on the other hand, work directly on raw point clouds.

3.1 METHODS BASED ON POINTS

Approaches under this category may be separated into convolution-based, pointwise MLP, hierarchical data methods, and other conventional methods based on the network architecture used for feature learning of each point.

MLP Methods with Points

As illustrated in Fig. 1, these approaches model each point separately using many shared Multi-Layer Perceptrons (MLPs) before aggregating a global feature using a symmetric aggregation function. Due to the inherent data abnormalities in 3D point clouds, traditional DL algorithms in 2D photos can't be implemented. PointNet is a pioneering technique that takes points as its input.
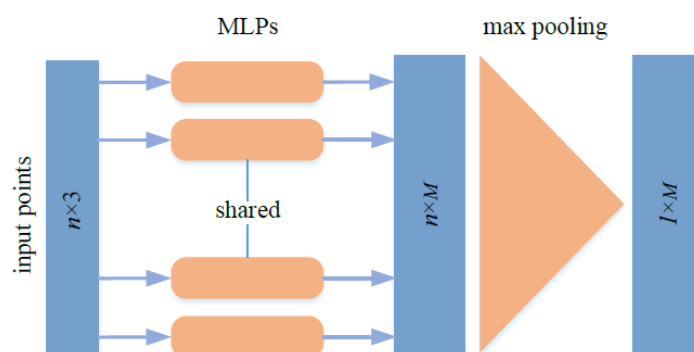
Fig. 1. The number of input points is indicated by n, and the size of the learnt features for each point is shown by M.

A symmetric function has permutation invariance. PointNet, in particular, uses numerous MLP layers to learn pointwise features independently and a max-pooling layer to extract characters. To conclude representations & applying nonlinear transformations, deep sets achieve permutation invariance. The local data structures between points can't be captured as characters are cultured individually for every location in PointNet. As a result, Qi et al. presented the PointNet++ hierarchical network for snapping the shapes in the vicinity for every point. PointNet++ acquires characters from a local geometric shape and abstracts the local geometric structure by stacking various predetermined abstraction levels [4][8].

MLP is used to learn structural properties among distinct local structures with the use of a Structural Relational Network (SRN). Lin et al. used a lookup table to speed up the inference process learned by PointNet. On a modest system, the inference time for the ModelNet and ShapeNet datasets is 1.4 ms and 30 times faster than PointNet. SRINet uses a PointNet-based backbone to extract a global feature and graph-based aggregation to extract local features after projecting a point for generating the invariant representations. Yan et al. proposed a module which uses adaptive samples to alter the positions and features of the points witht the help of FPS algorithm.

Methods based on convolution

Because of irregularity within point clouds, kernels for 3 dimensional clouds are more difficult to construct than kernels specified on 2 dimensional shapes (e.g., pictures). Current 3D convolution methods can be separated into continuous and discrete convolution methods based on the type of convolutional kernels used, as demonstrated in Fig. 2.

Methods of 3 Dimensional Continuous Convolution

Weights for surrounding locations are connected to the latitudinal spreading with respect to the centre in these algorithms, which define convolutional kernels on a continuous space [5].

Weighted average beyond a subset can be understood to be 3D convolution. RSConv is the internal layer of RS-CNN, and it includes subset of points revolving around a specific input. Kernel elements are chosen at random in a unit sphere.

The relationship among positions of the core parts and the cloud is then established using an MLP-based continuous function. Convolution is described as a Single-Layer Perceptron with a non-linear activator in DensePoint. To fully leverage the contextual information, characters are analyzed by joining features from the past levels. Thomas et al. suggested both inelastic and supple Kernel Point Convolution (KPConv) operatives for 3D clouds. The convolution kernel is divided into spatial and feature components by ConvPoint. The spatial part's positions are chosen at random from a unit sphere MLP[7].

Convolution is defined as the multiplication of a step function and a Taylor expansion specified on the k-nearest neighbours in SpiderCNN. The Taylor expansion takes the inherent local geometric fluctuations by intercalating arbitrary values at the vertices of a cube, while the step function catches the geometry by recording the local geodetic space. A convolution network PCNN based on the radial basis function is also suggested for 3D clouds. To solve the rotation equivariant problem that 3D convolution networks encounter, several techniques have been presented.

(a) 3D neighboring points (b) 3D continuous convolution (c) 3D discrete convolution
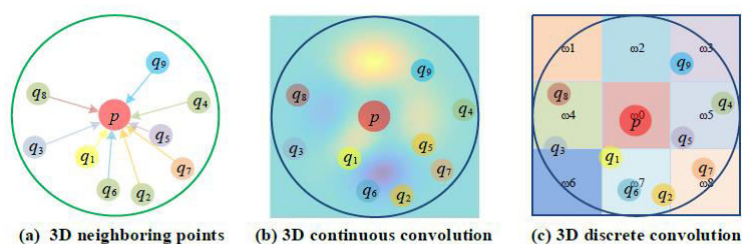
Fig. 2. Shows a continuous and discrete convolution for a point's local neighbours. (a) depicts a local neighbourhood qi centred at points b and c, respectively, depict 3D constant and separate convolution.

Esteves et al. introduced a 3D CNN that takes multi valued functions as input and learns rotation equivariant representation for 3D objects. Parameterizing the spectrum with points in the circular domain yields localised convolutional filters.

The Flex-Convolution specifies the weights of the kernel as a conventional scalar multiplication over k-nearest neighbours, that may be enhanced by means of CUDA, in order to improve processing speed. Its functioning on a trivial dataset with lesser parameters and lesser memory usage has been established in experiments [3].

Methods of 3D Discrete Convolution.
The weights for surrounding points are connected to the equipoises with admiration to the centre point in these algorithms, which describe convolutional kernels on consistent grids. Hua et al. demarcated convolutional kernels on every grid after transforming irregular 3D point clouds to regular ones. Every point within a grid are given the same weights in the proposed 3D kernel. The characteristics of all the nearby points within the grid are calculated for a specific point using the preceding layer. The characters of all grids are then weighted and added to form the current layer's output. By dividing a 3D sphere adjacent area into numerous volumes and coupling each bin, Lei et al. created a circular convolutional kernel.

The irregular initiation of the mean of values of its nearby points determines the output of the spherical convolutional kernel for a point. The arithmetical rapport between a point and its neighbours is overtly described in GeoConv using six bases [8]. A direction-associated learnable matrix weights edge topographies in all way of the basis unconventionally. The angles created by the supplied point and its neighbours are then used to aggregate these direction-associated properties. The feature at the current layer for a given point is defined as the totality of the point's features and the features of its neighbouring threshold features at the preceding layer.

Table 2. Comparison of 3D shape Pointwise MLP Methods classification results with ModelNet10 / 40 benchmark.

Methods	Input	params (M)	ModelNet40 (OA)	ModelNet10 (OA)	ModelNet40 (mAcc)	ModelNet10 (mAcc)
Point Net	Co-ordinates	2.47	88.2%	86.73%	-	-
Point Net ++	Co-ordinates	1.98	90.7%	-	-	-
MO-Net	Co-ordinates	3.21	98.3%	76.1%	-	-
Deep Sets	Co-ordinates	-	86.2%	--	-	-
PAT	Co-ordinates	-	90.3%	-	-	-
Point Web	Co-ordinates		92.4%	82.9%	-	-

SRN-Point Net ++	Co-ordinates		90.5%	-	-	-
JUSTLOOKUP	Co-ordinates		88.5%	85.3-%	91.8%	91.1%
PointASNL	Co-ordinates		91.9%	-	95.7%	-
PointASNL	Co-ordinates		92.1%	-	94.9%	-

Table 3. Comparison of 3D shape Convolution-Based Methods classification results with ModelNet10 / 40 benchmark.

Methods	Input	Param	ModelNet40 (OA)	ModelNet10 (OA)	ModelNet40 (mAcc)	ModelNet10 (mAcc)
Pointwise-CNN	Co-ordinates		85.1%	80.4%	-	-
MC Convolution	Co-ordinates		90.8%	-	-	-
SpiderCNN	Co-ordinates		91.4%	-	-	-
Point CNN	Co-ordinates	0.39	87.2%	67.1%	-	-
Flelx-Convolution	Co-ordinates		89.2%	-	-	-
PCNN	Co-ordinates	1.4	90.2%	-	93.9%	-
A-CNN	Co-ordinates		91.02%	91.3%	94.4%	94.2%
SFCNN	Co-ordinates		91.3%	-	-	-
SFCNN	Co-ordinates		92.2%	-	-	-
Dense Point	Co-ordinates	1.53	92.5%	-	95.5%	-
InterpCNN	Co-ordinates		92.3%	-	-	-
ConvPoint	Co-ordinates	12.8	90.8%	87.4%	-	-

Several systems use both 3D and 2D to learn. PVNet uses an embedding network to project high-level universal characters collected from multi-view pictures into the sub space of clouds, which are then blended with pointcloud characters. Lastly, for characters and multi-view, a residual connection is used to achieve shape recognition. Later, PVRNet [1] proposes using a relation score module to leverage the relationship among a 3D point cloud and the numerous visions. The original 2D characters are upgraded for pointsingle-view and point-multi-view fusion based on the relation scores.

3.2 CONCLUSION
For 3D form classification, the Model Net 10 / 40 databases are the most commonly used datasets. Table 2 displays the outcomes of various point-based networks. A number of conclusions can be pinched: Pointwise MLP systems are frequently used because its foundation for learning pointwise features in other types of networks. Convolution-based networks, as a usual DL architecture, may perform better on uneven 3D pointclouds. For irregular data, together distinct and constant convolution nets should be given more consideration. Graph-based networks have gotten a lot of attention in recent years because of their inherent capacity to manage irregular data. However, extending graph-based nets in the spectral area to different graph shapes remains a challenge.

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Implementation of Cloud API for High-Accuracy Knowledge and Diagnosis of Skin Cancer types Based on Transfer Learning

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ABSTRACT

Over the past few years, there has been a rise in reports of skin cancer in the Asian continents. A dermatologist recommends regular skin exams to identify skin cancer in its early stages. We'll be able to distinguish types of skin cancer conditions using deep learning and neural networks, which could help doctors diagnose cancer early. In our study, we proposed a cloud API that can diagnose types of skin cancer and classify them into seven classes such as melanoma, benign keratosis-like lesions, melanocytic nevi, vascular lesions, dermatofibroma, basal cell carcinoma, and actinic keratoses. By building a model using transfer learning by modifying the output of the Xception model in Keras applications to predict seven classes. The model has trained on HAM10000 dataset is a grouping of multi-source dermatoscopy images of common pigmented skin lesions that have balanced so that all class is on the same level. So, the proposed model outperforms its predecessors, according to experimental results. The aim is to allow doctors and specialists to access and use the application with convenience and flexibility.

Keywords: Cloud API, Deep learning, Multi-class classification, Skin Cancer.

1   INTRODUCTION

Studies have shown that artificial intelligence can diagnose skin cancer better than medical professionals. And this was the result of a study in which 157 dermatologists from 12 German university hospitals took part, as well as a computer program created specifically for the study [1]. And it was found through experiments that artificial intelligence was more accurate than human diagnosis, according to the National Cancer Center in Heidelberg, Germany. Skin cancer is an abnormal growth of skin cells that usually occurs as a result of exposure to sunlight, but it may occur in places that are not exposed to the sun. There are seven types of skin cancer according to the type of cells in which the tumor originates [2]. The key to protection and boosting the chances of recovery is prevention and early discovery of the disease if it happens.

Artificial intelligence works in identifying skin cancer by using cameras and smart devices to capture large-scale images of areas of patients' bodies and then uses the automated program available as an application on the cloud to quickly and effectively identify and diagnose its seven types in its early stages to avoid the spread of infection. The researchers emphasized that the issue is not about replacing doctors with artificial intelligence, but rather by making it an additional tool and an aid to them [3].

Using Python programming and the Keras library in deep learning, we can predict images by building a convolutional neural network with a pre-trained Xception model on the ImageNet database. So, they used the ImageNet dataset to train this model on 1.2 million images, with an additional fifty thousand images for validation and a hundred thousand images for testing to be able to classify an input image into thousands of different element classes [4]. In our study, we use the Xception pre-trained model, where the last layers build to suit the required output, and they were also trained on the skin cancer types database from which we extract seven classes.

The following parts of the paper are organized as follows: Section 2 overview of recent studies linked to the types of skin cancer. Section 3 provides details of the types of skin cancer. Section 4 explains the applications of Keras that are used in classifying images with a mention of the Xception model that will be used in learning transfer. Section 5 is a scenario for the proposed model which explains how the data is processed and how The architecture of the model is built, after that evaluation of the model then it is used in the cloud as Cloud API. Section 6 is the results obtained with a comparison of recent studies. Finally, the paper is summarized in Section 7.

2   PREVIOUS STUDIES

The most frequent type of cancer is skin cancer, and it's very common among people who work or play sports outdoors and those who sunbathe. There are seven types of skin cancer, and it is noted that most previous studies focus only on the most common types and spread among patients. The researchers created artificial intelligence models to classify these species by taking a picture of the suspected part. Here we view previous studies in recent years.

Shunichi Jinnai et al. [5] studied 3551 persons and photographed 5846 pigmented skin lesions. Malignant melanoma and basal cell carcinoma, as well as benign tumors, were among the pigmented skin lesions. Authors used the training dataset to train and assess a faster, region-based CNN (FRCNN). FRCNN's classification skill was compared to that of 20 dermatologists.As a result, FRCNN surpassed dermatologists in classification accuracy. In contrast to earlier research or professional dermatologists, Chaturvedi et al. [6] investigated an effective automated system for skin cancer classification with improved evaluation metrics. Authors used a Mobile Net model that was pre-trained on about 1,280,000 pictures from the 2014 Image Net Challenge and fine-tuned using transfer learning on 10,015 dermos copy images from the HAM10000 dataset. For seven classes in the dataset, the model utilized in this study had an overall accuracy of 83.1 percent. This technique had the potential to aid dermatological doctors in vital decision-making.

Karar Ali et al. [7] created a preprocessing image pipeline for categorization. The Authors eliminated hairs from the images, expanded the dataset, and resized the images to fit each model's requirements. Transfer learning on pre-trained ImageNet weights and fine-tuning the Convolutional Neural Networks were used to train the Efficient Nets B0-B7 using the HAM10000 dataset. The top model, the Efficient Net B4, scored 87 % on the F1 scale and had a Top-1 Accuracy of 87.91 %.

Tanzila Saba et al. [8] propose a novel automated method based on a deep convolutional neural network (DCNN). Three steps are included in the suggested design: 1) contrast enhancement with fast local Lap lacian filtering (FlLpF) and HSV color transformation; 2) lesion boundary extraction with color CNN and XOR operation; and 3) in-depth feature extraction with transfer learning and the Inception V3 model before feature fusion with the hamming distance (HD) method The authors was applied to the PH2 and ISIC 2016-17 datasets, respectively. On the PH2 dataset, the suggested technique achieved an accuracy of 98.4 percent, 95.1 percent on the ISBI dataset, and 94.8 percent on the ISBI 2017 dataset. Several instances were explored by Al_dwgeri A. et al. [9]. This is the first CNN model that has been trained from scratch, and it has been evaluated on both balanced and unbalanced HAM10,000 datasets. The accuracy for the balanced and unbalanced datasets was 64% and 57% respectively. Authors have updated models to classify skin lesions (VGG19, ResNet50, InceptionV3, DenseNet121, Xception, and VGG16) and accuracy of each model was 79%, 74%, 76%, 76%, 76%, and 77%. After that, they ensembled the models and reported an accuracy of 80%.

Andre Esteva et al. [10] All layers of the InceptionV3 network have been fine-tuned, with a learning rate of 0.001 and a decay factor of 16 applied every 30 epochs. This model was trained on 129,450 skin lesions from a variety of datasets, including Dermofit, Dermoscopic Archive, and Stanford Hospital data. There are 2,032 diseases in all. They estimated 72.1% accuracy.

3   SKIN CANCER TYPES

Skin cancer is an unusual growth of skin cells that are generated and develop in most cases on the face of the skin that is increasingly exposed to sunlight [2]. In addition, this common type of cancer can spread to different areas of the skin that have not received much sunlight. There are seven types of skin cancer, and some of these types are widely present, while others are rarely present. Table 1 below shows the types with each picture of each type, as well as an abbreviation used in the HAM10000 dataset [11]:

Table 1. Types of skin cancer

Type	Abbreviation
Melanocytic nevi	NV
Melanoma	MEL
Benign keratosis-like lesions	BKL
Basal cell carcinoma	BCC
Actinic keratosis	AKIEC
Vascular lesions	VAS
Dermatofibroma	DF

Some researchers in the classification of skin cancers have created a new line of artificial intelligence, using CNN called convolutional neural networks. These tubes have been used to analyze SPL mutations (suspicious pigmented lesions) through the use of wide-band photography common in most smartphones and personal cameras. concerning CNNs, the researchers explained, they are neural networks that can be used to classify images for subsequent assembly. Therefore, its machine learning algorithms belong to a subgroup of deep learning.

4   KERAS APPLICATIONS

Keras is a Python-based open-source neural network library. It focuses on ease of use, flexibility, and scalability to enable quick deep neural network experimentation. It was evolved as part of the ONEIROS (Open Neuroelectronic Intelligent Robot Operating System) project's research effort. Moreover, Keras includes ready-made templates for many of the basic components used in building neural networks like functions, layers, optimization methods, activation functions, and a set of tools to ease the coding required for deep neural network programming by making it easier to work with image and text data [12]. Keras allows users to produce models of deep neural networks on smartphones or the web. It allows for distributed deep learning model training, especially on GPU and TPU clusters. Keras Applications are deep learning models that have supplied weights that have been pre-trained. Prediction, feature extraction, and fine-tuning can be used with these models. These models have been trained on the ImageNet dataset, and models are included in the models package in order to facilitate access and use. In our study, we will use the pre-trained model Xception.

Xception Model:

Xception is a deep Convolutional Neural Network featuring Depthwise Separable Convolutions[4]. Google researchers created it. Google defines inception modules in CNN as a transition between normal and depthwise separable convolution (a depthwise convolution followed by a pointwise convolution)[13]. A depthwise separable convolution can be compared to an Inception module with the most towers at this stage.
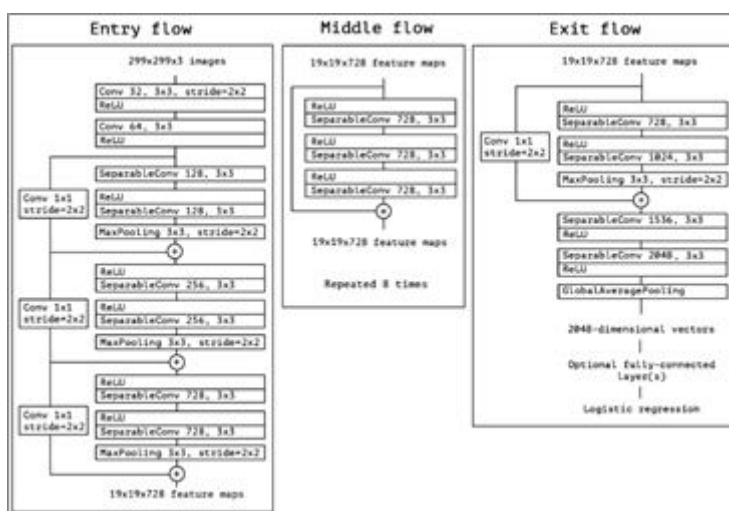
Fig. 1. Xception model architecture[13]

As a result of this finding, authors propose a novel deep convolutional neural network architecture based on Inception but using depth - wise separable convolutions instead of Inception modules.As a result, the order is inverted in the Xception model [13]. The first step is pointwise convolution, followed by depthwise convolution. Fig. 1 depicts the Xception model's architecture [4]. In Xception architecture, there are 3 main blocks, as shown in this diagram. The data seems to move via the entering flow first, then the middle flow, which is repeated eight times, and lastly the exit flow. Batch normalization is applied to all Convolution and Separable Convolution layers. In most classic classification challenges, Xception architecture outscored VGG-16, ResNet, and Inception V3.

5   PROPOSED MODEL SCENARIO:

Dataset manipulation

In this step, we are working to search for the data to be processed (Images of the types of skin cancer) from more than one source, specifically medical centers and everything related to this field. We work on structuring and separating the data once it is collected and obtained, so that it is multiclass, so that each category is distinct, and as a consequence, we have a multiclass dataset. Looking at the database, we erase noise and unclear data..etc. The rest of the data is processed and its size modified using data augmentation and balanced. We'll go over all of this in the next two sections.

HAM10000 dataset

The HAM10000 is referred to as a dataset ("Human vs. Machine with 10,000 Training Images")[11]. Dermatoscopic images were acquired from a variety of people and preserved in a variety of methods. More than 10,000 dermatoscopic images have been released as a training set for academic machine learning and are freely available through the ISIC archive. This normative data set can be utilized for machine learning and human

expert comparisons. It is training set includes pigmented lesions from different populations and has been collected from several specialized centers for early detection[14]. It should be noted that the quantity of images for each class is not equal to each of its counterparts, because some types of cancer are widespread and images can be taken from them, while others are rare in the presence of injury. Therefore, this database is considered imbalanced, as shown in Fig 2.
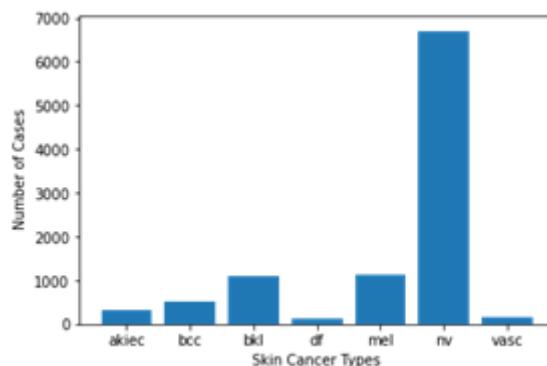
Fig. 2. HAM1000 dataset

Data Augmentation and Balanced

Deep learning has excelled at a variety of computer vision tasks. However, in order to avoid overfitting, these networks rely largely on massive data. Overfitting occurs when a network learns a function with a high variance to perfectly model the training data. Unfortunately, many application fields, such as medical image analysis, do not have access to huge data [15].

Because our field of study is health care, we need a balanced and equal dataset for all classes in order to get good results. However, if we use an imbalanced dataset and train the proposed model on it, the results will be biassed toward the most numerous classes because the data will be split randomly, which is one of the most common problems that most researchers overlook. Furthermore, we will use transfer learning algorithms that require a large dataset in addition to the previous ImageNet dataset that trained the model and obtained weights in the past, so data was generated alongside existing data with a change in the features so that we can work with a large dataset. As a result, data augmentation refers to a set of strategies to increase the size and quality of training data sets to build a robust deep learning model.

5.2 Model Proposed

In our scenario, we strive to learn new aspects, we don't learn everything right away. We take what we've learned and apply it to other (pre-trained) models. These algorithms have been programmed to solve certain problems. When the feature space distribution changes, models must be rebuilt from scratch. Transfer learning is the concept of leveraging knowledge learned from a single task to solve related tasks, as well as the usage of weights in pre-trained models, to overcome an isolated learning model. There are applications in the Keras library that are pre-trained on the ImageNet dataset. Where ImageNet is an image dataset arranged according to the WordNet hierarchy. The primary goal of the ImageNet dataset is to develop a model that can categorize an input image into 1000 different object categories [16]. About 1.2 million images are used to train Keras models, with an additional 50000 images used for validation and 100,000 images used for testing like Xception, VCG16, VCG19, Resnet50, and Inception V3 models.

We used Xception which is a 71-layer deep convolutional neural network. More than a million images from the ImageNet dataset were used to train it. Xception classifies photos into 1000 different classes. Therefore, the weights resulting from the previous training were preserved where new layers were added after Flatten method is between previous layers and dense layer [4]. Flatten method converts the multi-dimensional matrix to single dimensional matrix. Each neuron in the dense layer receives input from all of the neurons in the previous layer. It's used to categorize images based on the results of a pre-trained model using transfer learning. In addition, Batch normalization is a technique for training very deep neural networks that standardizes each mini-input batch's to a layer. This stabilizes the learning process and significantly reduces the nusber of training epochs needed to create deep networks. In this case, the output layer has seven neurons with a softmax activation function. Multi-class classification employs the Softmax activation function. The number of neurons in the output layer will be 7 and one class is represented by each neuron. The built section will be trained on a dataset

of skin cancer types to generate new weights that are parallel to the new layers. The architecture of the proposed model is depicted in Fig 3.
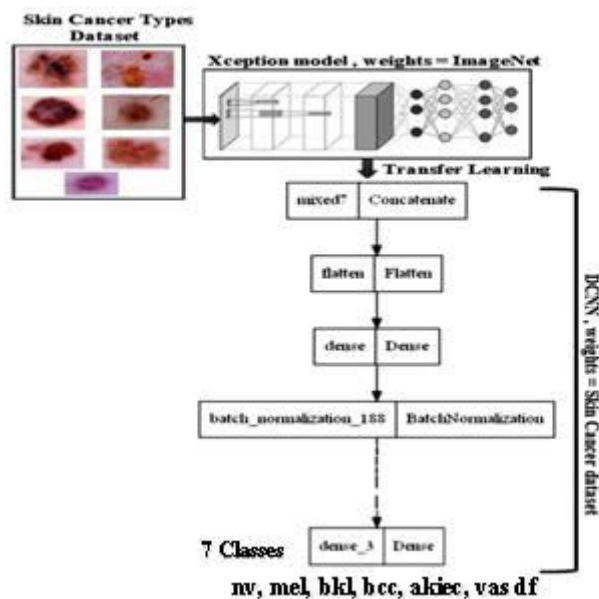
Fig. 3. The proposed Model's Architecture

5.3 Cloud API

A programming interface that allows developers to connect cloud computing services is known as a cloud application programming interface (cloud API). Application programming interfaces (APIs) allow the end-user to interact with cloud services by sharing their data and functionality with other software [17]. This interface is built within the cloud so that users can access, use, and interact with it via the Internet or servers if the cloud is private. This interface was built using Flask is a small, lightweight Python web framework that provides essential tools and capabilities for building online applications in Python. Flask is also extensible, as it does not require sophisticated modular code or a certain directory structure before starting. In addition, Flask makes use of the Jinja template engine to dynamically generate HTML pages using Python concepts like variables, loops, and lists.

Object-oriented interface Application is provided to diagnose and categorizing the types of skin cancer, where the user will find a button from which he can choose an image taken with a camera or one of the smart devices [18], and then the image appears to ensure and then presses the button to diagnose the image, and this button appears the result of one of the seven types for which the proposed model has been trained. Workflow in cloud API to classify skin cancer types is shown in Fig 4.
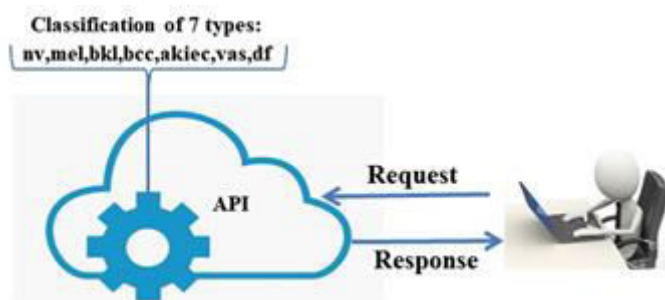
Fig. 4. Workflow in Cloud API

6   DISCUSSION& RESULTS

In this process, we normally train models using a subset of the original dataset, which is the dataset that the models use to learn from data. As a result, we must determine how well the proposed model performs using certain metrics that have been created based on the nature of the idea and the problem we are attempting to solve. To be able to train the model, set parameters, and then evaluate it to see if it can achieve the desired goal. Usually, the original dataset has divided into training and validation sets. The training set is usually the largest — in terms of size — set derived from the original dataset and used to fine-tune the model [19]. So, the dataset

must be balanced when it comes to supervised learning, and specifically in the medical field, such that the number of instances for each class is equal. When it comes to hyper-parameter tuning and model selection, the validation set comes in handy. It's also used to figure out the best network layer size, number of hidden units, and regularization term.

After training and evaluating the proposed model, we achieved the following results: training accuracy 97.2 %, testing accuracy 93.5 %, precision 97.5 %, sensitivity 99.9%, and specificity 99.9%. The training and validation accuracies are shown in Fig 5. Fig 6 indicates the loss value for the training and validation samples (red denoted training, blue denoted validation).
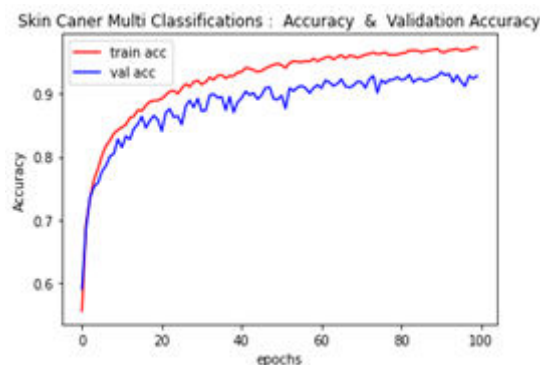
Fig. 5. Accuracy of proposed model
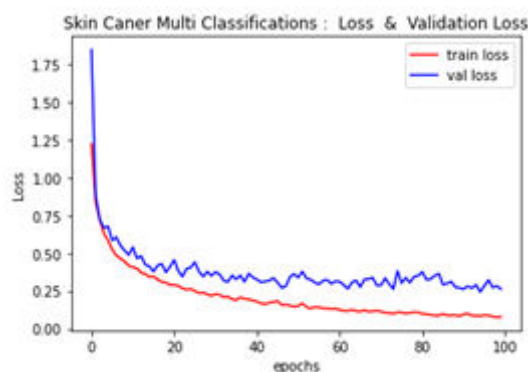
Fig. 6. Loss of propsed model

Furthermore, there are four basic categories of outcomes that could arise while making classification predictions namely true negative (TN), true positives (TP), false negatives (FN), and false positives (FP) [20]. Thus, in the case of multi-class classification predictions, these results are often plotted on a confusion matrix. After making predictions based on test data, each prediction was identified as one of the likely outcomes given in Fig 7. We employed a ROC curve using an OvR (One vs Rest) strategy to evaluate the most often used classification with the multi-class classification problem in Fig 8.

Fig. 7. Confusion matrix of 7 types
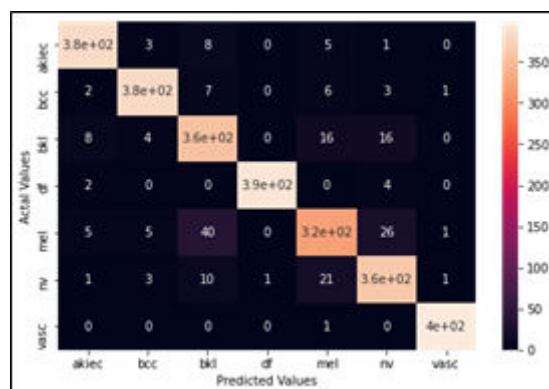
Fig. 8. ROC Curve to Evaluating
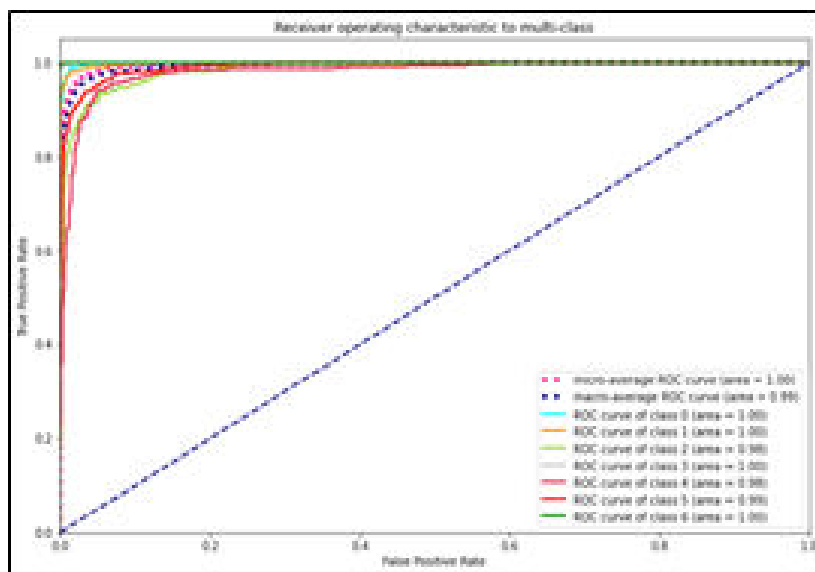
We have gathered the most recent previous studies published last three years that address the same problem as we do, and we compared these studies to the suggested model. Table 2 indicates the results of the comparison:

Table 2. Results of The comparison

NO	Model	Classes	Accuracy	Note
1	FRCNN [5]	6	86.2%	Not mentioned
2	ISIC 2018 [11]	7	88.5%	Not mentioned
3	MobileNet [6]	7	83.1%	Imbalanced
4	EfficientNets B4 [7]	7	87.91%	Imbalanced
5	DCNN [8]	3	95.1%	Imbalanced
		2	98.4%	
6	DCNN [12]	7	93.16%	
7	ResNet [13]	7	92%	Balanced
8	Xception [13]	7	90%	Balanced
9	Ensemble model [9]	7	80%	Balanced
10	**Proposed model**	**7**	**97%**	Balanced

7   CONCLUSION

One of the most difficult missions in medical image analysis is accurate automated medical image recognition of skin cancer kinds, including categorization. Deep learning algorithms have recently gained great success in the classification and segmentation of medical images, clearly establishing themselves as state-of-the-art techniques. The proposed cloud API was built by building a model using transfer learning by modifying the output of the Xception model in Keras applications to predict seven classes. So, we have two weights, one from the ImageNet dataset and the other from the skin cancer types dataset, where the HAM10000 database for each class has been balanced to obtain consistent results for all classes. The implementation result shows below: Maximum values of the average accuracy, testing accuracy, precision, sensitivity, and specificity are 97.2 %, 93.5 %, 97.5 %, 99.9%, and 99.9%, respectively. To assess the proposed study, a comparison study was conducted with other existing previous works. According to the comparison, our study's accuracy, sensitivity, and specificity are greater than the research work's results in table 2.

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Framework of an Expert System for Intelligent Information Retrieval across Languages Using CLIR Techniques

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ABSTRACT
Advances, ease of use and affordability, have enabled the web users to storing information using in the language of their convenience. The resultant exponential growth in the volume of multilingual documents has affected the performance of monolingual information retrieval systems failing to retrieve data from languages other than the language of query.

This paper provides insights on the working of information retrieval systems, their limitations and reviews some of the approaches for enhancing the performance presented by researchers earlier in this domain. Further, a framework is proposed for an Expert System that uses CLIR techniques to enable the traditional IR system for Intelligent Information Retrieval across languages barriers. The framework includes some specific processing involving CLIR techniques and the Vector Space Model (VSM) which enhances the performance by effectively retrieving documents containing information in multiple languages.

Keywords: Cross Language Information Retrieval, Vector Space Model, co-occurrence statistics, query expansion, query disambiguation, Multilingual thesauri, term frequency, inverse document frequency.

1 INTRODUCTION

The exponential increase in number of documents archived in repositories within world wide web has posed several challenges to retrieve desired and accurate information. Information Retrieval (IR) systems help users to search and retrieve information from the web. Numerous researchers are striving towards designing efficient techniques to retrieve more relevant documents from these repositories. The primary goal of information retrieval system (IRS) is "finding relevant information or documents that satisfies user information needs"[01]. Several advanced models and techniques designed by researchers enhanced the efficiency of information retrieval approaches in terms of degree of relevance of retrieved results from the documents that were represented in the language of user query. Thus, the work done by these researchers was more focused and restricted to monolingual information retrieval only. Although documents available on web are predominantly in English, the web has experienced a sharp growth in the number of documents stored in languages other than English. This consequently has driven to the need for information to be retrieved in any desired language.

Presently almost all search engines are monolingual i.e. they provide results in the language of query only, while most relevant information from user's perspective might also be present in documents from other languages. On an average, nearly seventy-four percent of surveyed open access repositories were found with the availability of multilingual documents[2]. The IR systems need to enable web search engines to handle multilingual documents in a unified manner. This is practically difficult considering the varied representations of documents in each language. Several factors like character encoding standards, fonts, availability of metadata, etc. remarkably affect this unified representation, making it difficult for the web search engines to process these multilingual documents.

This has led to research in the domain of Cross-Language Information Retrieval (CLIR), which enables the IR systems to retrieve documents written in a language other than the language of query. Integration of cross-language information retrieval techniques empower search engines for multilingual search. Since the language and representations for query and documents are different, the CLIR techniques need to reconcile them which usually is done by translating either the query or the documents. Translation is the most crucial phase in CLIR. Translating entire set of documents in target language is unrealistic and not feasible. Translating the query to target language and then retrieve documents from this language is the most viable approach. Manual translation of queries has several limitations, putting additional burden on the users which may lead to erroneous translation. Hence classical information retrieval techniques rely on machine intelligence to assist users in this task. Artificial Intelligence based approaches and Natural Language Processing techniques may provide a strong foundation for effective CLIR system by automating the process of translating queries provided by users.

2 RELATED WORK

The representation, organization and retrieval of knowledge is one of the crucial part of the information retrieval system where artificial intelligence can be useful. Gerald DeJong described a framework for an intelligent information retrieval system having capability of automatic bilingual search which accepts user query in a language and retrieves documents in two languages i.e. language of query (source) and other desired language (target) [03].

An intelligent information retrieval system prototype based on assigning context to documents is proposed by Dario De Jaco, et al. wherein each document is assigned context, based on the type of information. These systems select documents by matching conceptual representations rather than strings of characters, laying down the foundation of effective information retrieval system [04].

Lisa Ballesteros, et al. have presented a technique based on co-occurrence statistics from unlinked corpora which can be used to disambiguate dictionary translations associated with phrasal and term translation. Results after comparison of this method with parallel corpus disambiguation and other methods show that co-occurrence statistics can successfully be used to reduce translation ambiguity [05].

The corpus-based CLIR models that use statistical translation models learned from aligned bilingual corpora may solve the coverage issue caused by out of vocabulary words. The performance of Probabilistic Structured Query (PSQ) method using two statistical estimates 'term frequency and document frequency' is limited by incorrect computation of discrimination value. The modified version of the PSQ method as proposed by Ali Montazeralghaem, et al. have shown significant improvement in the performance of the CLIR [06].
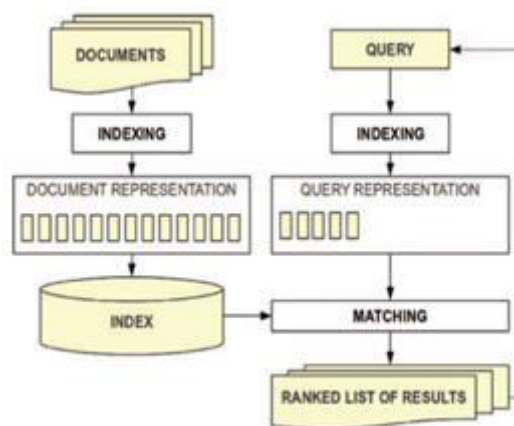
Fig. 1. Monolingual information retrieval

Model of the monolingual information retrieval system is depicted in the Fig. 1 [07]. Traditional IR system works with a set of documents and a query input by the user. Both are converted to some internal representations making it easier for comparison. Document representation is done using indexing that involves extracting terms, phrases, and concepts and storing them in a format that allow faster access. Query representation also involve processing like term and phrase extractions using stemming, stop word elimination, etc. Matching between both the document and query representations is performed using various approaches with an aim to find documents that matches the representation of query. The IR system provides these results in the form of a ranked list of documents with the document having highest match raked at the top of the list. Information retrieval systems may optionally take feedback from the user for further improvement in the retrieval results.

Several online tools with rich set of vocabulary are available for translation between various languages. Pu-Jen Cheng, et al. have tapped the potential of these online translation tools to determine effective translations for unknown query terms via mining of bilingual search-result pages obtained from Web search engines [08]. The problem of 'lack of large bilingual corpora', can be resolved with this approach helping to translate unknown terms from query and extracting semantically-close translations for CLIR.

Falah Al-akashi, et al. have recommended application of heuristic search methods from artificial intelligence techniques for building knowledge. The methods can effectively extract desired attributes of resources forming a basis for the learning component of the intelligent information retrieval systems that are capable of interpreting user requirements. The performance of intelligent retrieval model can be enhanced with advanced navigational techniques such as relevance ranking, concept searching, etc. [09].

DIALECT 2, an information retrieval system presented by M. Braunwarth, et al. uses Distributed Artificial Intelligence (DAI) tools and is composed of two modules based on the blackboard model: a linguistic parser and a reformulation module [10]. The model utilizes various expert tools like lexical entries expert, homographs expert, misspelling expert, templates expert, grammatical expert and word expert that largely contribute to effective retrieval by checking each word in the sentence, resolving ambiguity, autocorrecting wrong spellings and finally building the document template.

Classical IR methods based on matching of keywords often fail to comply with different grammar relevant to changing contexts in the information contained in documents. Exploiting the possibilities of detecting context of indexed terms, Piotr Malak, et al. have presented an approach combining Natural Language Processing with Supervised Machine Learning to detect contextual features of chosen entities from documents. Documents can be categorized according to the contextual features of these entities determined using supervised machine learning for role recognition [11].

Akira Maeda, et al. have proposed a dictionary-based query translation model using query term disambiguation method for CLIR as depicted in Fig. 2 [12].
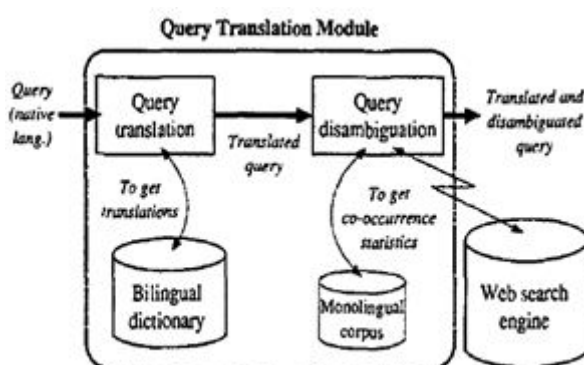
Fig. 2 Flow of query translation

Morphological analyzer performs segmentation on query terms which are then translated into target language using machine readable bilingual dictionary. These Translation candidates are then disambiguated using term co-occurrence statistics obtained from the target language corpus. The disambiguated terms are submitted to the web search engine for searching relevant documents in another language [12].

Application of thesauri can not only enhance the indexing and searching operations in a Digital Information Retrieval Systems (DIRSs) but also support in automatic key-phrase annotations, selective dissemination of information, ontology development and metadata harvesting, etc. In a study on thesaurus-enhanced searching mechanism, S. K. Sunny, et al. have described features like Query formulations, search filters, search term recommendations and automatic query expansion. The DIRSs may identify and add related terms from the thesauri and automatically expand the controlled terms from query. For DIRSs to search documents in another language, Multilingual thesauri can play very important role to find equivalent terms in target language [13].

Kornel Marko, et al. have proposed a method that automatically builds multilingual dictionaries from simple seed lexicons that are generated by cognate mapping from existing resources in various languages. After validation of lexical and semantic hypotheses, new lexicons are iteratively generated by making use of co-occurrence patterns of hypothesized translation synonyms in parallel corpora [14].

Pham Huy Anh, et al. have presented a concept based method for CLIR wherein queries are translated by multiple machine translation systems and expanded using the translated words with the help of bilingual dictionary. The term weighting model is used to retrieve and rank documents relevant to translated query and are re-ranked based on concept base from expanded query terms [15].

Dong Zhou, et al. have presented three translation approaches to deal with linguistic disparity between the queries and documents to be retrieved in cross language information retrieval [07].
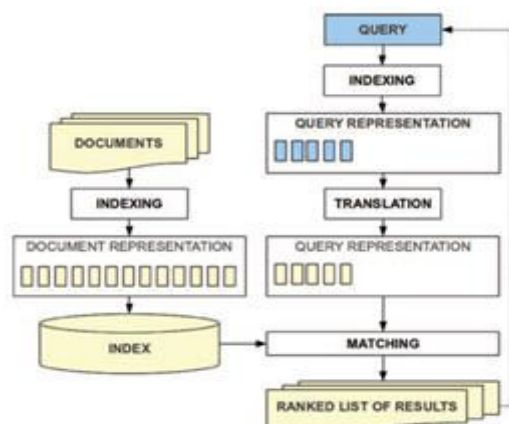
Fig. 3. Cross-language information retrieval utilizing query translation

Translate the query representation to match document representations (Fig. 3) [07].

Translate the document representations to match query representation.

Dual translation which translates the document and query representations into a third language or semantic space.

3   PROPOSED FRAMEWORK

Traditional monolingual information retrieval model cannot be applied directly for the cross language information retrieval. A framework for the agent described in Fig. 4, will be helpful in retrieving the information across the language barriers is proposed.

It is assumed that the user inputs query in language S (termed as source language here after) and expects to retrieve documents containing relevant information from the language of query i.e. source language S as well as in another language T (termed as target language here after). The model works with two different document sets respectively in source and destination languages.

User queries and documents from different languages have different representations, making it difficult to match the terms and hence requires some preprocessing before search can be performed. Translation is a general and effective approach for preparing comparable representations of both, queries and documents. Since translating all documents from data set is not feasible, the approach focuses on translating only the query in target language. The mixed set of keywords, original and translated, extracted from the query are then used for searching. The proposed model uses bilingual dictionary for translating the keyword terms retrieved from the query, Vector Space Model (VSM) for information retrieval and finally generates results in the form of list of documents ranked as per the degree of relevance with user's needs specified through query.
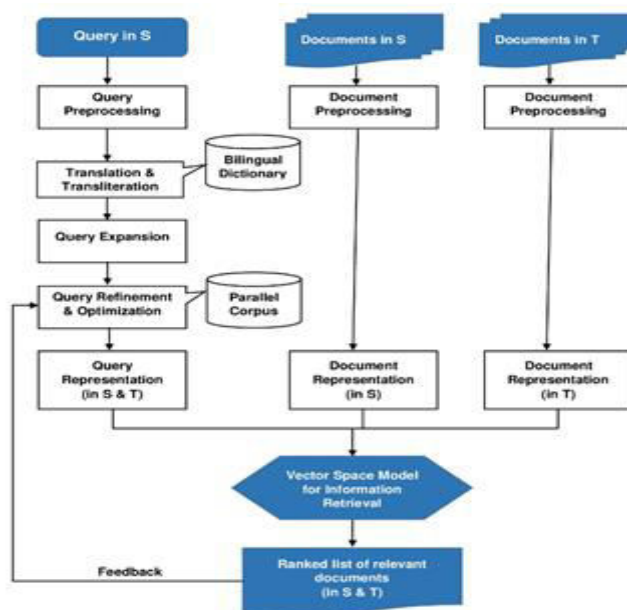
Fig. 4. Framework for an Expert System for Intelligent Information Retrieval

Various stages in the proposed framework are described as follows:

Query Preprocessing: A stemmer is used for tokenization to separate words from the query using lexical analyzer, out of which stop words are filtered out to identify the keywords.

Translation and Transliteration: A bilingual dictionary having rich collection of vocabulary is applied to translated retrieved keywords from source language S to target language T. Some keywords may have multiple translations which are added to the list while transliterated versions of the words that do not have meanings are also included in the output list of this stage.

Query Expansion: Set of translated and transliterated words are merged with the set of keywords from original query, expanding the scope of input query over to both sets of documents in source as well as target languages.

Query Refinement and Optimization: The list of keywords is further refined using various disambiguation strategies like compound words, phrasal translation, removal of mistranslated words, term co-occurrence statistics, parallel corpus, context mapping, etc. to eliminate irrelevant words. The optimized list of keywords is further used for matching within the documents for determining the relevance of document.

Query Representation (in S & T): Query in the form of keywords, in both the source and target languages, extracted after optimization phase need to be represented in a common format which is compatible for matching with format of keywords extracted from documents in the dataset.

Document Preprocessing: Similar to query preprocessing, keywords are extracted from documents from both sets which includes keywords from document contents and metadata.

Document Representation: Documents in the form of keywords, in both the source and target languages also need to be represented in a common format which is compatible for matching with format of keywords extracted from query.

Information Retrieval using Vector Space Model (VSM): The Vector Space Model for information retrieval designed by Salton (1971) ranks documents in decreasing order of a measure that corresponds to the relevance of each document to the query. Document d and query q are represented as vectors within a high-dimension information space. Weights are assigned to each document according to the frequency of terms (keywords) occurring within that particular document calculated using the tf-idf (term frequency - inverse document frequency) weighing scheme. Thereafter, the similarity of all documents in the collection to the query is computed using a distance measure.

The output of the Vector Space Model (VSM) is a list of documents ranked according to the similarity between documents and requirements of user specified through the query. Based on the relevance of the retrieved results, feedback can optionally be provided for query refinement.

4   CONCLUSION

Although use of English for storing information in the web is dominant over other languages, there is a rapid growth in information stored using languages other than English. Users might be interested in searching information in English as well as the native language. This has given rise to the concept of Cross Language Information Retrieval which enables Information Retrieval Systems to retrieve relevant documents written in a language other than the language in which query is represented.

The agent based intelligent information retrieval model proposed in this paper extends the functionalities of traditional IR model to enhance its scope crossing the language barriers. The framework includes specific processing like Query & Document Preprocessing, Translation and Transliteration, Query Expansion, Query Refinement and Optimization, Query Representation (in S & T) and Document Representation. Finally, the Vector Space Model (VSM) is applied for information retrieval by matching the information which provides results in the form of list of documents ranked according to the degree of relevance i.e. similarity between the document and the user query.

It may be concluded that the Expert System proposed in this paper can remarkably enhance the performance of traditional IR systems with the help of Cross Language Information Retrieval (CLIR) tools.

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The Rise and Role of ML and AI in GIS

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ABSTRACT

Artificial Intelligence GIS (AI GIS) is a combination of AI technology with various GIS functions, including spatial data processing and analysis algorithms (Geo-AI) that incorporates AI technology. In recent years, AI GIS has gradually become the main focus of geosciences research and application. In this paper, we explore the rise and role that are expanding the breadth of geographic information systems by using Machine Learning and Artificial Intelligence approaches in user interfaces, geographical data representation, and usage.

Keywords: AI, ML, GIS.

1   INTRODUCTION

A prominent study direction at the time is the development of Artificial Intelligence Geographical Information System (AI GIS) software. The majority of researches are focused on one or more application scenarios; however, only a small number of studies involve a study and analysis of the artificial intelligence GIS technology system. An examination and description of the AI GIS software technology system are also insufficient.

Throughout the preceding decade, there has been a major integration of artificial intelligence (AI) and geographic information systems (GIS) (GIS). Even though geographic information systems (GIS) are a powerful technology that can manage big data sets and a wide range of artificial intelligence applications in several contexts, artificial intelligence may provide more effective techniques for GIS projects than traditional approaches. It is known as AI GIS, which is an amalgamation of artificial intelligence technology with various geographic information system processes, such as spatial data analysis algorithms (GeoAI) that integrate artificial intelligence technology, as well as for a series of AI and GIS-enabled technologies. Geospatial information systems (GIS) based on artificial intelligence (AI) have progressively gained importance in recent years, eventually becoming the dominant focus of geoscience research and application [1].

The application of artificial intelligence to GIS technology systems in order to enhance and maintain the next stage of development of GIS technology systems is a cost-efficient way for dealing with the current intelligent problem of GIS systems in an effective manner. After completing the task in the early 1990s, AI GIS became the first company to deploy computer vision extraction of geographic information from satellite imaging photographs and movies, which was completed by AI GIS. The employment of artificial intelligence technology such as voice recognition and speech synthesis, which will allow for more empowerment, is also a possibility.

Today's world is filled with artificial intelligence (AI), with multiple large firms in the field investing heavily in the subject's research and development to keep up with the latest developments. Artificial intelligence is based on the notion of a computer doing tasks in a way that is comparable to how humans would execute them at their core. When used in geographic information systems, artificial intelligence makes geographic information systems more intelligent and flexible by using a number of methodologies such as machine learning, statistical analysis, natural language processing, and spatial analysis [2].

2   GEO-INTELLIGENCE

GIS, remote sensing and satellite positioning are all used in geo-intelligence applications. Geo-intelligence is a general term that refers to the visualization, analysis, decision-making, and design of geographical information using geographic information systems (GIS). Geographic information systems (GIS) are distinguished from other information technologies by their geo-intelligence, which is their most important differentiating feature. This pyramid of geo-intelligence is divided into four stages: geo-visualization, geo-decision, geographic design, and geo-control. Each step contributes to the overall pyramid of geo-intelligence, which is shown in the diagram below. The complexity of the pyramid rises as it progresses higher, yet the maturity of the pyramid diminishes as it progresses downward. As a consequence of the introduction of artificial intelligence, geo-intelligence will usher in a new age of technological innovation and value creation.

Geo-intelligence may be characterized as the use of geographic representation, analysis; decision-making, design, and command technologies based on geographic information systems (GIS), remote sensing, and global positioning systems (GPS) to accomplish the following tasks: Geographic information systems are distinguished

from other information technologies by their geo-intelligence, which is the fundamental differentiating characteristic [3].

In order to perform operations such as 3D simulations, map development, route analysis, and other tasks, traditional Geographic Information Systems (GIS) continue to be largely dependent on processing power to this day.

3 WHEN AND WHY SHOULD YOU MAKE USE OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) ARE IMPORTANT QUESTIONS TO ASK

Geographic information systems (GIS) offer ideal training datasets for artificial intelligence systems because they include a wealth of information that is characterized by geographic location. Given the breakthroughs in computer technology and image recognition that have occurred recently, this artificial intelligence is now recognized. In the areas of pollution control and disease prevention, there have been some successful initiatives to utilize geographic information systems (GIS) with artificial intelligence (AI).

Satellite images give data with varying degrees of accuracy, which is presently underutilized despite the fact that information is readily available and accessible. However, certain things such as buildings, roads, and other structures may be difficult to differentiate from one another. One of the more straightforward applications is the combination of geographic information systems (GIS) with the Internet of Things data in order to deliver practical solutions to urban industrial difficulties. As an added bonus, such systems may have access to data from public organizations, such as health reports or environmental monitoring, among other types of data [4].

4 CHALLENGES ARISING AS A CONSEQUENCE OF HUMAN ACTIVITY

4.1 Image assets are recognized and categorized

The image collection is examined using image recognition software that has been trained to seek for certain assets and to verify how assets are connected. Using this application, it may also analyze type features and read meters on images, such as gas pressure, among other things. Photographs with a geo tag are the most effective for image recognition software, but they may also be beneficial when images are connected with specific items in a geographic information system (GIS). As a result, it will be essential to identify the appropriate asset type just from the photograph, and then to confirm and update the information in the geographic information system (GIS) database [5].

4.2 Utility services are shown on a map

In the subject of utility geographic information systems, there is a multitude of drawings that often depict different phases of the network. It is common to practice to manually save drawing data of varying purposes and quality in the utility asset registration system rather than having it automatically entered into the GIS system, rather than having it automatically provided. When dealing with wrong data conditions, data professionals may use machine learning approaches to discover and improve the situation, as seen in the following example. If it is discovered that the diameter of the connecting pipes is too tiny, an algorithm may be used to decide what kind of missing valve should be placed in its place. It may be difficult to properly teach artificial intelligence such that it is completely capable of doing these tasks, especially given the many roadblocks that stand in the way.

4.3 Organizing the information

The process of doing data cleaning and data augmentation jobs takes time, especially when it comes to removing missing or incorrect data from assets that are buried under the surface of the data warehouse. Despite the fact that databases are becoming more popular, GIS utility data, which is frequently a colorful collection of variable quality (historical) data, is often recalled by engineers rather than being preserved in databases [6]. There are several areas in which machine learning has the potential to provide considerable advantages to the utility industry.

5 ARTIFICIAL INTELLIGENCE AND GEOGRAPHIC INFORMATION SYSTEMS: WHAT THEY MEAN AND WHY THEY MATTER

There has been an upsurge in the convergence of artificial intelligence and geographic information systems during the past ten years. Precision information is required for GIS to function properly as a mapping technology. Accuracy can only be accomplished via the usage of exact information. This is one area in which artificial intelligence may be beneficial. Artificial intelligence (AI) is a kind of technology that is designed to replicate the human brain and has the capacity to learn on its own. It is becoming more popular. The ability to assess huge volumes of data and detect patterns that humans may otherwise ignore allows artificial intelligence to achieve great levels of accuracy. The amount of time necessary for data gathering, processing, and map generation is reduced by a factor of many orders of magnitude.

In order to enhance space pattern selection, artificial intelligence may be employed. Artificial intelligence can also be used to assess the prediction capabilities of spatial modeling approaches. As seen in the following example, the field of landscape ecology, in which defining the pattern of a landscape is critical for classification, finds it to be quite beneficial in this respect.

It has also been shown that the integration of artificial intelligence technologies with geographic information systems (GIS) may be very advantageous to the transportation industry. In the case of an emergency, such as an accident or bad weather, it may aid road network employees in reacting to the situation and rerouting traffic in the most effective way.

In the field of geomarketing, another example that might be employed is the usage of GPS. Using geographic information systems (GIS) and artificial intelligence, decision-makers may redirect delivery trucks in the case of an accident or other emergency. It helps to control of supply chain efficiency as well as decrease of shipping time. Geospatial artificial intelligence has also found use in the health sector, where it enables authorities to monitor population demographics and prevent the spread of infections by restricting the transmission of illness via the environment [7].

6 PROBLEMS WITH THE INTEGRATION OF ARTIFICIAL INTELLIGENCE WITH GEOGRAPHIC INFORMATION SYSTEMS

A huge amount of potential exists when artificial intelligence (AI) is combined with geographic information systems (GIS). We have, on the other hand, experienced a number of obstacles in the process of integrating the two systems together.

It is necessary to have a comprehensive infrastructure in place as well as a significant quantity of storage capacity. It takes a large amount of money to make artificial intelligence and geographic information systems operate effectively, which puts them out of reach for small firms. Because geographic information systems (GIS) need a vast number of varied data, the integration procedure must also address data structure difficulties. In order for the system to function properly, it is critical that we give it with reliable data sources.

Another problem that has to be addressed is a lack of skilled professionals in the area of medicine. People in charge of GIS and artificial intelligence systems must not only have considerable industry knowledge, but they must also have a deep grasp of machine learning and data science. Although more professionals are entering the industry, we may expect that this issue will be resolved in the near future as a result of the influx of newcomers [8].

7 SYSTEM TECHNOLOGY: AI-GIS

Using a four-layer structure, it is possible to effectively support the three characteristics of artificial intelligence in geographic information systems. This allows for the establishment of a fairly complete AI GIS technology system, which can then be connected with other systems. It is positioned at the bottom of the stack, followed by the domain library and finally the presentation layer. A variety of artificial intelligence frameworks may be sufficiently abstracted and confined at the framework layer if they are designed properly. The top functional layer of the AI GIS is comprised of the three portions of the AI GIS that have been explicitly stated.
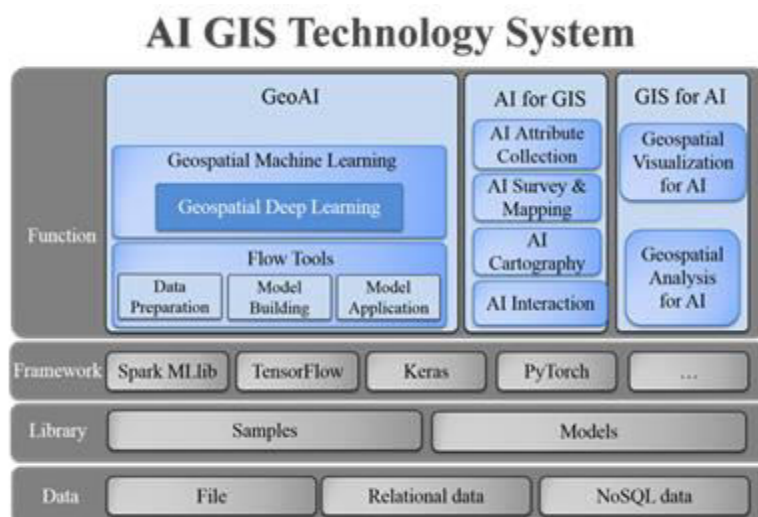
Diagram 1: System Technology: AI-GIS

If artificial intelligence technology is to be used to serve a diverse range of GIS applications, it must be extensively integrated with various types of GIS software, such as component geospatial information systems (GIS), desktop geographic information systems (GIS), server geographic information systems (GIS), and so on in order to jointly develop an AI GIS product architecture for use in the field.

Technology in the field of artificial intelligence and geographic information systems is classified into three categories:

GeoAI: It is a geographical data processing and analysis approach that incorporates artificial intelligence and is the outcome of both artificial intelligence and geographic information systems being used in conjunction (GIS).

Geographic Information Systems (GIS) and Artificial Intelligence (AI): Enhancing the features and user experience of geographic information system (GIS) software by using artificial intelligence capabilities.

Geographic Information Systems (GIS) for Artificial Intelligence: Artificial intelligence output results are geographically visualized and further spatially examined with the use of geographic information systems (GIS) for visualization and analysis.

7.1 GeoAI

Geographical AI Machine learning is at the foundation of artificial intelligence research, and deep learning is the most intriguing new research trend in this field of study. Generally speaking, GeoAI may be classified into two categories: Geospatial Machine Learning and Geospatial Deep Learning. The first of these two aspects is geospatial machine learning, which is the first of its kind. Geospatial Machine Learning may be used to solve a variety of GIS application difficulties, including geographic clustering, spatial classification, and spatial regression, to mention a few. Users can learn more about Geospatial Machine Learning here.

In recent years, data-driven earth science research has risen in popularity as a consequence of geospatial deep learning's capacity to recognize time and space properties from geographical data and to automatically and efficiently build complex features.

A process tool for the GeoAI algorithm is required because the spatial characteristics of ground objects differ in different regions and during different seasons. This process tool will allow the application unit to retrain the model in response to its own data characteristics, thereby increasing the success rate and accuracy of model reasoning while decreasing the cost of model training. In addition to multiple basic activities, such as data preparation, model development, and model application, the process tools expressly include numerous fundamental processes that are all covered by the program [9].

7.2 Systems of Geographical Information (GIS) Artificial Intelligence are being used.

When we talk about artificial intelligence for GIS, we're talking about using artificial intelligence technology to increase the intelligence of geographic information systems software. This includes things like artificial intelligence attribute collection, artificial intelligence survey and mapping, artificial intelligence cartography, and artificial interaction. AI Attribute Collection can assist users in intelligently classifying and identifying multi-source targets such as video images; AI Survey & Mapping can provide lower cost and more convenient indoor mapping solutions; AI Cartography can save users from the time-consuming process of manual mapping, and the transfer of style from image to map can be realized through simple operation; AI interaction includes rich application interacts and can be implemented in a variety of ways.

7.3 Artificial Intelligence and Geographic Information Systems (GIS)

In the case of AI recognition results, geographic information systems (GIS) may further process and mine data by using their geographical visualization and spatial analytical skills, thereby making AI possible in their respective environments. Applications that use map visualization, such as traffic flow monitoring, city component management, and cases, may give a more natural way of expressing information. AI extraction findings that have been subjected to extensive processing and mining may be used to provide real-time geofence warnings and vehicle tracking, among other features that can be used to enhance the capabilities of apps.

8 ARTIFICIAL INTELLIGENCE AND GEOGRAPHIC INFORMATION SYSTEMS (GIS): WHAT THE FUTURE HOLDS

The use of artificial intelligence in geographic information systems (GIS) to develop and construct the future generation of GIS technological systems is an effective technique to tackling the present intelligent problem of the GIS system, which is currently being addressed by the system. As the first company to perform computer vision extraction of geographic information from photographs and videos taken by remote sensing satellites, AI GIS was the first to market. Artificial intelligence technology, such as voice recognition and language

processing technologies might also be deployed, resulting in more empowerment. Artificial intelligence in geographic information systems, on the other hand, is still in the Narrow AI stage and is a long way from reaching the level of general artificial intelligence (AGI). The technology represented by generic artificial intelligence, as a consequence, is also a critical avenue for the future development of artificial intelligence geographic information systems.

9 CONCLUSION

Businesses may benefit from the usage of artificial intelligence in combination with geographic information systems to aid them in making quick and intelligent decisions. Asset monitoring and management, fleet localization, and location intelligence are just a few of the domains where they will increasingly be employed in combination with one another. Eventually, it is anticipated that this will revolutionize the GIS environment and expand the possibilities for GIS-based applications to be developed.

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Effective Use of AI for Discovery of Social Relationship

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ABSTRACT

Artificial Intelligence based machine learning algorithms are often utilized to extract hidden links from social networks and to classify people into separate groups based on their preferences, hobbies, and educational levels. This has lead to Social Network Analysis (SNA), or social network analysis. SNA has become more popular as a tool for examining interpersonal relationships in the workplace. This research paper focuses on scopes and possibilities of using AI based SNA for uncovering previously unnoticed patterns of social cooperation.

Keywords: Data mining, Social media, Decision Tree, Clustering, Linear Regression.

INTRODUCTION

Nowadays, it is feasible to link people who reside in various regions of the globe who would be divided by a digital divide in terms of SNA. Social networks have grown into virtual communities that have been thoroughly studied in terms of human interactions and major structural patterns. Social network sites like Twitter, Instagram, Facebook, and MySpace have evolved into internet-enabled applications that allow users to connect. Machine learning algorithms are often utilized to extract hidden links from social networks and to classify people into separate groups based on their preferences, hobbies, and educational levels, among other factors. There are lot of opportunities for using SNA to uncover previously unnoticed patterns of social cooperation [1,2].

We are user that one of the AI approach called data mining can be used on social network data to uncover patterns and connections in huge datasets that would have gone undetected by the human eye. Data mining is a technique for scrutinizing enormous volumes of data to find patterns and trends. Data mining is performed on data that is quantitative, textual, or multimedia in nature to connect between two or more variables is referred to as an association. Individuals are communicating information at any time and from any place to it [3]. Since there have many issues in social media networks such as anomalies. Anomalies arise in online social networks when individuals or groups of people abruptly change their interaction patterns or involve in behavior that is considerably different from their peers. The resulting network structure demonstrates the consequences of this uncommon behavior. Fraudsters are collaborated to improve their reputation in an online auction system. These are generated strongly connected subregions in the network of their high level of interaction [4]. The structure of a networking system, as well as how it is linked to other networks are examined to detect this kind of behavior. The growth of social networks, the digitization of many interactions, and online social networks have become crucial components of SNA [5]. The possible issues include,

A community analysis establishes

Opinion mining and Sentiment analysis

Enactment of social recommendation system

Influence modeling of some event or advertisement

Information Diffusion and Provenance

Past researchers studies have camewith many models of effective using AI enabled DM for above purposes. These models are used to investigate a wide range social data. When we surveyed them, there are two big difficulties with proper SNA,

Identifying how and why information flows across a social media network.

What are some potential sources of information considering current social media activity?

The first difficulty of data dissemination has taken a lot of attention from investigators. There are various methods to confirm the outcomes. The real cause is the nature of social media data, whose distribution is random and dynamic. So we can not get a single model to investigate SNA using established techniques of classical provenance study [16].

AI ENABLED DATA MINING TECHNIQUE AND TOOLS

Data mining techniques are utilized to mine data in a certain representation (such as a cluster or graph), as well as to mine completely added information based on data mining. There are several data mining approaches. Data is categorized utilizing classification algorithms based on certain characteristics. Data is organized into groups based on their qualities using clustering algorithms. It is feasible to build neural networks that replicate the cognitive activity of the brain and extract data based on predetermined rules and after completing specific kinds of learning based on repetitions. Some of the accepted data mining techniques are explained further like classification, clustering, associative rule mining, and regression technique. These techniques can be separated into two categories: predictive and descriptive data mining techniques. Predictive data mining analyzes the data for making models and attempts to forecast the nature of new data set on basis of previous instruction. Descriptive data mining helps in describing the dataset shortly and cumulatively and presents attractive properties of data. This strategy is utilized to uncover useful patterns, trends, and future forecasts that are hidden in pre-built tools. Data mining utilizes a model that contains several components to identify trends.

Classification : Classification is a data mining technique that predicts the data samples. Opposed to unsupervised machine learning, is based on previously labeled data. It can predict what will happen to the data by using training. Prediction involves guessing the likely class of the data.It is provided all depends on the training sample. The two main types of attributes are output attributes, also known as dependent attributes, and independent attributes. In supervised classification, the input data set is translated to a limited number of discrete class labels. Input data set $X \in R^i$, where i is the input space dimensionally and discrete class label $Y \in 1 \ldots \ldots T$, where T is the overallamount of class types. It is developed in the period of comparation$Y = Y(x, w)$, w is the vector of variable factors[22,23].

Clustering : Exploratory data analysis is an unsupervised classification method in which are no supplied labeled data. The clustering technique isutilized to divide unlabeled data sets into distinct and constrained groupings. Unobserved samples originating from the same probability distribution cannot be described properly. Clustering is classified into two major groups, each of which focuses on a distinct feature of the   phenomena [24].

Regression : Regression is another data mining method that uses supervised learning to make predictions about a continuous or numerical target value. Sales, profitability, space footage, temperature, and mortgage   rates are all forecasted. All of this is predicted using regression algorithms.The initial stage in regression is   to determine the value of the data set. It is depending on how individuals are educated. It calculates an estimate of the value by comparing known and projected values. These data items might be summarized   using   a model. The discrepancy between the expected and predicted numbers is referred to as the residual,   and it is considered an error. The major objective is to reduce the number of errors so that we can acquire   an accurate response. There are two kinds of regression techniques such as linear regression and nonlinear regression.

Association Rule Mining : Association rule mining is one of the highly capable data mining approaches. The most desired patterns are discovered among the enormous amounts of data. The basic goal of this method is to judge relationships between multiple items in a transactional database. Certain association   criteria   are used to find items in a dataset that occur often. These are composed of several separate choices   of   aspects such as find rules and purchase transactions. The basic problem statement is represented by a   collection of operations, which is a collection of literal errors. A rule of involvement is an extraction of the   method X => Y, where X and Y are groups of things. The instinctive interpretation of such a directive is   those database operations containing X likely to include Y. Many applications utilize association rules   mining, including market basket analysis, catalog design, retail architecture, consumer segmentation, and telecommunication alert prediction. Dynamic itemset counting (DIC), Apriori Algorithm (AA), Dynamic hashing and pruning (DHP), FP growth (FPG), and partitioning are the many association rule mining algorithms [15].

A range of free and open-source tools are used for data mining. Some of the techniques are applied designed for clustering, some for classification, regression, and association.It found in the earlier each method has its set of algorithms. Several tools are presented along with information on how they might be utilized to build specific algorithms. These include WEKA, R Miner, Python , EXCEL, SPSS, etc

DATA MINING TECHNIQUES RESEARCH AREAS

It is identified 15 data mining techniques that had been utilized by researchers around social media such as Support Vector Machine (SVM), Bayesian Networks (BN), KNN, Decision Trees (DT), Artificial Neural

Network, K-Means, Linear Discriminant Analysis (LDA), Novel, Density-Based Algorithm (DBA), Hierarchical Clustering (HC), K-Means, Maximum Entropy (ME), Logistic Regression (LR), AdaBoost, and Apriori. Table 1 shows the technique used in the selected paper and Figure 1 shows the data mining techniques among selected papers below [25]:

Table 1.Techniques used selected paper

S. No.	Technique	Percentage (%)
1	Support Vector Machine (SVM)	22
2	Bayesian Networks (BN)	20
3	KNN	7
4	Decision Trees (DT)	9
5	Artificial Neural Network (ANN)	6
6	K-Means	5
7	LDA	7
8	Novel	9
9	Density Based Algorithm (DBA)	8
10	Hierarchical Clustering (HC)	2
11	Linear-Regression (Lin-R)	1
12	Maximum Entropy (ME)	2
13	Apriori	1
14	AdaBoost	2
15	Logistic Regression (LR)	3
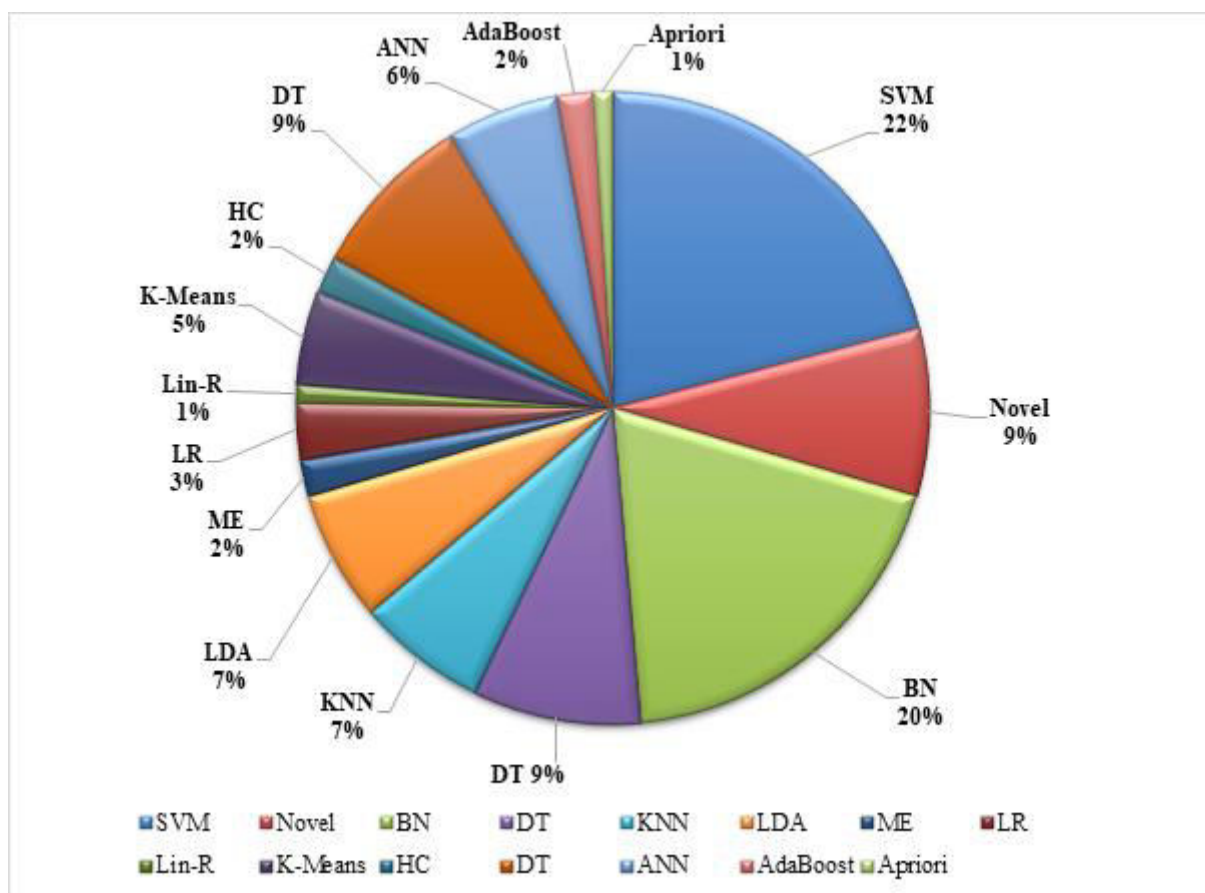
Figure 1. Data Mining Techniques among Selected Papers

Figure 1 shows the SVM, and Bayesian Networks (BN) is the most popular technique in the area in the social media network with a percentage of 20%. SVM techniques with a percentage of 22% are considered as one of the highest. It is defined six broad domains that used distinct methodologies in nine different research areas to exploit the flow of large data generated from social media.

CONCLUSION AND FUTURE SCOPE

In digital era where lot of data is generated every day, the Ai enabled technologies have tremendous scope for analysis and insight formulations. We have surveyed data mining approach here which integrates a range of fields, including machine learning and statistics, database systems, pattern recognition,as a part of artificial intelligence. An applications for SNA have been touched upon here which has evolved dramatically in recent years, and owing in part to the growing trend toward online user involvement. Data mining techniques such as k-means clustering, association rule mining, and text mining are utilized to analyze patent data. Clustering is utilized to locate patent data groupings with commonality to find existing technical clusters.

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A Review on Amblyopia Risk Factor Condition in Children

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ABSTRACT

In our life, eye vision is an important part, due to eye vision we have the ability to see the world. But in the world most of the people are taking easy. People are not think about caring for his eyes until something wrong with his eye. What to do when you have eye problems? Lazy eye is one of the problems with eye vision. In lazy eye syndrome there weak connection between eye and brain. Brain is not received the vision signal properly so one eye is stronger vision than other eye. This problem arrives in mind and paper is focusing on what are the causes of eye problems and how to treat them for maintaining long term eye health. This paper is focused on the causes and treatments of most common eye problems. This paper is also focused on literature revive of the amblyopia.

Keywords: Lazy Eye, Symptoms, Treatment, Eye Exercise.

1. INTRODUCTION

Amblyopia is Greak word i.e. dullness of eye vision. Dull means amblyos and opia means vision. Amblyopia is not detected by physical examination of the eye. Amblyopia, commonly known as lazy eye, is a vision disorder. In lazy eye in which one eye or both the eyes have reduced vision. Some times in one eye or both the eye have no vision. The person suffering with amblyopia condition, the brain is focused on only one eye. Due to this reason other eye vision signals are not recognised by the brain, brain is ignoring the vision of eye that is lazy eye. The lazy eye does not receive proper stimulation, so the brain cells responsible for vision. Amblyopia risk can be detected and diagnosis in early childhood. It required to detect and diagnosis of amblyopia in childhood otherwise to make a blindness in the lazy eye. Due to loss of vision of lazy eye image of the world is not available on the eye retina and it may be blurred image ignore by the brain[1].

Due to an abnormal visual experience in life, this changes the path between eye retina the brain. This causes the weaker eye to receive weaker visual signals that can be transported to the brain. The human eye to work together decreases, which causes the brain to suppress or ignore the information provided by the weaker eye and develop the amblyopia**.**

2. LITERATURE REVIEW ON LAZY EYE TREATMENT:

In India 3% to 4% population are lost his eye sight before the age of 20 years, due to the affecting of amblyopia. Therefore early detection and treatment is more important in children. It is a very common disease affecting 4% to 5% in most common developed countries[1].

In Worldwide every year, 2.45 million children are born with amblyopia or lazy eye. It is near about 1to 2% in the world. The highest occurrence of lazy eye detect in Western Europe. In Western Europe 3.67% of children are affected by amblyopia. In European countries, the prevalence is estimated at 3 to 4 %. A study on Singaporean Chinese children reports that 15% of amblyopia cases are detected as lazy eye. [2].

The prevalence of amblyopia worldwide is approximately 1%–5% (Ganekal et al., 2013; Fu et al., 2014; Oscar, et al., 2014; Aldebasi, 2015). A Lazy eye detection study was held in Minia state in upper Egypt, it is found that the of amblyopia detection was 1.49%, which is higher in rural areas compare to urban areas. (Abdelrazik and Khalil, 2014)

Numbers of lazy eye treatment models are available. One of the occlusion treatment model is the standard treatment for lazy eye with covering a patch on good eye[3]. This treatment is prescribed by world health organization for period of time ranging from 10 minutes daily(Von Noorden and Campos, 2002; Stewart et al., 2005). This treatment is very effective for children and adults to cure the lazy eye (Pediatric Eye Disease Investigator Group, 2005).

Another model of lazy eye treatment is atropine eye drops and optical penalization. This model of treatment is usually secondary treatments. This treatment is failed to patching of good eye. (Foss et al., 2013).

Perceptual learning may improve the visual different abilities such as texture, colour etc. This treatment approach which is independent of different age group and different types of amblyopia. (Polat et al., 2004; Levi and Li, 2009). It is shown recently that therapy promotes binocular vision by strengthening stereopsis and reducing suppression (Hess et al., 2010; Hess et al., 2011). Binocular vision is a coordination of two eyes both

eyes are focusing on an object. Binocular vision is important because it allows perceiving depth and relationship between object. Each eye see slightly different spatial information and transmits these difference to brain. If the amblyopic eye has been improved then it is not automatically restored again.. In fact, once the patch is removed after therapy, the amblyopic eye could be suppressed by the healthy eye. So may be loose some gains achieved as a result of therapy. (Birch, 2013). This is the disadvantage of binocular vision therapy. In addition, wearing a patch eliminates any advantage of binocularity (Dixon-Woods et al., 2006).

Home-based conventional treatment approach standard treatment for lazy eye treatment for children and adults. This treatment is useful monitoring the patients by remotely using information and communication technology (Hess et al., 2014). Virtual reality based video game are developed for lazy eye treatment and this treatment is more enjoyable for the children. (Foss et al., 2013). Patients can use the iPod or Mobile device or computer for doing the exercise by video game for lazy eye treatment. Lenticular printing is a multi-step process which consists of creating a lenticular image from at least two images, and placing it behind a lenticular lens. In binocular vision approach overlay screen preserved the luminance contrast and changes the images in different angels (Hess et al.; 2014)

In prolonged treatment, leading to poor compliance, patching related distress, relationship strain and stigma are disadvantages. No-compliance with patching results in a costly hospital admission to supervise the patching treatment. Not all patients respond to patching treatment, but those who are responded have gain the good results after treatment is stopped regardless of compliance (Hess et al., 2014).

3. FACTORS ASSOCIATED WITH AMBLYOPIA:
Following are the factors or causes to increase the risk factor of amblyopia.

Blurred vision and poor depth recognition are the symptoms of lazy eye.

There is a weak connection between brain and lazy eye.

Lazy eye includes factors like a muscle imbalance or eye disease causes amblyopia.

Premature birth of child.

Family history of amblyopia.

Development of disabilities.

Blockage in eye.

Lazy eye required effective treatment for curing of amblyopia in childhood.

4. SYMPTOMS OF A LAZY EYE MAY INCLUDE:
Lazy eye receive blurred image.

Some times receive double images independent eye.

There is weak connection between lazy eye and brain so image is not recognizing properly.

Both eyes not work together properly.

An eye direction may be changed, either upward, downward, outward, or inward

5. TYPES OF AMBLYOPIA:
Amblyopia can be divided into four categories, which are Strabismus amblyopia, Refractive amblyopia, Deprivation amblyopia, and Reverse Amblyopia.

5.1. Strabismus amblyopia:
Strabismus is abnormal alignment of the eyes having a squint condition i.e. eyes that look in different directions. It is a deviation of one eye, both eye cannot work in parallel way. Both the eyes does not receive equal images. It means that in strabismus amblyopia both eye not work equally in parallel way, due to this reason visual system of eye recognise the changes in image. Strabismus is the most common reason of lazy eye. To recognise the double vision due to poorly aligned eye. So the brain ignores the visual input from the misaligned eye[4].
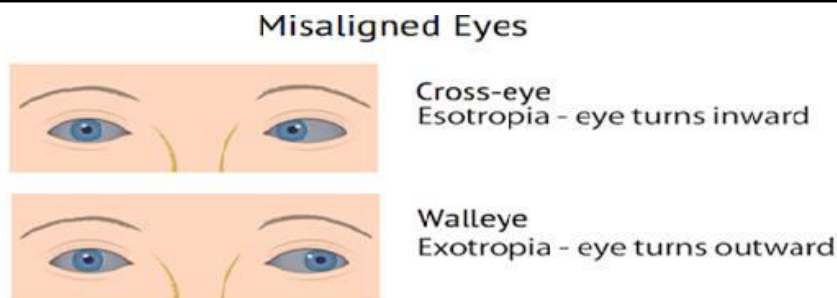
Figure 1 Amblyopia Strabismus (Source: Daigavane S, Prasad M.)

5.2. Refractive amblyopia

Decrease in visual acuity and deficient performance is the characterstics of refractive amblyopia; it is common type of amblyopia. This type of amblyopia may occurs at the time of child is born. When a child is born with a high refractive error (diminished acuity or blurriness) in one eye, so both eyes are misaligned. In this type of amblyopia one eye has significant near sightedness or far sightedness and due to this reason lazy eye will does not work equally with other normal eye. It means that one eye may have significant astigmatism and the other eye does not. The person having refractive amblyopia have face the problems like driving bike, reading, 3Dimensional recognition and many more[5].

Figure 2 Refractive Amblyopia (Source: Daigavane S, Prasad M.)

5.3. Deprivation amblyopia

In deprivation amblyopia eye visual acuity is decreases and does the abnormal performance of the eye visual system[10]. Due to this reason in deprivation amblyopia normal image forming is decreases in the eye. Due to the glaucoma, eye injury and eye surgery are main reason of this deprivation amblyopia[6].

Figure 3 Deprivation Amblyopia (Source: Daigavane S, Prasad M.)

5.4. Reverse Amblyopia

This amblyopia can be occurring due to aggressive amblyopia therapy, like the usage of an eye patch or atropine usually in early childhood on the sound eye. This is an uncommon amblyopia and it can be resolved by discontinuing the treatment. During the treatment of amblyopia, we have to patching the sound eye. Some times patching sound eye having the problem decreases his visual acuity. Again we have to treat the sound eye. This problem will happen due to mismanagement of amblyopia treatment. Reverse Amblyopia is known to be reversible through appropriate management of the eye therapy condition[7,9].

Figure 4 Reverse Amblyopia (Source: Daigavane S, Prasad M.)

6. TREATMENT ON AMBLYOPIA:

Amblyopia can traded doing some home exercises like Push Pencil, reading colouring chart, visual games, eye patching treatment, solving puzzles etc. All this exercise is prescribed the experts and doctors. We have to do the action therapy treatment plan at home and do the exercise. The best type of eye exercise is one that your child will focus on and enjoy, such as putting together jigsaw puzzles or playing specialized video games[8]. Occlusion or penalization therapy of the strong eye, in this therapy brain is forcefully receiving the input from weaker eye. The number of clinical studies are providing the evidence of occlusion therapy for improve the efficiency of the lazy eye.

Optimizing occlusion and penalization, perceptual learning, playing video games, Dichoptic treatment, training stereopsis, homeostatic plasticity are the some therapies are available for curing the amblyopia. Eye surgery, eye drops and patching of eye are also available treatment from expert as well as doctors.

7. CONCLUSION:

This paper are summarised the problems of lazy eye, how to treat lazy for improvement. The numbers of lazy eye treatment models are available for curing the lazy eye. After the literature survey author has found that home based eye exercise treatment is more suitable for children it includes eye patching treatment, video game treatment, push up pencil treatment.

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A Critical Review of Business Intelligence and Performance Estimation

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ABSTRACT
As we all know that there is lot growth in technologies, the Business Intelligence (BI) market is growing too, which forces the businesses to implement their offerings to the needs of the customer requirements. Implementation of Business Intelligence technique has become one of the most significant technological, organizational modernisms in decision-making processes [1]. Making world better place, businesses help to serve someone's requirements in productive manner. Recording the business activities can be maintained using electronic media and then those activity records become data. In addition to that data can be gathered through the customer's responses and using industry as a whole can also collect data. How a business can be functioned can be based on those data analysis and mining of those data using special tools and techniques to form patterns and intelligence [2].
Keywords: Business Intelligence (BI), key performance indexes (KPIs), Cognitive computing

1   INTRODUCTION
1.1 Business Intelligence (BI)
Business intelligence (BI) is having tools and techniques for collection, analyzation, visualization that can help executive to make any decision in the industry. Data mining comprises statistics as well as machine learning techniques to develop decision-making models from raw data [1]. Monitoring any business environment for its performance may help in adjusting future plans that is the today's business need and these monitoring includes industry, competitors, customers and the supplier. And the main method is to develop a scorecard to track its own health as well as vitality. Employers can decide, what they want to track based on their key performance indexes (KPIs), or (KRAs) Key result areas, there is a need to have customized reports designing to meet employer's requirement. And finally these reports can be then converted into customizable dashboards that help to understand the information easily (Easy-to-Grasp format) [2]. Business Intelligence (BI) is a set of Information Technology solutions, which comprises of tools for collecting, analyzing, reporting information to the user about performance of organization and its environment.

Digital data made organizations to learn more about their businesses and use that knowledge directly for improving performance and decision-making. Analytics either could be reactive or proactive. Where using business intelligence tools can do reactive analytics and using predictive modelling, text mining, optimization, and forecasting and statistical analysis can do proactive analytics [8].

Benefits of Business Intelligence[9]:
Business intelligence tools can be used to financial risks.

BI can also used to find the best new business patterns.

Strategic framework to implement Business Intelligence for an organization.

BI can be used for decision support and risk management.

Data collection strategies to find relevant information.

Adaptive analysis for meeting sudden requirement.

Mining of new business opportunities from huge volume of data by using rational extraction methods.

1.2 REVIEW OF LITERATURE AND DEVELOPMENT:
Many researchers have been using various techniques in improving business strategies by having boardroom discussions. In addition to that these discussions are now frequently helped in mining strategies. To predict efficient business strategies as well as business patterns business can use Artificial intelligence (AI), Machine Learning (ML). Other than this, now cognitive analytics can be a method that could change how business intelligence can be perceived. Researchers are now trying to emulate the human brain and then train the computer to think accordingly [3].

The processes of stimulating human thought in a computerize model is the cognitive computing. It comprises self-learning systems, which use data mining, pattern recognition to mimic the way of human brain function. The purpose of having cognitive computing is to develop automated IT system, which will allow problem

solving without having human involvement. Cognitive computing techniques frequently acquire knowledge from the data inserted into them by mining data for information. The techniques improve the way they look for patterns as well as the way they process data hence they become capable of anticipating new problems as well developing potential solutions. However they require deep domain knowledgeable expertise, instead of replacing human experts, cognitive computer system act as a decision support system and help them take better decisions based on the data available, whether in finance, healthcare or customer service [3].

Business Intelligence and Analytics (BIA) is a combination of BA and BI technology helping in decision-making systems. It is a combination of technology, technique, system, practice, methodology and application [4]. Implementing BIA techniques in an organization can assist analyzing tools for representing information and can also help in emphasizing insights of information that will help in efficiently enhancing the performance of business and its services and also allows manager to make decision for future plans.

Business Intelligence (BI) can be used for analyzing tool for representing information whereas Business Analytics (BA) highlights on information insight than the data management. These days, both the academicians as well as practitioners are applying analytic in the decision-making process using integrated data [4].

Methodology:
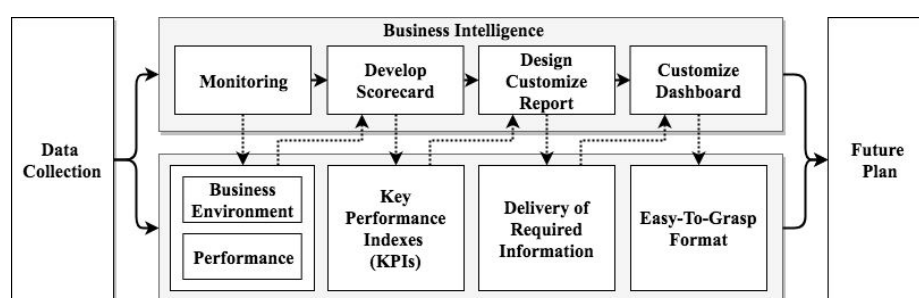
Fig. 1. Business Intelligence and Analytics Process

The methodology applied for Cognitive Business Intelligence And Analytics Performance Management for business will be validated through analysis of data set. The results from overall stage lead to minor refinements of the original framework and in addition to that will provide new research question for future research work.

1.3 CONCLUSION

It is very difficult task to select appropriate applications and tools in Business Intelligence and Analytics. Basic business intelligence and analytics require Data Warehousing (DW) and ETL tools, these tools allow making integration of different data source. That is not sufficient, for business intelligence require business intelligence tools that helps IT team to design data visualization as per user requirement. Data can be visualized through reports, dashboard, charts, require Business Intelligence and analytics platform to be accessed. Finally data analyst requires appropriate statistical as well as data mining algorithms to accomplish data analytic [4].

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Crop Leaf Disease Detection & Classification Using Machine Learning

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ABSTRACT.
The conventional approach of disease detection and identification for crop leaf diseases has greater risk of failure and delays in disease detection leads to huge losses to farmers. The leaf disease are of several types, some have symptoms at early stage and some may have symptoms at later stages or at the time of yield, due to which the yield and the production may also can get affected. Machine learning and its different algorithms has been boon for overcoming such issues of detection and identification of crop diseases. The methodology used implements techniques like image processing, segmentation and classification as their back end to obtain disease detection goals. This paper represents several techniques and algorithms that are applied to detect crops leaf disease and infection detection to achieve utmost success and also represents the methodology used for crop disease detection by machine learning algorithm to achieve more efficiency and success.

Keywords: Machine Learning, image processing, Crop Leaf Disease Recognition System (CLDRS).

INTRODUCTION

India is land of villages; agriculture being backbone of Indian economy is also the most important source for human beings on the planet. It has a great impact on the Indian economy, since India is heavily dependent on the quality and quantity of production of crops and their yield. Crops are vulnerable to a variety of diseases, with signs appearing on the leaf, fruit, and stem in the number of situations [1]. The early detection of diseases proves to be important for decreasing the use of pesticide use, and most of the farmers depend on traditional method of relying on expert advice made by some senior person to identify diseases based on visual effects on leaf, which is not accurate most of the time and time consuming. With such a manual and traditional method of disease detection technique continuous monitoring of large farms becomes extremely difficult. The use of image processing techniques is an efficient way to easily identify and classify plant leaf diseases [2] [3].

1.5 Image Processing as a catalyst for Disease Detection

Crop leaf disease recognition involves various image preprocessing and processing fundamentals in order to recognize and distinguish crop leaf diseases. Acquisition of image, pre-processing of image, segmentation of image, feature extraction of image, and leaf disease detection are among the steps.

Crop leaf disease detection includes some image processing basic step to detect and classify the crop leaf diseases. The steps include Acquisition of image, pre-processing of image, segmentation of image, feature extraction of image, and leaf disease detection. These steps are as follows:

Image Acquisition:
The first step in image processing is image acquisition. Image acquisition is the first stage in any vision scheme. High-resolution cameras are used to collect and record the crop/plant leaf. Photos can also be taken from a number of sources, such as public databases, the internet, or directly from the fields. Image quality is measured by image resolution as well as the parameters of RGB (Red, Green, and Blue) values.

Image Pre-Processing:
The second step in image processing is image pre-processing. Image enhancement, RGB transformations, filtration, and other steps are all part of the pre-processing process. The image enhancement can be accomplished by increasing the contrast. Filtering techniques are then used to smooth out the image. Filtering strategies include median, average, and Gaussian filters, among others.

Image Segmentation:
The third step in image processing is Image Segmentation. The term "segmentation" refers to the division of an image into many parts with the same or similar features. Segmentation can be achieved using a variety of methods, including the otsu process, converting RGB images to HIS models, and k-means clustering, among others. The objects are categorized into K number of classes based on a collection of features using K-Means clustering objects. The classification of the object

Feature Extraction:
The fourth step in image processing is Feature Extraction. The extraction of features from an image is critical for object recognition. The affected or diseased part of the image is removed after image segmentation. Color,

texture, form, edges, and morphology are the attributes and that can be used in plant leaf disease detection in a variety of applications of image processing. Various techniques, such as Color moments, Color histogram, and Color structure descriptor, are used to extract color characteristics. The Grey Level Co-occurrence Matrix (GLCM) approach is used to remove texture characteristics.

Classification and Detection:

The last and final step in image processing is Classification and Detection. Several classifiers are used for working on data set training and testing. Support vector machines (SVM), k-nearest neighbor, neural networks, fuzzy logic, and other classifiers are examples. Leaf diseases are categorized and detected using these methods [4].

1.2. Machine learning:

The technique of teaching computer and machines how to manage data more efficiently & effectively is known as machine learning. Many times it may be not possible to interpret the pattern or also extract information from the data after viewing it. In such cases, machine learning is used. Machine learning is becoming more common as more data sets become available. Machine learning is used in a number of fields, from medicine to the military, for extraction of relevant data. Gaining of knowledge from data is basic goal of machine learning. Many experiments were

had been carried out in order that computer learn on their own. Many of the mathematicians and programmers use a variety of approaches to solve this problem. Some of them are seen in the illustration below [5].
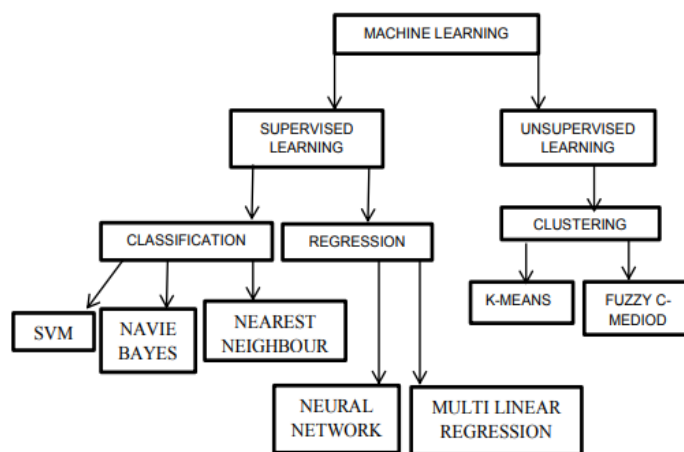
Figure 1: Machine Learning and its types

Supervised Learning:

Algorithms that need external assistance are known as supervised machine learning algorithms. The training and research data sets are isolated from the input data set. The output variable in the train data set needs to be estimated or categorized. For prediction or type, all algorithms examine styles from the training information set and follow them to the take a look at records set [5].

The supervised machine learning algorithms are those algorithms which needs external assistance. The input data set is divided into train and test data set. The train data set has output variable which wishes to be expected or classified. All algorithms study a few sort of styles from the schooling records set and apply them to the take a look at statistics set for prediction or category [5]. Three maximum well-known supervised systems getting to know algorithms have been discussed here

Decision Tree:

In decision trees, based on values the group attributes are sorted. The decision tree is primarily used for classification. Nodes and branches make up each tree. Every branch characterizes some value that a particular node can take, and each node represents attributes in a category that needs to be categorized [5].

Naive Bayes:

The text classification industry is the primary focus of Naive Bayes. It is primarily employed for the purposes of clustering and classification [6]. The conditional probability is used in the underlying architecture of Naive Bayes. It creates trees based on the likelihood of them occurring. Bayesian Network is another name for these trees.

Support Vector Machine:
Support Vector Machine is each other more common used machine gaining knowledge of technique (SVM). It's mostly used for categorization. SVM is based on the concept of estimating margins. Basically, it is used to draw lines between groups. The margins are drawn such that the difference between the margin and the classes is as small as possible, reducing the classification error.

Unsupervised Learning:
The data is used only to learn a few features by the unsupervised learning algorithms. When new data is added, it recognizes the data's class using previously learned features. It's also used for feature reduction and clustering.

K-Means Clustering:
Clustering, also known as grouping is an unsupervised learning strategy that generates groups on its own. Objects with common characteristics are grouped together in a cluster. Since it produces k distinct clusters, this algorithm is called k-means. The center of a cluster is the mean of the values in that cluster.

Principal Component Analysis:
The dimension of the data is reduced in Principal Component Analysis, or PCA, to make computations quicker and easier. Have a look at an example of 2D data to see how PCA operates. When plotted in a graph, the data can take up two axes. When PCA is applied to the data, the data becomes one-dimensional.

Semi - Supervised Learning:
Semi-supervised learning algorithm method is incorporated with aids both unsupervised and supervised learning techniques. It can be useful in areas of machine learning and data mining where there is already un-labeled data and getting the classified data is a time-consuming process [5].

Crop Leaf Disease Classification:
2.1 Bacterial Disease Symptoms:
"Bacterial leaf spot" is the most common name for the disease. Tiny, yellow green lesions on young leaves, which are normally deformed and twisted, or dark, water-soaked, greasy-appearing lesions on older foliage, are the first signs.

2.2 Viral Disease Symptoms:
All virus diseases cause a reduction in yield, and virus-infected plants have a limited lifespan. Viruses can affect the different parts of crops like root, stem, leaves and fruit as well. Most recordable symptoms on crops infected by virus are those which appear on leaves. It is very difficult to diagnose a viral infection. Leaves appear wrinkled and twisted, and development may be slowed due to the virus [6].

2.3 Fungal:
It's a type of plant pathogen that causes some of the most dangerous plant diseases. Fungi are responsible for the majority of vegetable diseases. Plants are harmed because they destroy cells. Infected seed, soil, crops, and weeds are the major sources of fungal disease. Wind and water, as well as the movement of polluted soil, livestock, workers, equipment, and tools, disperse it.

It firstly appears as water-soaked gray-green spots on lower or older leaves. These spots darken over time, and white fungal growth occurs on the undersides. A yellow to white streak appears on the upper surfaces of older leaves when downy mildew is present. On the undersides, white to grey fungal growth surrounds these areas. Water-soaked lesions are found in leaf-late blight. It started as a small brown or black spot on the undersides of the leaves and later spread throughout the area.

Alternaria solani causes early blight, which is a fungal disease. It appeared on the lower side of older leaves as small brown spots with concentric circles that formed a bull's eye pattern in the beginning. As the disease rate rises, it opens out on the surface of the leaf, giving rise to become infected. It started as a small brown or black spot on the undersides of the leaves and later spread throughout the area. Alternaria solani causes early blight, which is a fungal disease. It appeared on the lower side of older leaves as small brown spots with concentric circles that formed a bull's eye pattern in the beginning. As the disease rate rises, it spreads outward on the leaf surface, causing it to become infected [6].

Proposed Crop Leaf Disease Recognition System (CLDRS)
STEPS:

Image Acquisition can be done Using Red Green Blue

Pre- Processing of Image can be done from RGB to HSV Color Transformation

K-Means is used for Segmentation of Image

Grey Level Co-occurrence Matrix (GLCM) is used for feature extraction

Support vector machine is used for classification

RGB Image acquisition:
The acquisition of the image is the first step in image processing. We obtain the image using a data set of 60 images, 35 of which are diseased cotton images and 25 of which are regular cotton images obtained from various farms.

Image pre-processing:
Following image acquisition, image pre-processing is performed in order to improve image quality and eliminate any unnecessary distortions. The picture is clipped to get the desired region of the cotton leaf. The aim of image enhancement is to improve the image's contrast. The Hue-Saturation-Value (HSV) image is formed from the Red Green Blue image.

Image segmentation:
The pixels that are green are masked. The picture is clustered using K-Means clustering. The classification into K number of classes is done using K-Means clustering, which is based on objects and a collection of features. The number of squares of distances between the corresponding clusters is minimized when classifying an object.

Feature Extraction:
For feature extraction with four features, GLCM is used. The features like energy, homogeneity, contrast and correlation.

Classification:
The useful segments are obtained to classify the leaf diseases. Segment the components using genetic algorithm Classification is based on the Support Vector Machine (SVM) algorithm.

RESULTS
To begin, a data set of 60 cotton leaves with 35 diseased leaves and 25 healthy leaves is produced. The RGB colored input images are translated to HSV color space and segmented using the SVM algorithm. A total of three clusters have been chosen. The segmented images and the sample input images.

With the aid of diseased leaves segmentation, the diseased portion of the leaves was established. The images were resized to 256 x 256 pixels and converted to gray scale. For each image in the data set, the Contrast Correlation Homogeneity and Energy features of the GLCM texture were extracted and processed. The SVM classifier was given all four vector features of database images as input.
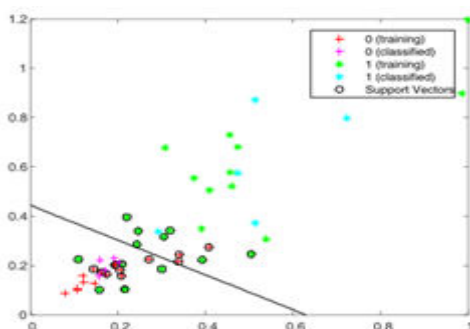
Figure 2: Support Vector Machine Analysis

Table 1- Classifier Performance

Diseased leaves	Normal leaves	Minimum Classification Accuracy
35	25	0.90

Figure 3: Classification Results

CONCLUSION
Cotton leaf disease identification was implemented. The features of the GLCM were extracted, and SVM was used to identify cotton leaf diseases. The Crop Leaf Disease Recognition System (CLDRS) model of disease

detection was used to detect disease. Different classification models may be used in the future to improve classification accuracy.

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Comparative Analysis of Word Embedding Models

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ABSTRACT

The words in the word vocabulary are mapped into real valued vectors of low dimensional which is similar to vocabulary length is termed as word embedding. Words with similar vector values are semantically related to each other. In this paper, we present a comparative analysis of different word embedding models such as Continuous bag of words, Skip gram and Glove (Global Vectors for word representation).

Keywords: Word embedding, Continuous bag-of-words, Skip gram.

1 INTRODUCTION

Word embedding maps the vocabulary words into real valued vectors. It understands both the semantic and syntactic meaning of the words from a huge unlabeled corpus.

Bengio et al. first introduced word embedding's in 2003 and trained in a neural language model. This maps a word w from vocabulary v to a real valued vector w in an embedding space of dimensionality D [1] [2].

Word Embedding Model: However, every feed-forward neural network takes words from a vocabulary as input and then embeds them as vectors into a lower dimensional space, which is fine tuned through back propagation, which yields word embedding's as the weights of the first layer, which is usually referred to as Embedding Layer [4].

The figure 1. Demonstrates the word embedding model using NN with having a hidden layer. This hidden layer used as loop up table. Words embedding's transformed text into real numbers.
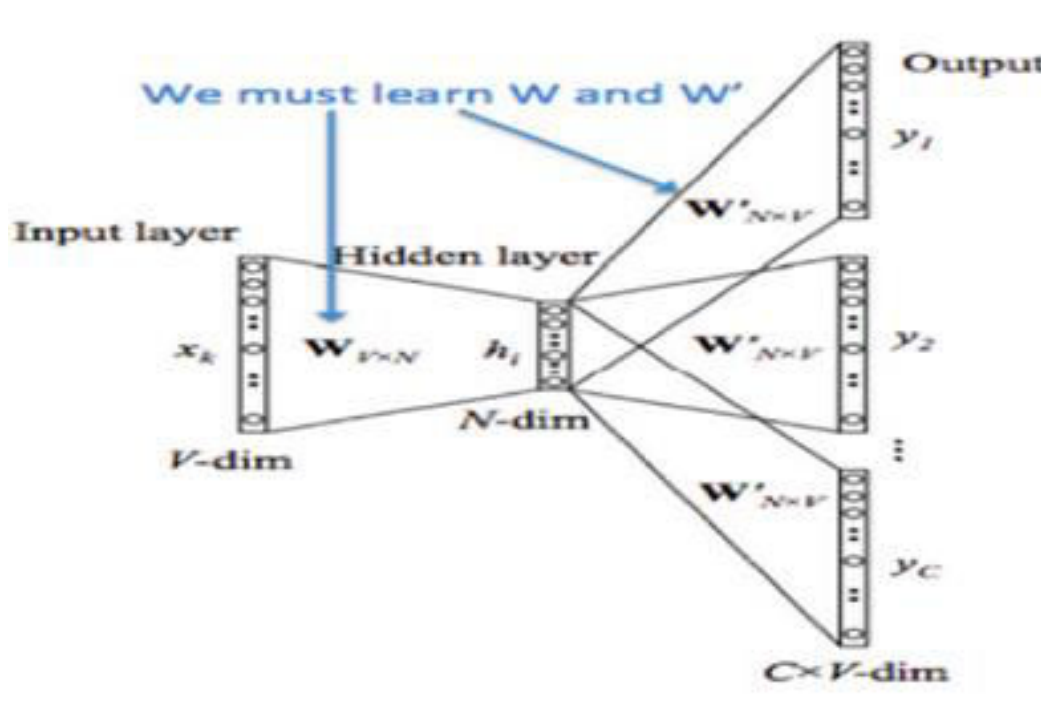
2 LITERATURE SURVEY ANALYSIS

Author [2] used skip gram model to learn higher quality of vectors, but it fails to capture semantic meaning. In the paper [5], used neural model with retrieval model which captures semantic relationship via word embedding. In paper [3], Glove embedding used and it performed significantly better.

The different word embedding models explained in this paper are as follows-

2.1 Continuous Bag-Of-Words Model:

In continuous bag of words word embedding model CBOW, predicts the current word given context words within specific window. This is based on a standard feed forward neural language model without the intermediate projection layer as shown in figure 2.
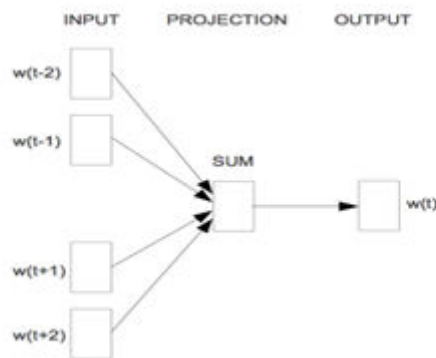
Fig. 2 Continuous bag of words model [5]

2.2 Skip gram model

Skip gram predicts the surrounding context words within specific window given current word. Initially random values are assigned to the vector representation of words. Then gradient descent with decaying learning rate is used to optimize these vector.
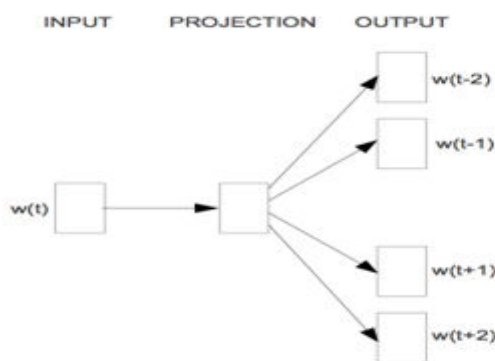
Fig. 3 Skip gram model [5]

2.3 Glove (Global vectors for word representation)

Glove is an unsupervised learning algorithm for obtaining vector representations for words. Training is performed on aggregated global word-word co-occurrence statistics from a corpus, and the resulting representations showcase interesting linear substructures of the word vector space [3]

3 COMPARATIVE ANALYSIS OF DIFFERENT WORD EMBEDDING MODELS

Word embedding maps a word from its original input space to lower dimensional vector space. Different word embedding models are compare as follow.

CBOW uses context words to predict center word and skip gram uses surrounding words to predict context words. While Glove uses the ratio of co-occurrence probability between words to predict target words.

Performance with respect to size of training data CBOW require more data since conditioning is done on context words. Skip gram works well with small data. Glove performs better with smaller coupes.

Memory consumption of CBOW, Skip gram is linear while Glove is quadratic. Classifier is trained using deep neural network in CBOW and Skip gram, whereas Glove trains the classifier using context windows.

Changes in dimensionality effects the CBOW and Skip gram model and the Glove uses co-occurrence matrix to quickly factorize dimensionality.

From the above three models, the best model is Glove, because the count matrix is preprocessed by normalizing the counts and log-smoothing them. This improves the quality of the learned representations and it is easier to train over more data as compare to other models.

Parameter Model	CBOW	Skip Gram	Glove
Basic over view	It uses context words given window to predict word	It uses surrounding words to predict the context words.	It uses ratio of co-occurrence probability between words.

Size of the training data	More data	Less data	Less data
Memory consumption	Linear memory	Linear memory	Quadratic Memory
Supported Classifier	DNN	DNN	Context Window
Effectiveness while changes in dimensionality	Training starts from scratch	Training starts from scratch	It can re-use co-occurrence matrix

4   CONCLUSION

Three word embedding model compared in this paper based on different parameters like basic over view, size of the training data, memory consumption, supported classifier and effectiveness while change in dimensionality.

Thus we can conclude that Glove is the best model as compared to other models as it is scalable to large corpus and words well even with small dataset. it improves the quality if learned representations by normalizing counts and log smoothing on them.

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Variations of K-Means Clustering Algorithm

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ABSTRACT

K-means clustering algorithm is widely used data clustering technique in data analysis/data mining till date. Though it was proposed 50 years ago [19]. In data mining, grouping of data items can be done on the basis of certain similarity measure (distance, features etc.) is called clustering. Clustering is an unsupervised learning; it is used to uncover hidden patterns in data set. K-means clustering algorithm is one of the most used algorithm due to fast and simple execution. In k-means algorithm k is for number of clusters, which needs to be predefined by the user. So the optimal number of clusters cannot be acquired. Many academics have developed and improved the basic k-means algorithm based on application or domain requirements. Also some researchers have combined basic k-means algorithm to another approach for example neural networks, genetic algorithm etc [20]. In this paper authors are presenting a small review of basic k-means clustering and its variants.

Keywords: K-Means, Clustering, Data mining.

1 INTRODUCTION

K-means algorithm is simple and mostly used unsupervised algorithm. Unsupervised algorithm is for finding natural groupings in the dataset and we don't have predefined classes or groups. It is now 50 years since the name "k-means" was coined by James McQueen in 1967[2], though the idea goes back to Hugo Steinhaus in 1956[3]. Clustering is iterative process, due to its fast execution and simplicity it became popular in data mining applications. Clustering is grouping of data items on the basis of certain similarity measures. K, in k-means are number of clusters, most of the time are pre-defined. If numbers of predefined clusters to be found are not correctly declared, may lead to incorrect results and may affect interpretation and would be difficult to find underlying patterns in dataset.

Clustering's classic definition would be grouping data items into different groups based on some similarity measure i.e. the procedure of arranging data items so that objects in the same group/cluster are more identical to each other than those in other groups/clusters. Similarity could be like distance of data items from group/cluster centers (centroids), application specific parameters, relation, density etc.

In this paper author presents small review of k-means clustering algorithm and its variations/advancements in basic k-means. Organization of this paper has four sections; first section is introduction which talks about the idea about this papers basic theme. Second sections are about discussion of basic k-means algorithm. Third section is about variations of k-means and fourth section is about concluding remarks.

2 K-MEANS ALGORITHM

K-means clustering is the process of grouping data objects into several categories. It is a vector quantization method that seeks to partition n observations into k clusters, with each observation belonging to the cluster (cluster centers or cluster centroid), which serves as the cluster's prototype. As a result, Voronoi cells are used to split the data space. Within-cluster variances (squared Euclidean distances) are reduced by k-means clustering, but regular Euclidean distances are not, which is the more difficult Weber problem: the mean optimizes squared errors, but only the geometric median reduces Euclidean distances. Using k-medians and k-medoids, for example, better Euclidean solutions can be obtained.

Although the problem is computationally challenging (NP-hard), effective heuristic techniques quickly converge to a local optimum. These are frequently comparable to the Both k-means and Gaussian mixture modeling use an iterative refinement strategy to achieve expectation maximization for mixtures of Gaussian distributions. They both employ cluster centers to describe the data; however, k-means clustering prefers to find clusters of similar spatial extent, whereas the Gaussian mixture model allows for diverse cluster forms. The unsupervised k-means algorithm is related to the k-nearest neighbor classifier, a famous supervised machine learning technique for classification that is frequently confused with k-means because of its name. The 1-nearest neighbor classifier is used to classify incoming data into existing clusters using the cluster centers acquired by k-means. This is known as the Rocchio algorithm or nearest centroid classifier.

K-means clustering aims to divide a collection of observations (x1, x2,..., xn), each of which is a d-dimensional real vector, into k (n) sets S = S1, S2,..., Sk in order to lower the within-cluster sum of squares (WCSS) (i.e. variance). The formal purpose is to discover:

$$\arg\min_{\mathbf{S}} \sum_{i=1}^{k} \sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2 = \arg\min_{\mathbf{S}} \sum_{i=1}^{k} |S_i| \operatorname{Var} S_i$$

where μi is the mean of points in Si Minimizing the pair wise squared variances of points in the same cluster is equivalent to this:

$$\arg\min_{\mathbf{S}} \sum_{i=1}^{k} \frac{1}{|S_i|} \sum_{\mathbf{x},\mathbf{y} \in S_i} \|\mathbf{x} - \mathbf{y}\|^2$$

Identity can be used to deduce equivalence.

$$|S_i| \sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2 = \sum_{\mathbf{x} \neq \mathbf{y} \in S_i} \|\mathbf{x} - \mathbf{y}\|^2$$

1.1   Since the total variance is constant, the sum of squared deviations across points in various clusters should be maximised. (between-cluster sum of squares, BCSS)[1] is similar. In probability theory, this deterministic relationship is linked to the law of total variance.

3   VARIATIONS OF K-MEANS

Jenks natural breaks optimization: Using k-means applied to uni variate data, this technique aims to reduce variance within classes while increasing variance between classes.

k-medians clustering uses the median in each dimension instead of the mean, and this way minimizes norm (Taxicab geometry).

K-medoids (also: Partitioning Around Medoids, PAM) uses the medoid instead of the mean, and this way minimizes the sum of distances for *arbitrary* distance functions.

Fuzzy C-Means Clustering is a soft version of *k*-means, where each data point has a fuzzy degree of belonging to each cluster.

Gaussian mixture models trained with expectation-maximization algorithm (EM algorithm) maintains probabilistic assignments to clusters, instead of deterministic assignments, and multivariate Gaussian distributions instead of means.

K-means++ chooses initial centers in a way that gives a provable upper bound on the WCSS objective.

The filtering algorithm uses kd-trees to speed up each *k*-means step.[10]

Some methods attempt to speed up each *k*-means step using the triangle inequality.[7][8][11][9]

Escape local optima by swapping points between clusters.[6]

The Spherical *k*-means clustering algorithm is suitable for textual data. The approach computes a disjoint splitting of the document vectors and a centroid normalized to have unit Euclidean norm for each partition. [12]

Hierarchical variants such as Bisecting *k*-means,[13] X-means clustering[14] and G-means clustering[15] repeatedly split clusters to build a hierarchy, and can also try to automatically determine the optimal number of clusters in a dataset.

Internal cluster evaluation measures such as cluster silhouette can be helpful at determining the number of clusters.

Minkowski weighted *k*-means automatically calculates cluster specific feature weights, supporting the intuitive idea that a feature may have different degrees of relevance at different features.[16] These weights can also be used to re-scale a given data set, increasing the likelihood of a cluster validity index to be optimized at the expected number of clusters.[17]

Mini-batch *k*-means: *k*-means variation using "mini batch" samples for data sets that do not fit into memory.[18]

Otsu's method: This method is used for image thresholding and one of the most successful for the same. Otsu methods objective function and k-means multilevel thresholding are same.

Harigan-Wong Method: Initially, all datapoints are assigned to random centroids. The latter is then calculated as the average of their allocated datapoints.

4   CONCLUSION

K-means clustering has three main characteristics of k-means that make it efficient is frequently seen as its most significant disadvantages: Euclidean distance is for distance metric, while variance cluster quality. As we use predefined number of clusters k; choosing k incorrectly can lead to bad results and interpretation of optimal number of cluster can affect decision making. Meeting to a local minimum might receive unexpected outcomes.

In this paper authors focused on basic k-means and development in k-means algorithm. These variations are application oriented, using these lead to accuracy improvement and improved performance.

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Performance Based Seismic Assessment of RC 2D Models with Non-Linear Static Analysis

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ABSTRACT

IS code method being traditional one for the design and which is force based. It is clear that damage is very much dependent on the displacement of the structure rather than the force. These results in the requirement of seismic deign approaches that are based on displacement design. Also, the displacement-based method is quite complex and time consuming. This gives rise to the rational and fast method known as "Direct Displacement Based Design" which is used as preliminary design of performance-based design, the method needs to be validated and explored in detailed manner. As IS code design cannot give the various types of performance levels therefore there is need to see the results of design of RC space frame designed with IS code method with the performance-based design. The study aims to understand the analysis and design of 6 storied reinforced concrete moment resisting space frame by the IS code method and Performance based seismic design with direct displacement-based design. The comparative results are observed in the form of base shear, drift and IDR has been evaluated of each model. For analysis and design of building finite element tool SAP 2000 and MS Excel has been used.

Keywords: Performance based design, IS code method, DDBD, IDR, Base shear, SAP 2000

INTRODUCTION

Buildings are critical life-line facilities which should remain functional without damage after an earthquake to facilitate the daily work and various types of operations. In recent years, several types of buildings have been constructed such as Residential, Commercial and Industrial, which results in a great demand to evaluate the effects of seismic behaviour of the buildings, and properly reflect it in their seismic design. Considering all the loading conditions, apart from gravity loads, the structure will experience major lateral forces of greater magnitude during earthquake events. It is necessary to estimate and specify these lateral forces on the structure in order to design the structure to resist an earthquake. It is not possible to exactly determine the earthquake induced lateral forces that are expected to act on the structure during its lifetime.

It has been observed after Bhuj, Gujrat earthquake that building having irregularities are susceptible more than regular building at the time of earthquake [9]. However, after considering the consequential effects of earthquake due to successive failure of the structure, it is very much important to estimate these forces in a rational and realistic manner and the design can be made on the basis of these forces considering economy factor. An account of the major earthquakes in India and the associated fatalities is provided in Table 1

Table1: Fatalities and damages due to earthquakes in India (Rahul Rathod and Dr Zameeruddin,2020)

Sr.No.	Earthquake	Year	Intensity	Fatalities
1	Latur (Khillari)	30, September 1993	6.2	9748
2	Chamoli	29, March 1999	6.8	103
3	Gujrat (Bhuj)	26, January 2001	7.7	20000
4	Off west coast (Northen Sumatra)	26, December 2004	9.1	15000
5	Kashmir	8, October 2005	7.6	1350
6	Gangtok (Sikkim)	18, September 2011	6.9	118
7	North India	25, April 2015	7.8	8900
8	North India	12, May 2015	7.3	04
9	Dibrugarh (Assam)	28, June 2015	5.6	03 injured
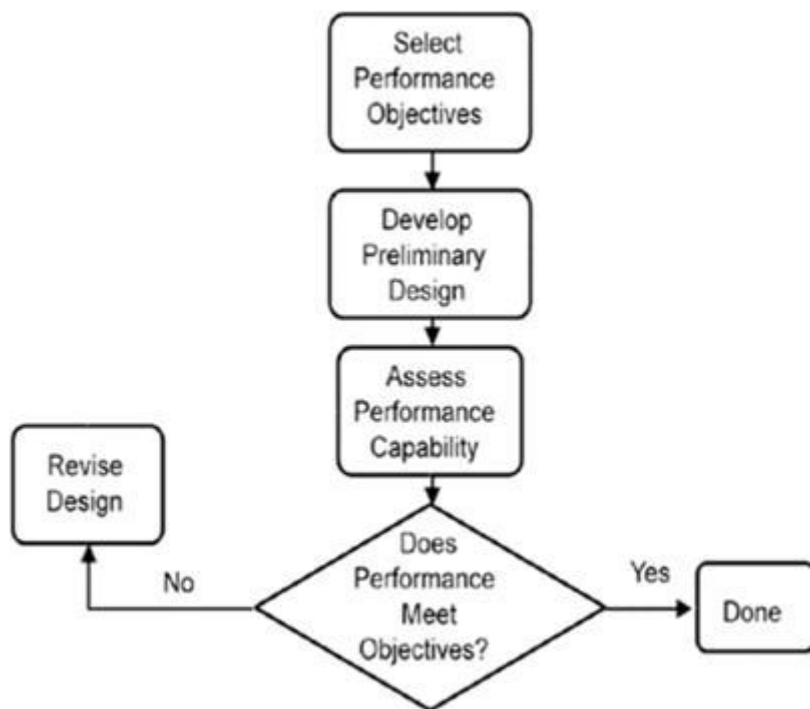
Fig-1: Performance based seismic design

2. FUNDAMENTALS OF DIRECT DISPLACEMENT BASED DESIGN

The objective of this section is to establish the fundamentals of the direct displacement-based seismic design of frame buildings. This method utilizes the substitute structure approach. The method fundamentals have been shown in fig.2 to fig.5. It considers SDOF representation of MDOF system as shown in fig.2. The bilinear envelope of lateral force displacement response of ESDOF representation is shown in fig.3.

An initial elastic stiffness is followed by post yield stiffness of r*Ki. While force based seismic design characterizes a structure in terms of elastic pre yield properties (initial stiffness Ki, 5% elastic damping), DDBD characterizes the structure by second stiffness Ke at maximum displacement △d.
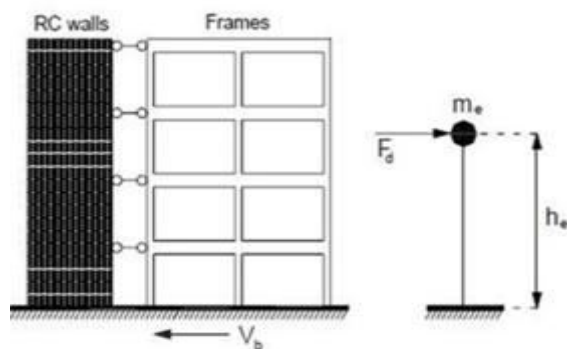
Fig-2: Equivalent SDOF system
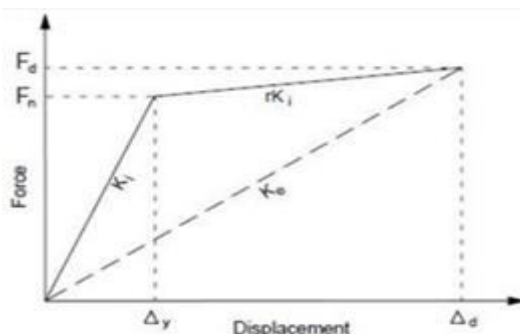
Fig-3: Effective Stiffness K_e
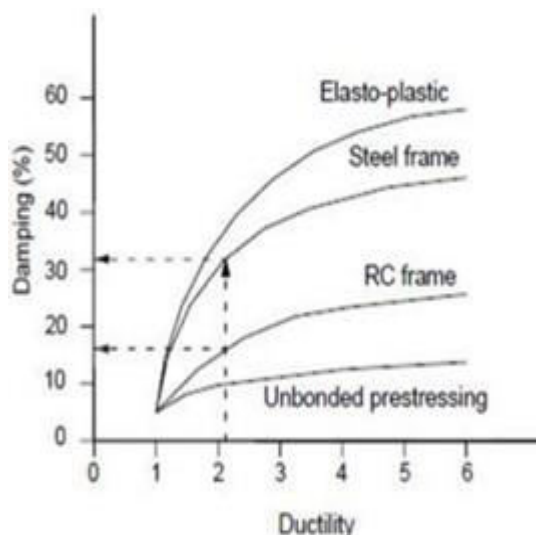
Fig-4: Equivalent Damping Vs Ductility
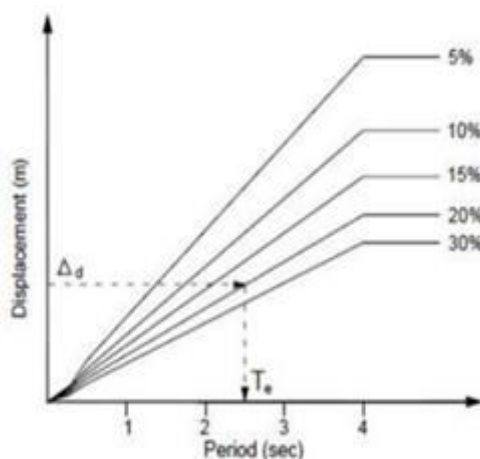
Fig-5: Design Displacement spectra

A level of equivalent viscous damping ξ eff, representative of combine elastic damping and the hysteretic energy absorbed during inelastic response as shown in fig.4. The corresponding estimated from the expected ductility demand. the effective time period Te at maximum displacement response, measured at effective height He can be read from set of displacement spectra for different level of damping as shown in fig.5. Hence required effective stiffness is given by:

$$Ke = \frac{4\pi^2 m_e}{T_e^2}$$ ……………. (1)

Where,

m_e = Effective mass of ESDOF participating in fundamental mode of vibration.

Hence the design lateral force, i.e., design base shear is:

$$F = V_{base} = K_e * \triangle_d$$ ……... (2)

The design concept is thus very simple. Such complexity that exists relates to determination substitute structure characteristics, the determination of design displacement and development of design displacement spectra.

3. GEOMETRICAL MODELLING OF STRUCTURE

The software SAP 2000 is used to create model and run all analyses. The software is able to predict the geometric nonlinear behavior of space frames under static or dynamic loadings, taking into account both geometric nonlinearity and material inelasticity. The software accepts static loads (either forces or displacements) as well as dynamic (accelerations) actions.

Fig-6: Plan of Building
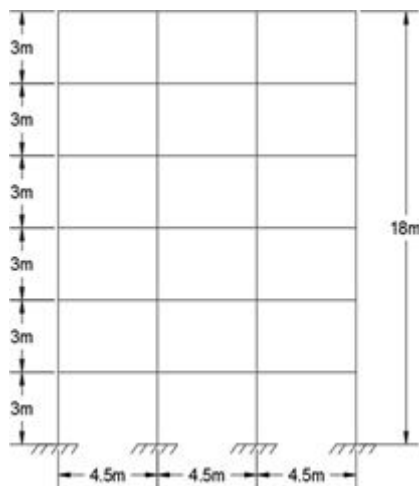
Fig-7: Elevation of Building

4. RESULTS

The geometrical modelling of frame is carried out using finite element tool SAP 2000 software. The analysis and design are carried out by using IS 1893 (Part I): 2002 and various results are drawn which are stated in this chapter.

4.1 Base Shear for IS code Method

Analysis is done with the help of software and various results are drawn for the study purpose. The base shear from the software is given in table 2:

Table-2: Base Shear for various load combinations

Output Case	Global Fx (KN)	Global Fy (KN)
Ex	701.51	2.83E-10
Ey	3.07E-10	647.382
1.5(DL)	2.46E-14	2.03E-15
1.5(DL+LL)	3.63E-14	1.47E-15
1.2(DL+LL+Ex)	841.813	3.39E-10
1.2(DL+LL-Ex)	841.813	3.39E-10
1.2(DL+LL+Ey)	3.68E-10	776.859
1.2(DL+LL-Ey)	3.68E-10	776.859
1.5(DL+Ex)	1052.266	4.24E-10
Output Case	**Global FX (KN)**	**Global FY (KN)**
1.5(DL-Ex)	1052.266	4.24E-10
1.5(DL+Ey)	4.60E-10	971.074
1.5(DL-Ey)	4.60E-10	971.074
0.9(DL)+1.5(Ex)	1052.266	4.24E-10
0.9(DL)-1.5(Ex)	1052.266	4.24E-10
0.9(DL)+1.5(Ey)	4.60E-10	971.074
0.9(DL)-1.5(Ey)	4.60E-10	971.074

The various parameters for Direct Displacement based method are given in table 3.

Table-3: Parameters for Direct Displacement based Method

Target displacement (Δd)	0.291 m
Effective height of ESDOF system (He)	12.201 m
Equivalent mass (m_e)	886.789 tones
Frame yield rotation (Θy)	0.014
Equivalent yield displacement (Δy)	0.172
Design displacement ductility factor (μ)	1.699
Equivalent effective damping (ξeq)	13.893 %

4.2 Storey Drift

The story drift is the relative displacement between two floors. It is important to know the storey drift because if the maximum storey drift is greater than the allowable storey drift then it is not permitted in the design procedures. If the storey drift is greater than the allowable storey drift then it is required to revise all the design procedure and follow all the design steps again and make this process till the storey drift has lesser value than the allowable drift.

IS code gives the value for the allowable storey drift and is given by the formula as:

Allowable storey drift is = 0.004 * storey height   Allowable storey drift is = 0.004 * 3000 =12mm

The maximum storey drift is 4.22 mm and it is between the second and third floors. The storey drift 4.22 mm is less than the allowable storey drift which is 12 mm. Therefore, the design is safe.
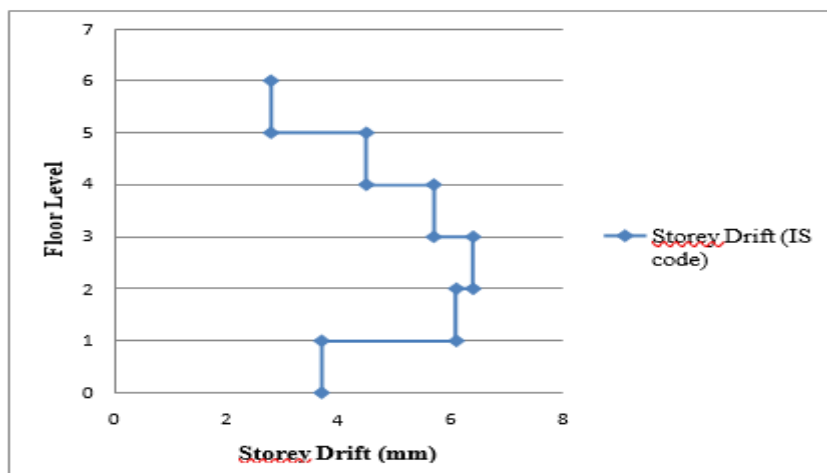
Fig-8: Storey Drift for IS Code method
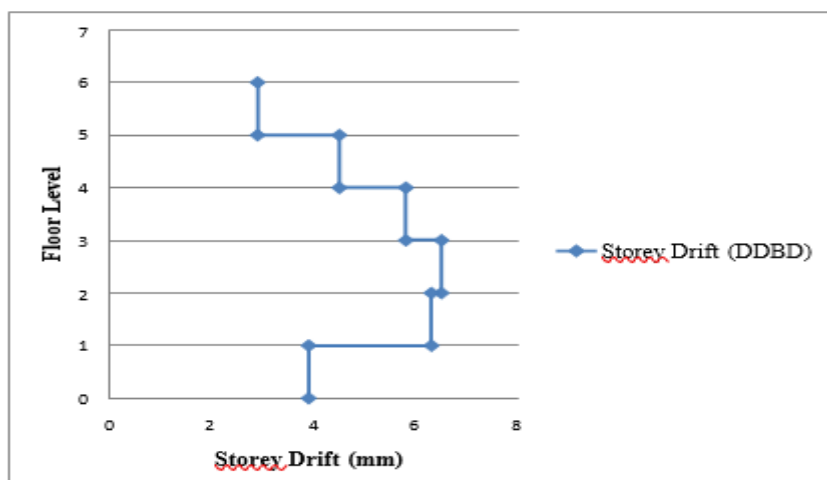
Fig-9: Storey Drift for Direct Displacement Method

4.3 Interstorey Drift Ratio (IDR)

The interstorey drift ratio is calculated from the following formula as:

Interstorey Drift Ratio (IDR) in percentage= (Relative displacement between two floors/Storey height) *100
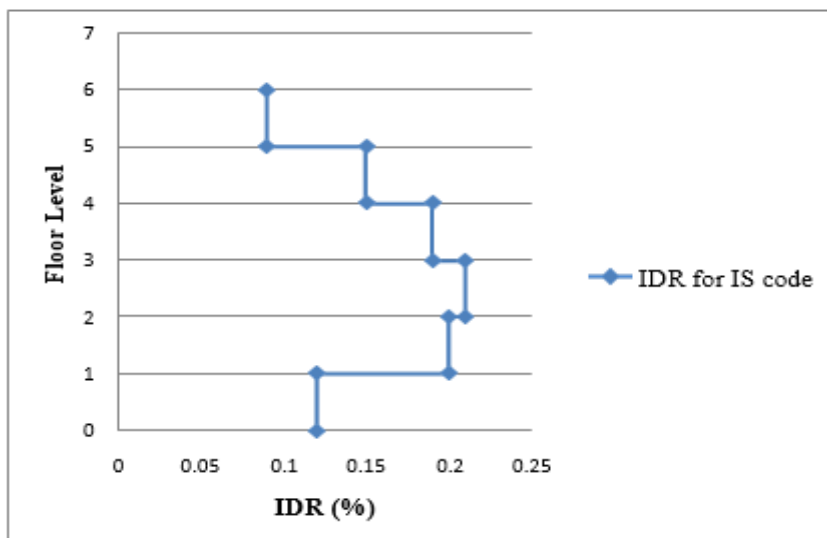
Fig-10: Interstorey Drift Ratio for IS Code method
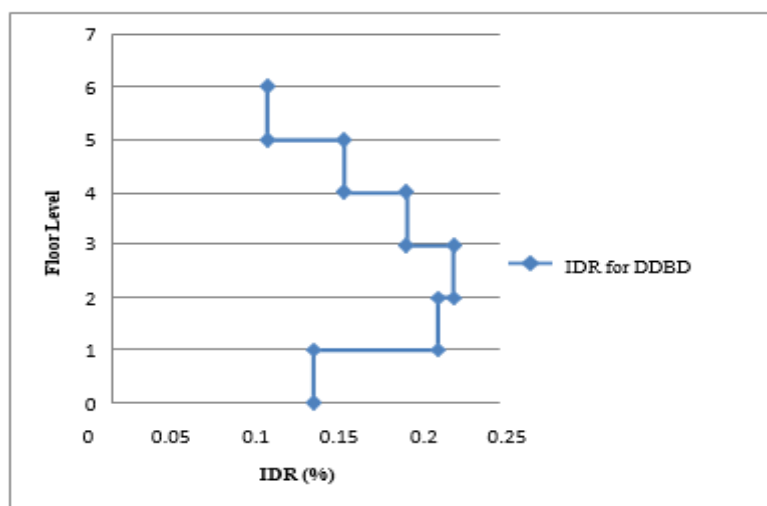
Fig-11: Interstorey Drift Ratio for Direct

Displacement Method

4.4 Reinforcement Details

After completion of analysis part, design part gives the required reinforcement details which are given in the table 4 and these reinforcement details are drawn with the help of various design parameters such as Rebar Percentage, Column P-M-M interaction ratios, Column-Beam Capacity Ratios and Joint Shear Capacity Ratios. The above parameters are considered with their limits for the design purpose.
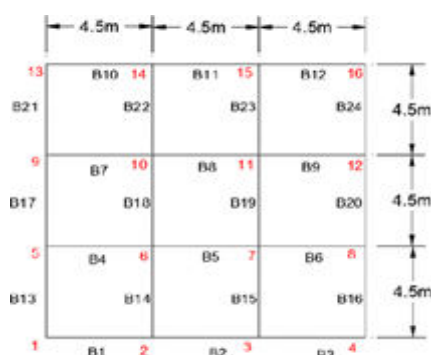
The grouping for the various columns on the basis of their position in the plan is given as below-

C1- C1, C4, C13, C16

C2- C2, C3, C5, C8, C9, C12C14, C15

C6- C6, C7, C10, C11

Table-4: Reinforcement Details for Columns of Building

Floor No.	Member	Reinforcement (mm^2)	Reinforcement (mm^2)
1st	C1	2206	2228
	C2	1962	2026
	C6	1711	1904
2nd	C1	1600	1421
	C2	1629	1549
	C6	1711	1885
3rd	C1	1600	1421
	C2	1629	1548
	C6	1711	1748
4th	C1	1600	1421
	C2	1629	1538
	C6	1697	1593
5th	C1	1600	1421
	C2	1600	1454
	C6	1600	1494
6th	C1	1600	1421
	C2	1600	1421
	C6	1600	1421

5. CONCLUSIONS

The storey drift for the concerned geometrical model is within the allowable limit of storey drift given in IS 1893 (Part 1):2002

The maximum Interstorey Drift Ratio (IDR) is less than design drift for the Collapse Prevention (CP) performance level.

The column beam capacity ratio is greater than 1.1 for concerned member sizes which ensures strong column weak beam philosophy.

The concerned DDBD philosophy gives economical design.

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Data Mining Applications in Healthcare Domain: A Comparative Study of Algorithms in Prediction of Cancer Disease with Effective Use of SPSS Modeler

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ABSTRACT:
In today's modern era Data Mining is raising popularity for being used for research purposes. The healthcare industry is a vital element of the economy, with the aging of the population and the rising cost of healthcare services. Traditionally, the goal of IT adoption in health care has been cost minimization and payment systems. This system provides positive incremental benefits to healthcare organizations by storing patient records and drug utilization information, managing insurance payments, the bulk ordering of drugs, and streamlining hospital operations such as bed assignments and admit and discharges.

The usage of data mining techniques has grown in popularity as the number of medical concerns has increased. Data mining has the potential to enhance healthcare choices and patient survival times [1]. Choosing the appropriate data mining technique is the main task because accuracy is the main issue. Earlier diagnosis done was based on the doctor's experience or expertise but still, wrong cases were reported. The objective is to give exposure to a variety of data mining techniques so that the researchers can have a direction to research incurable diseases which are the costliest diseases so as to save money and the lives of the patient.

To exemplify the benefits of data mining, this study examines disease data and studies the use of data mining algorithms to predict diseases. This article looks at how data mining may be used in the healthcare field. In this study, the cancer disease data is considered for the prediction of diseases identification using various data mining algorithms using the SPSS Modeler.

Keywords: Data Mining, Healthcare Data Mining, SPSS Modeler in Healthcare.

INTRODUCTION

Data mining is a critical step in the process of database knowledge discovery and is a key subfield of knowledge management. This study examines explores how to use data mining techniques for knowledge discovery in the healthcare domain.

The healthcare data is not only increasing in a massive amount of size but also in numerous dimensions which arises its complex issues. Because of this, it is very difficult to efficiently analyze such complex data using conventional methods or approaches, while using modern techniques such as integrating statistics, mathematics, and programming logic based on advanced algorithms, it is possible to discover useful knowledge and make use of it for successful treatment and additional benefits. In certain cases, data mining can be useful for extracting significant patterns from a vast amount of healthcare data. Based on the extracted meaningful patterns can turn into integrated knowledge for making essential decisions. The research problem that the researcher has identified is "prediction of cancer disease with effective utilization of Data Mining applications using SPSS Modeler".

DATA MINING TECHNIQUES

The data mining techniques are nothing but the data mining algorithms which are used to process the data and find useful knowledge out of it. The algorithms used in these techniques are of two types, where the first type is defined as predictive or supervised which is used for predicting unknown data patterns. Data classification, data regression, and prediction these forms are included in predictive or supervised types. And second is known as a descriptive or unsupervised type which includes association, cluster, sequence, and summary of descriptive data. Here similarity among the data objects has been measured and on that basis relations or patterns of unknown data, objects have been found [11]. According to these two types of techniques, widely used data mining techniques are discussed below. As a predictive and informative approach, the following figure demonstrates the deployment of data mining techniques [12].
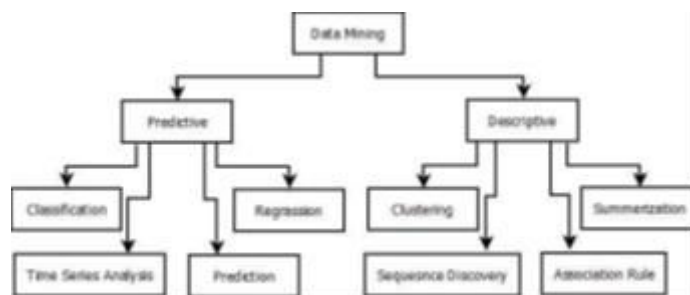
Figure 1: Categorization of DM Techniques [13][14].

Medical healthcare is the one boon research area where data mining is proved beneficial. The motive is to give a detailed view of popular data mining techniques to the researchers so that they can work more exploratory. Data mining discovers hidden information based on different algorithms to extract knowledge in terms of patterns from large datasets, while KDD is the aggregate method of exploring knowledge from large data [7][15][16].

LITERATURE REVIEW

A Healthcare information system is the computerization of health records that supports various departments like administration, medical care, research, training, insurance, etc. [2]. The information which is retrieved by using data mining applications can help experts like physicians, surgeons, and management authorities to take appropriate decisions. Decision-making by adapting the information retrieved by means of data mining is also called Knowledge Discovery (KDD) and this offers a good advantage to the healthcare organizations.

Research articles spanning the years 2018 to 2022 are analyzed in this study to see how the data mining application works for recovering knowledge from a large volume of healthcare data. The journals were found by using keywords like Data Mining, Applications of Data Mining in healthcare In title, abstract, and keywords in various online databases like IEEE, Springer, Elsevier, Science Direct, and some open access journals are analyzed using keywords; Data Mining, Data Mining Applications, Knowledge Management, Classification, Clustering, Association rules, CART, Decision Tree, Naive Bayes, Artificial Neural Network, Support Vector Machine (SVM), Fuzzy rules, Healthcare, Bioinformatics, Tech-support, etc.

Keywords	Years				
	2018	2019	2020	2021	2022
Data Mining	12	14	9	13	7
Classification	8	7	9	8	4
Clustering	8	8	7	5	3
Association rules	6	7	5	6	1
Decision Tree	8	8	9	7	1
Naive Bayes	8	4	5	6	1
SVM	7	5	9	7	2
Healthcare	5	4	6	3	1

Table 1: Details for the articles found according to keywords concerning years.

Chart 1: Number of Publications Year wise
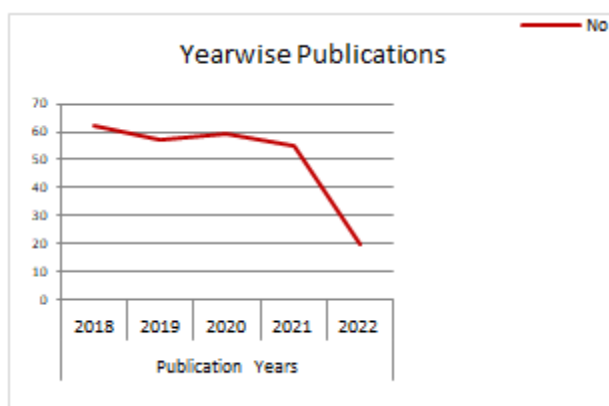
Chart 2: Number of Publications Algorithmwise
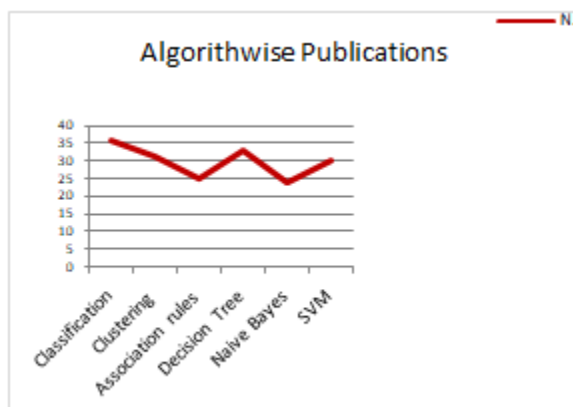
In the beginning, the articles analyzed the term Data Mining and describe its various practices like classification, clustering, regression, and association, then various algorithms and the functionality of data mining are reviewed for the mentioned period, and finally, it focuses on the advantage, disadvantages, issues, and challenges in the healthcare domain. It has been found that the Data Mining algorithms are capable of predicting, diagnosing, prognosis, and classifying the diseases [2].

DATA MINING

Data Mining can be defined as "discovering meaningful and useful information from the huge amount of data" by Fayyad [4]. These techniques include characterization, classification, clustering, association, evaluation, pattern matching, and knowledge representation [5]. The following figure illustrates the KDD process. In 1996 four companies created a comprehensive data mining process model called CRISP-DM which consists of six different steps: (i) understand the business process, (ii) understand data, (iii) prepare data, (iv) prepare the model, (v) model evaluation, and (vi) execution [3][6]. Fayyad et al. Describe Knowledge Discovery stages: (i) selection of data, (ii) pre-processes the data, (iii) transform data, (iv) applications of data mining techniques, and (v) information interpretation. Hence with this kind of similarity, Data Mining has become a milestone in the KDD process [7][3][8].
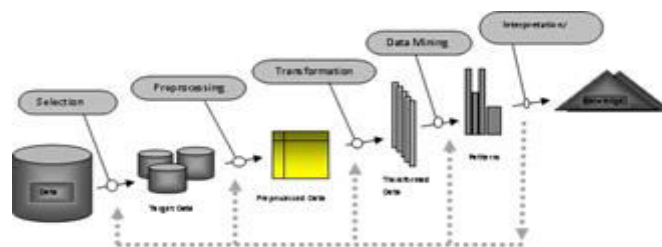
Figure 2: KDD process (Fayyad et.al.) [7]

Figure 2 shows the KDD procedure, which is an iterative series of events as:

Selection: Selecting the data to be analyzed. In this stage, the data is chosen based on a set of criteria.

Pre-processing: Noise removing and specifying target data. It is also known as the data cleansing stage.

Transformation: Transform the data into an appropriate format. It only transformed useful data in particular research

Data Mining: Extracting Data Patterns by applying suitable algorithms to transformed data. Data mining is a stage knowledge discovery process.

Interpretation: Removing irrelevant data, interpreting the discovered patterns into human-understandable knowledge.

DATA MINING TOOL

SPSS Modeler is one of the leading machine learning and data analytics tool. Worldwide organizations trust SPSS Modeler for data processing and discovery, prediction analysis, model development, deployment and management, and machine learning. It is best suited for hybrid environments which require strong supremacy and security needs. SPSS Modeler is a part of IBM Watson© Studio. It has advantages like

Visual Analysis stream

Insightful graphical GUI which helps to visualize the steps of the Data Mining process

Automatic data preparation to the best suitable format

Supports open-source technologies using R, Python, Spark, and Hadoop to amplify its analytical power.

open source-based innovation which includes R or Python, combines programming and visual skills, exploiting a hybrid approach

RESEARCH METHODOLOGY

For this research data mining tools are used to demonstrate the data mining tasks and data mining applications in the healthcare domain. As per the literature survey researchers have utilized various data mining tools which are professionally developed for data mining tasks. But very few used IBM SPSS for this job. The SPSS Modeler is one of the add-ons to the SPSS package which is specifically developed for data mining and knowledge discovery purposes. The researcher has used this modeler to create a data mining model to represent the hidden knowledge from the selected database. The SPSS modeler has the potential to construct a module to extract the raw data, apply the techniques of data mining as necessary, and display the output that will represent some kind of information. The SPSS model gives various kinds of services to select particular data mining techniques and test the speed, accuracy, and other forms.

Data Collection: The data was collected through recognized research database agencies. The data collected through these agencies on request that this data be used only for research purposes and not been distributed to anybody for any menace of use. The data mainly contain the disease data to test the data mining techniques for knowledge discovery.

Data Analysis: Several data mining algorithms used to assess the accuracy of disease prediction using IBM SPSS Modeler are used on the database and the results are mentioned. The Modeler offers algorithms such as classification, prediction, segmentation, and association to be applied in the form of nodes. The results of Modeler can be easily read from the databases. Here the sequence of operations is organized in a data stream which is a flow of records from source to destination through each manipulation.
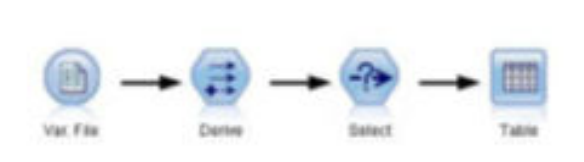
Figure 3: SPSS Modeler data stream

The cancer disease data gathered from the research organizations are used to analyze the data mining applications using SPSS Data Modeler. With the help of this modeler all the steps used by Fayyad, et, al. [7] were considered for preparing the data mining model. Figure 4 indicates the model created.

Figure 4: Data Mining Model for Cancer database

Here the first block refers to the data file taken as an input for this model (cancer. sas). Then the selected data passed through the Type block which defined the type of data, its measurements, fields, missing values, and roles. This is the phase of preprocessing that reduces noise and conflicting information. After that, the modeling block (pentagon shape TRT) refers to the data mining algorithms which are going to apply to the database. The researcher has used auto modeling for testing multiple suitable algorithms on the selected date.

Here in this model, the researcher has used auto modeling for testing multiple suitable algorithms on the selected date. The approximate number of models to be executed is seen in figure 5. The block represented by diamond shape (TRT) represents the output of the data mining algorithms. These blocks also apply suitable data mining algorithms as per the data and truncate the unnecessary algorithms from the process. Figure 6 shows the models which are applied to the selected data, it also shows the overall accuracy % of the output.
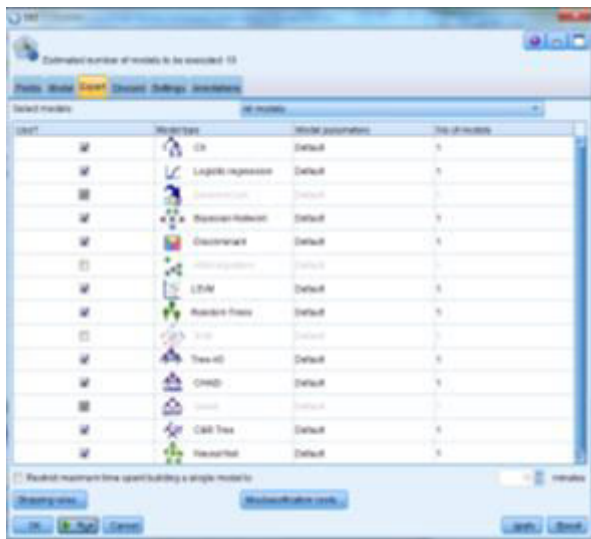
Figure 5: The estimated number of algorithms been executed

The results are shown in figure 6 which shows the algorithm applied on the basis of data type and its overall prediction.
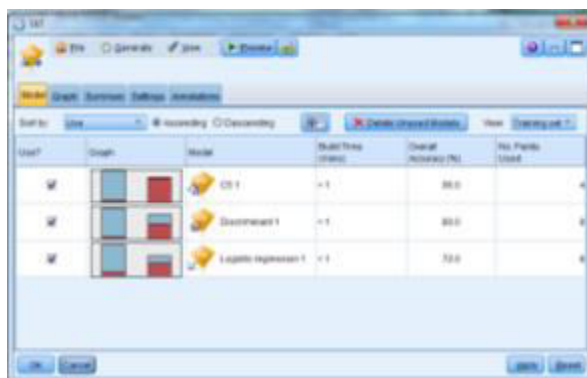
Figure 6: The executed data mining algorithms.

CONCLUSION

This study recommends the successful implementation of Data Mining Applications in the healthcare domain for disease prediction. With the help of various data mining tools, hidden knowledge can be retrieved and utilized for better results. In this study, various data mining algorithms has tested on the cancer disease data. Out of those C5.1, Discriminant and Logistic regression have given satisfactory accuracy as shown in figure 6. Specifically, C5.1 gave 96% accuracy for the given dataset. Similarly, several scholars have presented various data mining approaches employed in the healthcare industry. Because accuracy is a primary priority, data mining has been shown to be effective. Data mining techniques are advantageous since they aid in the accurate and precise early detection of medical disorders.

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A Survey of Image Processing and Two Dimension Image Recognition

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ABSTRACT

Computer Vision and Image processing is continually growing. During the past ten years, there has been a significant increase in the level of interest in computer vision, image recognition, soft computing techniques, neural networks etc. This paper reviews different research papers on Digital image, fundamental of digital image processing. Lastly, it focuses on the future scope of the image recognition.

Keywords: Image Recognition, Neural Network, Fuzzy Logic, Genetic Algorithm, Soft Computing.

INTRODUCTION:

Digital Image recognition is the ability of a system or software to identify objects, people, places, and actions in images. It uses machine vision technologies with artificial intelligence and trained algorithms to recognize images through a camera system.

Two dimension digital image is represented as an array of real or complex numbers represented by a definite number of bits. An digital Image is represented as a two dimensional function $f(x,y)$, where 'x' and 'y' are spatial (plane) coordinates and the amplitude of f at any pair of co-ordinates (x,y) represents the intensity or gray level of the image at that point. The digital image is one for which both the co-ordinates and the amplitude value of f are all finite, discrete quantities. Hence, a digital image is composed of a finite number of elements, each of which has a particular location value. These elements are called image elements, picture elements or pixels.

A digital image is discrete in both spatial coordinates and brightness and it can be considered as a matrix whose rows and column indices identify a point on the image and the corresponding matrix element value identifies the gray level at that point.

There are many sensors or devices to acquire images. Most of the device or sensors give a continuous voltage as output, which will be continuous in both amplitude and coordinates. To convert it a digital form, we have to sample this function in both co-ordinates and amplitude. Digitizing the co-ordinate values is called sampling. Digitizing the amplitude value is called quantization. The of sampling and quantization is a matrix of real number.Hence , an image can be represented as shown in figure 1.
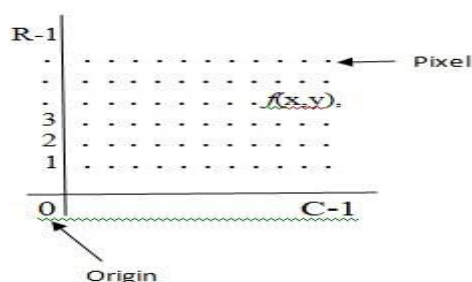
Figure 1

Image Representation

Where the function $f(x,y)$ is assumed to have 'R' rows and 'C' columns. The values of the coordinates are now discrete quantities.

Now, from the above notation, we can write the function $f(x,y)$ as shown in the below

$$f(x,y) = \begin{pmatrix} f(0,0) & f(0,1) \text{............} f(1,C-1) \\ f(1,0) & f(1,1) \text{............} f(1,C-1) \\ \cdot & \\ \cdot & \\ \cdot & \\ f(R-1,0) & f(R-1,1) \text{............} f(R-1,C-1) \end{pmatrix}$$

And the above matrix notation, can be modified as,

$$
P = \begin{pmatrix}
P_{0,0} & P_{0,1} & \cdots \cdots & P_{0,C-1} \\
P_{1,0} & P_{1,1} & \cdots \cdots & P_{1,C-1} \\
\cdot & & & \\
\cdot & & & \\
\cdot & & & \\
P_{R-1,0} & P_{R-1,1} \cdots \cdots & & P_{R-1,C-1}
\end{pmatrix}
$$

Where $P_{x1} = f(x=i, y=j) = f(i,j)$

LITERATURE REVIEW

Today, in the 2022th, we are heading into new era of ubiquity, where the user of the internet are counted in trillions and where humans may become the minority as generators and receivers traffic. Instead, most of the traffic will flow between devices and all kinds of "things", thereby creating a much wider and more complex digital image.

It focuses on the recognition of MRF image and FFNN is used to solve the two basic problems of MRF modeling. He uses clean and noisy binary images. The Recognition rate is 100% using Gibbs and Noise Parameters [1].It proposed an EBAM i.e. extended bidirectional associative memory (EBAM) neural network model and MLP NN. He used gray image. In pre-processing filtering, enhancing the image and removing the noise of image, extracting the feature of image and applying EBAM model. The Recognition rate is EBAM is better than MLP NN [2]. It focuses on FL, GA and NN approach. He used NN approach for nature scene image segmentation. The result show nature scene image segmentation efficiency is good using NN approach [3]. The concept of different Edge detection method is focused. The experiment use Noiseless and Noise images [4]. This paper is focused on segmented image using soft computing techniques [5].It is very difficult to recognition degraded image. Outdoor image scenes are degraded due to cloudy medium in the atmosphere (i.e., impurity in air). Such as lack of clarity, fog, and pollution are the phenomena of atmospheric absorption that scatter the image. It focuses on Various Image Dehazing Techniques to remove noise and recognize it [6]. This paper used "LIVE Image Quality Assessment Database", university of Texas. It uses MATLAB to convert colour image to gray scale image. He compares the original and mutilated images using (PSNR), HVS utilizing Fourier Transform, Structural Similarity Index (SSIM), and Universal Image Quality Index (UIQI) measurements. TheComparison result display in tabular format [7].Three Alex Nets, GoogLeNet and ResNet50network are used. CIFAR10,CIFAR100 and MNIST data sets are used. Object detection and object category classification using CNNs. GoogLeNet and ResNet50 network to recognize improved accuracy objects compared to Alex Nets. Performance of CIFAR10 test dataset and CIFAR100 test dataset show in tabular format [8].It focuses on image recognition system structure. The image set of COIL20 is used. Traditional and Improved BP neural network is used to for object recognition and comparison result is shown [9].

Fundamental steps in Digital Image Processing [10]:

Figure bellow shows fundamental steps in digital image processing.
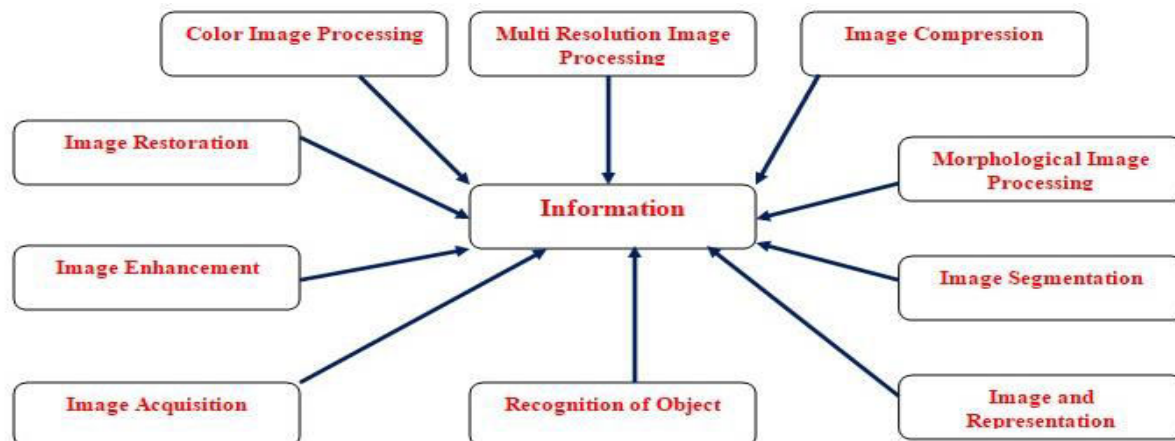
Figure 2

FUNDAMENTAL STEPS IN DIGITAL IMAGE PROCESSING
These steps are briefly discussed bellow.

1. Image Acquisition

This is the first step and fundamental step of digital image processing. Image acquisition could be as simple as being given an image that is already in digital form. Main task performed in the Image acquisition step is preprocessing such as scaling etc.

2. Image Enhancement

Image enhancement is among the simplest and most tempting area of digital image processing. Basic idea behind enhancement techniques is to bring out detail that is disguised, or simply to highlight certain features of significance in an image such as changing brightness & contrast of the image etc.

3. Image Restoration

Improving the appearance of an image is achieved by Image restoration. However, unlike enhancement, which is subjective, image restoration is objective, in the sense that restoration techniques tend to be based on mathematical or probabilistic models of image degradation.

4. Color Image Processing

Color image processing is an area that has been gaining its importance because of the significant increase in the use of digital images over the Internet. It includes color modelling and processing in a digital domain etc.

5.Multi Resolution Image Processing

Multi Resolution offers an capable outline for extracting information from images at various levels of resolution.

6. Image Compression

Image Compression deals with technique for reducing the storage size required to save an image or the bandwidth to transmit it. Particularly data compression is very significant in the data transmission through internet.

7. Morphological Image Processing

Morphological Image processing deals with tools for extracting image components that are useful in the representation and description of shape.

8. Segmentation

Segmentation partitions an image into its ingredient parts or objects. Autonomous segmentation is one of the most difficult tasks in digital image processing. A rugged segmentation procedure brings the process a long way toward successful solution of imaging problems that require objects to be identified individually.

9. Image and Representation

Image and Representation almost always follow the output of a segmentation stage, which usually is raw pixel data, constituting either the boundary of a region or all the points in the region itself. Choosing a representation is only part of the solution for transforming raw data into a form suitable for subsequent computer processing. Image deals with extracting attributes that result in some quantitative information of interest or are basic for differentiating one class of objects from another.

10. Recognition of Object

Recognition is the process that assigns a label, such as, "motor vehicle" to an object based on its descriptors.

11. Information:

Information may be as simple as detailing regions of an image where the information of interest is known to be located, thus limiting the search that has to be conducted in seeking that information. The Information base also can be quite complex, such as an interrelated list of all major possible defects in a materials inspection problem or an image database containing high-resolution satellite images of a region in connection with change-detection application

Future scope of image recognition Two and Three dimensional digital image recognition has a large scope in the future research. It will help to monitor the different two and three dimension image. Unpredictable development might be occurring using soft computing. It will also help with recognize different category of image. It is useful to convenient to computer security, human security etc.

Conclusion It is our opinion that research on the image recognition is an exciting area for many year to come and will keep many scientists and engineers, researcher busy. This paper introduces Digital image and fundamental of digital image processing. It studied so many different techniques for image recognition. Lastly, it focuses on the future direction of the image recognition & the topic is open to further research.

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Survey on Semantic-Aware Sentiment Analysis in Social Network based on Natural Language Processing Techniques

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ABSTRACT

The Social Network (SN) refers to the vast amount of data collection available using conventional software methods. In a social network, there are numerous platforms such as Twitter, Snapchat, Instagram, Facebook, Google, LinkedIn, etc. which illustrate the tremendous data collection and activities that have been released through social networks through unstructured data and multimodal distribution Social networking. Though it is not only about interacting with your friends or relatives, it has become a great way for organizations to find potential customers or nurture their connections with existing ones. Both organizations and individuals contribute an unimaginable amount of data that grows exponentially with each passing year by posting their views, photographs, or videos on these sites. There are many queries nowadays such as, how these platforms are handled and how to explore the mining algorithm properly to get useful stuff from social network data. Through using the sentiment analysis method, this study provides information about the role of artificial intelligence on social networks. The researcher begins to provide a general description of social networks and a sentiment analysis review. This study also reflects on how Artificial Intelligence is used in social media and further discusses Natural Language Processing (NLP), Methods Natural Language Processing, NLP application, Component of NLP, Steps of Natural Language Processing, and complexities of sentiment analysis.

Keywords: Social network, Artificial Intelligence, Natural Language Processing, Sentiment Analysis.

INTRODUCTION

Recently, large amounts of important data, such as social networks, can be easily obtained and generated from numerous sources. Social networks are a rich source of information and are typically made up of social objects joined by certain modes of interdependence (e.g., friendship, common interest). For example, a Facebook user will create a personal profile, add other Facebook users as contacts, and turn messages [1]. A lot of humans across the globe are using social networking sites that produce comparatively small time scales inside unstructured data [2]. The enormous volume of user-generated data and information is the product of integrating their background descriptions and everyday experiences on such a platform. This immense volume of data generated has recently been intensively analyzed as "Big Data"[3]. The content of social networks, like posts, comments, reviews, and tweets, have led substantially to the development of social media data, either platform suppliers or separate domains [4];[5]. A recent surge of enthusiasm in the field of artificial intelligence and data processing has brought about the emergence of big data from social networks. As per Ellison, the established social network belongs to any social media site that has got all three aspects. Instagram, Twitter, Facebook, wikis, LinkedIn, YouTube, and blogs are examples of social networking platforms that generate a huge volume of unstructured data. Big data in social media along with the development of computational mechanisms have developed as the path to crucial insights into individual behavior and are continually collected and prepared through people, companies, and governments [6]. Social network analysis (SNA) focuses on the social connections between various social media users using node and link network theory. Social network analysis has developed as the main methodology. This analysis has also obtained a large following in biology, anthropology, medicine, and information science. The analysis of social media has become a famous topic of investigation and research with the quantity and ubiquity of content from social media, websites, sensors, and social media research has undergone a renaissance [7]. In multiple information sources and at many various scales, social networks are embedded. Social networks may emerge from knowledge in sources, such as text, databases [8] communication systems, sensor networks, and social media [9]. For example, social media assists organizations to get customers' feedback regarding their products, which can be used to alter decisions and to get value out of their business [10], [11]. Studies verified that most of the existing approaches to analytic big data in social media rely on machine learning techniques.[12] Some of the most popular techniques are classification [13],[14] Clustering [15], And deep learning [16]. Machine learning is an area of artificial intelligence that has been used to discover patterns of data on multiple social media sites. However, due to the peculiarities of social media such as slang and vocabulary used in posts, dealing with a vast volume of data obtained from so social media in various formats has often raised some challenges. Big data collected from social media is meaningless when properly used but after changing the data into useful observations to meaningful insights [17]. Analyzing social networks using different traditional information and machine

learning and data mining mechanism is still an active domain of study. For this case, publishing market study information can be achieved by mining people's opinions that result in developing business decision-making [18]. Effective strategies and analytical approaches to handling the ever-growing data generated by various social media applications are of crucial need. 0[19] In the last decade, research on social media has become more famous and various algorithms have been developed related to machine learning and artificial intelligence.

Fig. 1. Types of Big Data Analytics

Social network analysis
The huge data in social network which needs to context analytics that related to social networks analysis, news analytics, and natural language processing and sentiment analysis. These techniques are playing to enhancement and enhance the business and decision making out of the analysis [20].
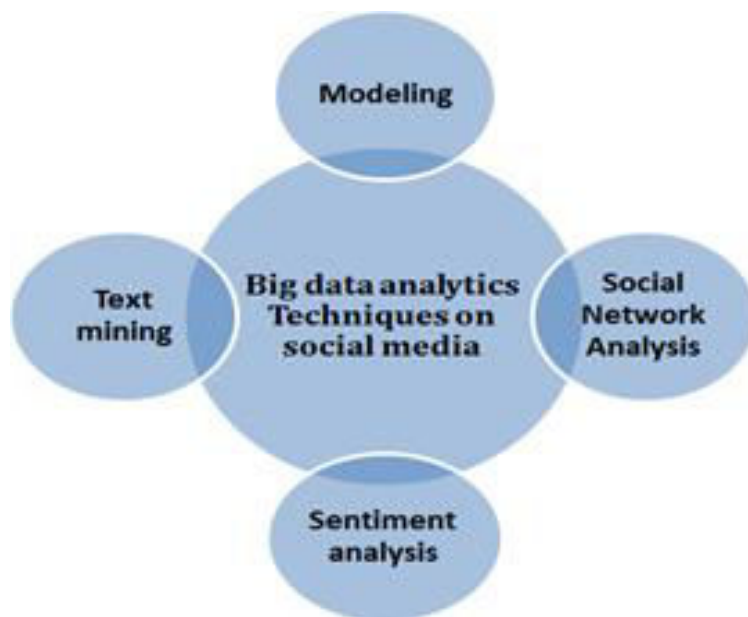
Fig. 2. Social media analysis techniques

Natural Language Processing (NLP)
NLP is called Natural Language Processing which is a science and technology area that investigates how machines can be used to explicate and control speech or text in natural language to do useful stuff. The goal of NLP researchers is to collect information about how people use language and understand it so that suitable techniques and tools can be improved to allow machine systems to manipulate and understand natural languages to satisfy required tasks [21]. It's the technology used through machines to comprehend, manipulate, understand and analyze the languages of humans. It lets developers coordinate knowledge for functions such as translation, Named Entity Identification (NER), automatic summary, extraction of relationships, recognition of speech, and segmentation of topics [22]. The following are the components of the NLP:

Natural Language Understanding (NLU)
Through extracting metadata from information like keywords, entities, definitions, feelings, interactions, and semantic functions, NLU allows the computer to analyze and understand people's language. NLU is the

language translating and reading method. From natural language inputs, it creates non-linguistic out-puts. NLU supports the machine to analyze and understand people's language via extracting the metadata from content such as entities, concepts, feeling, relations, keywords, and semantic roles. Natural Language Understanding is the process of reading and interpreting language. It produces non-linguistic outputs from natural language inputs. In Business Applications, NLU is primarily used to understand the problems of the client in both spoken and written language. Thus, it has tasks to map the given input into useful representation and to evaluate various facets of language.

Natural Language Generation (NLG)
NLG is called natural language generation that serves to translate or that transforms computerized data into the representation of natural language. Text preparation, sentence planning, and code realization are primarily concerned. Natural Language Generation is the writing or language generation process. It creates constructed outputs of natural language from non-linguistic inputs.

Steps of Natural Language Processing
There are the following five steps of natural language processing:
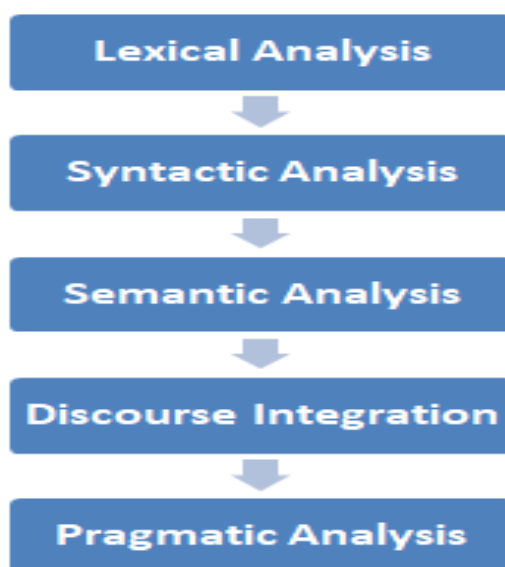
Fig. 3. Steps of natural language processing

3.1 Morphological and Lexical Analysis
The first step of the natural language process is the Lexical analysis. This step scans the source code as a flow of characters and transforms it into meaningful lexemes. It divides the entire text into sentences, words, and paragraphs.

3.2 Parsing Analysis (Syntactic)
Syntactic Analysis can review and check grammar, and word arrangements, and it also displays the relationship between the words. For instance: Ajra goes to the Poanam, in the real world, Ajra goes to the Poanam. It does not have any meaning and doesn't make any sense. However; it will be rejected by the syntactic analyzer..

3.3 Sentiment analysis
Sentiment analysis uses natural language processing, text analysis, biometrics, and computational linguistics to systematically define, isolate, measure, and analyses affective states and subjective knowledge. In addition, it means categorizing customer perceptions, attitudes, and beliefs on the product, brand, or service of a business. Sentiment analysis is commonly applied to the voice of client products with applications ranging from marketing and customer service to clinical practice, such as ratings and survey results, internet and social media, and healthcare materials. Sentiment research has varying applications in social media. This research, for example, will be used to classify consumer attitudes in a marketing and customer service department, resulting in the exploration of whether customers are pleased or unhappy with a product. [23].The study of sentiment is also a type of NLP, statistics, and text analysis. By classifying them into positive, neutral, or negative, the concept is to find the sentiment of the text. Typically, this analysis is used for binary decision-making, i.e. consumers want something or hate it, or the product is bad or good [39]. A sentiment analysis task is usually modeled as a classification issue, whereby a classifier is fed a text and returns a category figure 4 shows that:
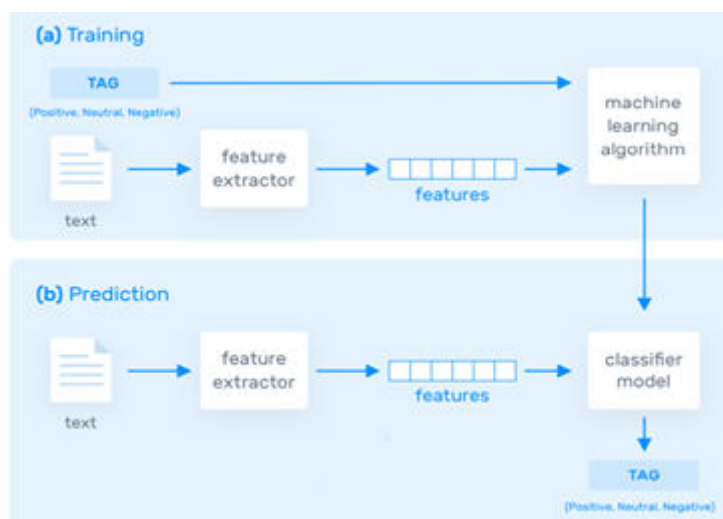
Fig. 4. Sentiment Analysis Classification

Our model learns to connect a specific input of any text to the corresponding output (tag) in the first step, called the training process (a), and based on the test samples applied for training. The extractor of features transfers the text input into a vector of features. For creating a model, pairs of attribute vectors and tags for example negative, positive, or neutral are fed into the machine learning algorithm. Thereafter, the feature extractor is used to translate unseen text inputs into feature vectors to test the model we pass to the second stage, called the prediction method (b). Then, these function vectors are fed into the model, creating expected tags such as positive, negative, neutral, or again).

Applications sentiment analysis
There are several applications used for sentiment analysis. The most commonly used applications are to detect emotion, opinion, etc. There are five applications representation of sentiment analysis that are explaining on below:

4.1 Website applications that use reviews or comments:
A huge range of ratings and feedback on about all is accessible on the Internet today. Thus, it covers opinions on political issues, service comments, and reviews of products. There is a need for a method for sentiment analysis that can extract feeling about a specific product or service. This will assist us to automate the provision of feedback or rating for the given item, or product. Hence, it will serve the needs of both the users and the vendors.

4.2 Applications as a sub-component Technology
In recommending systems, a sentiment prediction system may also be useful. Items that receive a lot of negative comments or fewer ratings would not be suggested by the Recommendation System. We come across abusive and aggressive language and other negative elements of online communication. These can be identified easily by identifying such a negative sentiment and taking action against it accordingly.

Business intelligence applications
Nowadays, it has been noted that people research to look at feedback of goods that are available online before purchasing them. And for many companies, the online view determines their product's performance or failure. Sentiment Analysis therefore plays an important role in industries, companies often aim to extract opinion from the online feedback in order to enhance their products and in turn their reputation and support in customer satisfaction.

Domains applications:
Modern research in sociology and other domains such as medicine, sports can benefit from Sentiment Analysis which shows trends in people's opinions and emotions, mostly on social network**.**

Smart homes applications :
The technology of the future is expected to be smart homes. In the future, entire homes will be networked and persons using a tablet computer would be able to access any section of the home. There has been much research lately on the Internet of Things. Sentiment Analysis is still going to make its way in. For instance, depending on the user's current feeling or relationship, the home may also be used in trend predicting after its ambiance to

create a relaxed and comfortable environment. Sentiment Analysis relevant evidence on sales trends and customer happiness can be extracted by tracking public attitudes.

Methods of Sentiment Analysis

There are several reports that include tools and techniques used for sentiments analyze. The most commonly used methods to detect the polarity of emotions (positive and negative impact) of a message are based on emoticons [26]. To evaluate sentiment results, there are five stages representation of the architecture of a sentiment analysis that showing in fig.5:
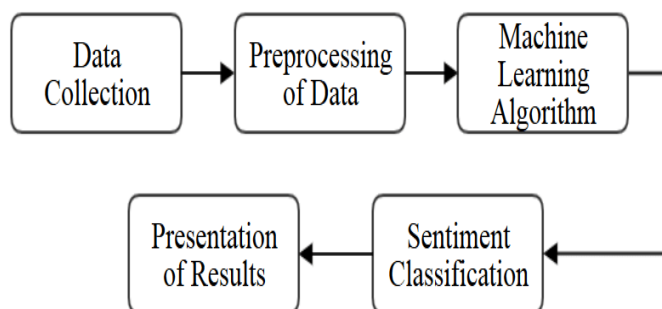
Fig.5. Methods of Sentiment Analysis

Data Collection

Consumers typically share their opinions on online forums such as blogs, message boards, product reviews, and social network platforms such as Instagram, Facebook, and Twitter on their private logs. Opinions and emotions are conveyed in various ways, with distinct vocabulary, writing context, the use of short forms and slang, making the data vast and unstructured. It is practically impossible to manually analyze sentiment data. Therefore, to process and analyze the data, special programming languages like 'R' are used.

5.2 Preprocessing of data

Text-processing is nothing but filtering the extracted data. It requires defining and deleting from the data non-textual information and content that is unrelated to the field of research.

Machine Learning Algorithm

At this stage, Algorithms for machine learning are split into ways of supervised and unsupervised learning. The training data includes the input vectors along with their corresponding purpose vectors in supervised learning, whereas the training data involves a set of input vectors without corresponding target values in unsupervised learning. Sentiment analysis can be used as supervised learning in this stage, which uses a training set to improve our sentiment classifier. It contains two data sets: the testing set and the training set for classification. The training set allows for the development of a classification model that classifies the vectors of the input feature into their corresponding class labels, and the test set also allows for verification of the model via predicting the class labels of unseen feature vectors [26].

Sentiment Classification

It is possible to classify sentiments generally into two classes or more negative, positive, etc. Classification is a task that requires the use of machine learning algorithms that learn how to assign a class label to examples from the problem domain. An easy-to-understand example is classifying emails as "spam" or "not spam." At this stage of the method of sentiment analysis, each detected subjective sentence is classified as negative, positive, poor, like, hate or good.

Presentation of Output or Data visualization

Finally, stage sentiment analysis is to modify the unstructured text into meaningful information to get a prediction that described the case. After the completion of the analysis, the test outcomes are shown on graphs like line, pie, bar, and chart graphs.

Related work

In present days, there has been a rising amount of literature on the use of social networks data for different purposes that have become extremely common that they appear as new sources of real-time data concerning different events and topics. For instance, several studies have used it for events detection on social media. Indeed, social media analytics such as sentiment analysis that is related to Natural Language Processing in Artificial Intelligence can be used to detect events such as extracting new patterns related to human language through which we conclude future predictions to analyze the user's feelings such as to avoid companies from

risks its product that can allow obtaining a good picture of the product, permitting faster response and more effective that can less overall damage and loss. Walaa Medhat et al. offered a summary of the latest updates in algorithms and technologies for emotion analysis. More than Fifty-four of the papers published recently and cited have been classified and summarized. These papers lead to several areas related to sentiment analysis and utilize sentiment analysis approaches for different real-world applications [27]. Manatee Godsay has provided a comprehensive report of the review of concept sentiment and its application. In addition to the workflow that describes the implementation of this analysis, it discusses the different real-life uses of sentiment analysis. The new approaches used in the research have been briefly defined and the relevant output metrics have been added to them. The paper enlightens the need for sentiment analysis and its importance [28]. Yasir Ali Solangi et al. offered a summary of the NLP methods for evaluating opinion mining and sentiment analysis. NLP is initially reviewed and then briefed on its popular and helpful steps in preprocessing. They also presented a description of pinion mining that was analyzed and reviewed at different stages. Issues are identified at the end and several suggestions for opinion mining and sentiment analysis are suggested [29].Wei Yen Chong et al. have offered a summary of their preliminary tests on tweets sentiment analysis. This experiment is intended to extract emotion based on topics in tweets that exist. Using natural language processing techniques, it detects the emotion that relates to the specific topic. To classify sentiment, their experiment contains three main stages, which are, semantic association, subjectivity classification, and polarity classification. By defining the grammatical relationship between sentiment lexicons and the subject, the experiment utilizes sentiment lexicons. Experimental findings suggest that the system proposed works better than existing tools for analyzing text sentiment, as the structure of tweets is not the same as normal text [30]. Adil Rajput has provided a comprehensive review of NLP and sentiment analysis. Besides, he provided a short description of the strength of the NLTK toolkit and the Python language. After this, in the area of sentiment analysis and the application of NLP to the medical field, he has presented diverse applications. In the future, the author would like to apply sentiment analysis in the detection of mental health diseases such as cyber bullying and depression [31]. Jeonghee Yi et al. presented a summary in a Sentiment Analysis (SA), they provided a summary that extracts opinion or sentiment from documents by online text. Instead of classifying the sentiment of a whole text on a subject, sentiment analysis extracts all references to the subject and allows NLP tools to evaluate the sentiment in each of the references. Their sentiment analysis involves a topic-specific feature term extraction, sentiment extraction, and subject or sentiment, association by relationship analysis. Sentiment analysis uses two linguistic resources and the sentiment lexicon for the analysis. The performance of the algorithms was verified on online product review articles such as music, digital camera, and reviews. There are also more popular documents involving public news articles and web pages [33]. All previous literature reviews mentioned interest in the process to fetch data from social networks these data have been used to analyze and detection in social media. Indeed, social media analytics such as sentiment analysis that is related to Natural Language Processing in Artificial Intelligence can be used to detect events such as extract new patterns related to human language through which we conclude future predictions to analyze the user's feelings and extracts opinion or sentiment about online text documents. Instead of classifying the sentiment of a whole document online, social analysis extracted all references to the given subject and determines sentiment in each of the previous literature using NLP techniques.

CONCLUSION

In present study, we have offered a comprehensive summary of NLP and sentiment analysis related to social media data and its background. At the beginning, we focused on social media analysis such as sentiment analysis technique that related to Natural Language Processing that has two components (Natural Language Understanding and Natural Language Generation) and Steps of Natural Language Processing. After that, we have discussed in details several representative related NLP applications. Then, we have explained in details sentiment analysis and how the sentiment analysis work and also the methods of sentiment analysis. The current paper highlights and reveals the details knowledge of sentiment analysis.

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Data Synthesis and Evaluation Interpretation of Educational Data Mining

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ABSTRACT:

Academic analytics and Educational Data Mining (EDM) are becoming more popular for data processing at many phases, such as data collection, analysis, synthesis, and evaluation. Students' reactions to the usage of Social networking on social media platforms refers to the use of the internet to link people with their friends, family, and acquaintances. The study's goal indicates that it falls within the experimental approach category. It pertains to the operationalization of selected variables as well as the establishment of a causal link between the variables. The study's problem is educational datasets and Educational Data Mining (EDM).

Keyword: Data Analysis, Data Interpretation, EDM, KDD

INTRODUCTION

Both the user and the service provider are concerned about the quality of the service. Quality is defined by rapid, accurate, and relevant activities, as well as quick decision-making and efficiency, all of which are dependent on the knowledge domain. However, educational institutions today have access to a vast amount of electronic data. Manual activities make extracting information from it harder. Data mining, business intelligence, and academic analytics have all emerged as viable options for achieving the stated goal. In this context, the possibilities of data mining are addressed and defended. It includes techniques for finding patterns in data, a user- centric, interactive process that uses analysis technologies and computing power, or a group of techniques for discovering relationships that have not been discovered before, are not reliant on an existing database, and are a relatively simple task that requires knowledge of the business problem/subject matter expertise.

Many higher education institutions nowadays retain mountains of administrative data about students, courses, and faculty, including lecturers, organizational people, and management systems, among other things. Higher Education Institutions' data serves as a valuable resource for strategic planning. The most effective use of these strategic resources will lead to one of the system's key aims, which is to improve the quality of processes. A profound grasp of the information concealed amid the data is necessary to maintain and ensure educational excellence. In India and other poor countries, higher education now lacks thorough and sufficient understanding of procedures such as evaluation, counseling, and so on. This deficiency prohibits the management system from accomplishing this quality goal, therefore their strategic resources have not yet been used efficiently and effectively. Data mining techniques may be used to identify undiscovered patterns from a set of data and uncover important knowledge that can help decision-makers improve their decision-making and policy-making processes. As a consequence, more value may be extracted from the raw data collection, and strategic resources can be used more efficiently and effectively. It increases the quality of higher education procedures in the end.
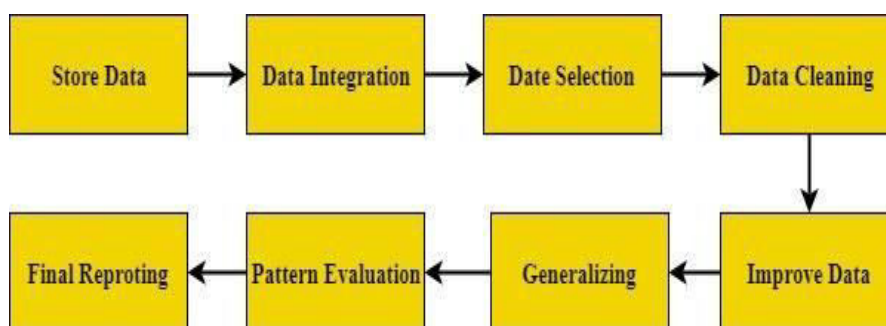
Fig 1.1: KDD Processes

RESEARCH METHODOLOGY

The goal of the research was to create a new generic framework (model) for automatically extracting and recognizing hidden patterns in a large collection of student behavior. Its goal is to examine data mining's capabilities and applicability to large amounts of educational data as a potent tool for academic intervention. It

has proposed a model and an algorithm for each educational area discovered via the analysis of the Education database.

The Academic records and personal records, as well as student background data, student activities, Hobbies, and interests, are all significant components of a student's academic progress. As a result, the EDM incorporates a large number of variables from students' educational and other data. The nature of the problem indicates that EDM approaches are appropriate for the currentstudy's objectives.
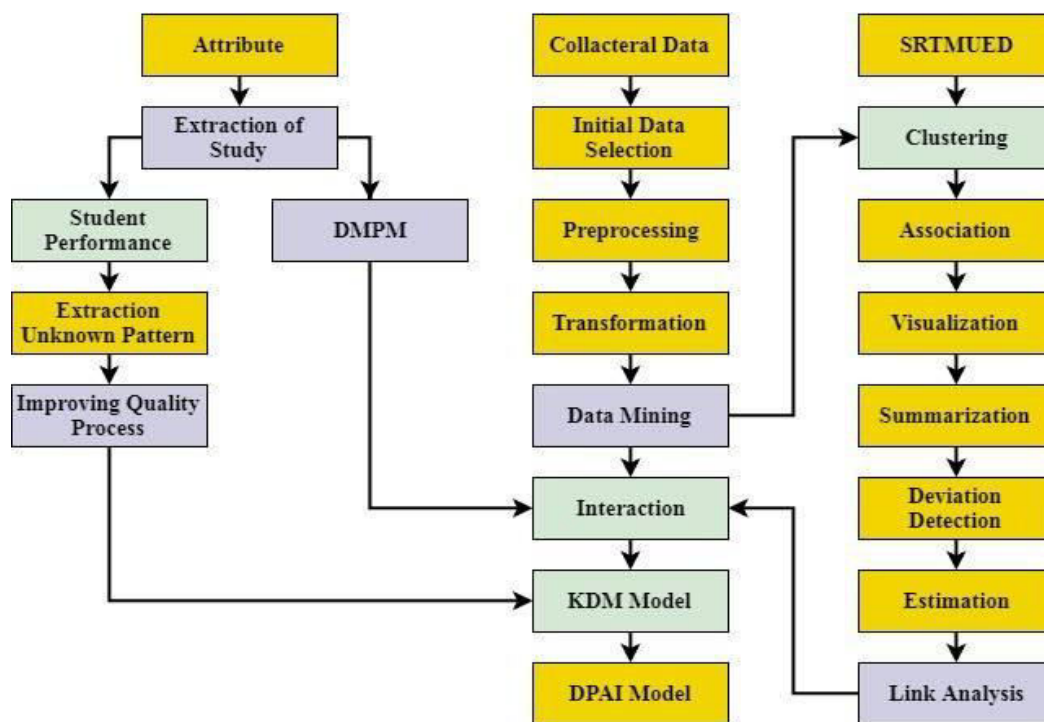
Fig: 1.2 Research Methodologies

Data Analysis and Interpretation:Step I:

In the first experiment, we used existing method to produce the outcome. To do so, there are many different tools available over the Internet resources but for this research work WEKA is used because it is free, open source. In this section result are analyzed which find better to extract hidden patterns experiments. We applied WEKA on our database WEKA support different type of algorithm. Following stages are used as a methodology for recognition and extraction of hidden patterns from student database that is Swami Ramanand Teerth Marathwada University,Nanded.

Name	Number of Cluster	Cluster Instance	No. of Iteration	Within Cluster sum of Speared error	Time Taken To Build Model	Log Like Liked Time
K-means Algorithm	2	0-100(67%)	4	62.1436882815	0.14 sec	
		1-50(33%)	7			
Father First Cluster	2	0-84(56%)	0	0	0.02 sec	3.06315
		1-66(44%)				
Density Based Cluster	2	0-100(67%)	4	62.1436882815	0.05 sec	
		1-50(33%)	7			
Filtered Cluster	2	0-100(67%)	7	62.1436882815	0.02 sec	
		1-50(33%)	4			

Step II:

The goal of this project was to apply academic analytics procedures to datasets that had been acquired. Using the foregoing domains, the current effort aims to approach student successes and performance in university level education. Using questionnaires and progress reports, a real-world data collection of pupils has been compiled. This comprises information about the student's social, intellectual, demographic, behavioral, health,

and financial circumstances. Factor analysis models were used to predict the fundamental features where we saw a drop in student performance. The results suggest that if a student's previous knowledge is accessible, a high level of predicted accuracy may be reached. The closed questionnaire approach was used to construct a student dataset with 360 records and 46 fields. SPSS software was used to build hierarchical clustering techniques.
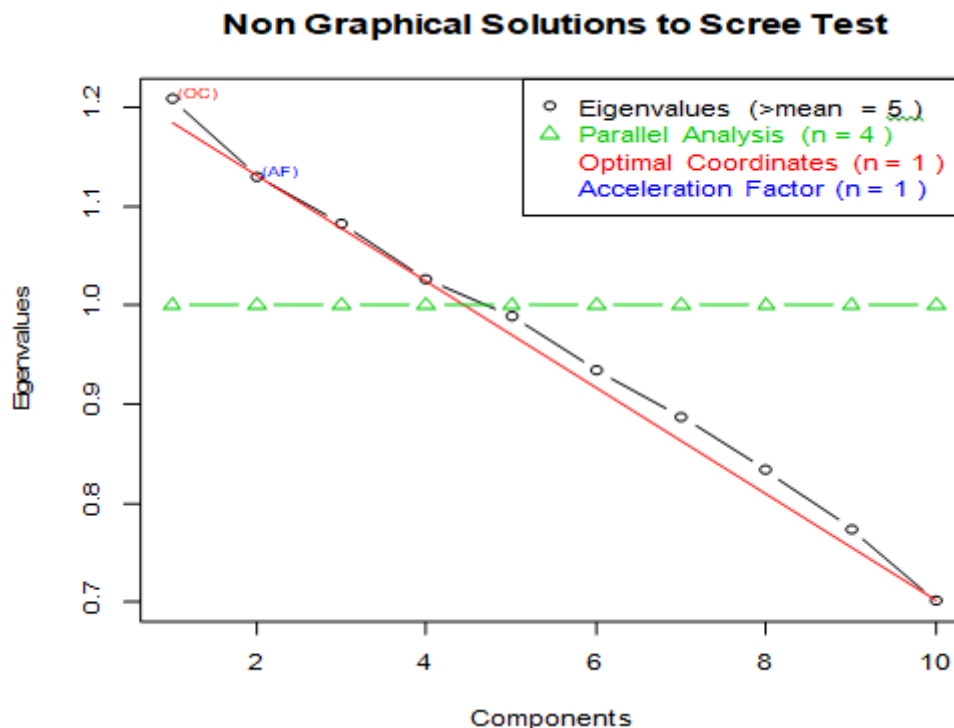
Fig 1.3 Non graphical solution to screen test

CONCLUSIONS

The performance of the K-Mean algorithm has improved as the RMSE performance has declined, and the performance of the RMSE has also decreased as the number of clusters has increased. The performance of the K-Means algorithm is superior to that of the Clustering algorithm, which is based on Density. When clustered, all of the techniques have equivocal results in some (noisy) data. When employing a large data collection, the tone of all algorithms becomes more favorable in comparison to other algorithms. The performance of DBSCAN and OPTICS on tiny datasets has been proven to be extremely poor. The K-Means algorithm is extremely sensitive to dataset noise. While considering the method's output, this interference makes it harder for the algorithm to cluster information into appropriate clusters. When compared to alternative clustering algorithms that produce quality clusters while working with large datasets, the K-Means technique is faster. Because there are some empty clusters, the Farther, First approach has shown poor performance. Because of the identical technique used by clustering software, the cluster algorithm produced the same results when using any other software and modifying any factor.

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Research and Development in Smartphone based hearing aids for Auditory Training: A Review

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ABSTRACT

Auditory training, which is sometimes referred to as "aural rehabilitation," was developed by hearing healthcare professionals to assist people with hearing loss by improving their listening skills and speech understanding. Auditory training program may use to strengthen brain's auditory processing capability.

Due to shortage of audiologists affects fight against hearing loss. Smartphone hearing test applications are providing alternative tests in underserved areas that provide low-cost solutions that can result in early detection. A Smartphone hearing test is easy to perform and can be self-administered at any time.

The focus of this article is on describing currently available mobile apps for use by individuals with hearing loss independently.

Keywords: Auditory training, Android, AdaBoostM1, Computer Assisted Speech Training, Hearing loss, iOS , Machine Learning, MFCC, REPTree.

I. INTRODUCTION

Hearing loss is one of the most common developmental disorders identifiable at birth which, if left undetected, has a negative impact on a child's speech, language, cognitive, educational and socio emotional development. Unfortunately, there are limited prospects of identifying hearing loss in individuals/children.

Auditory training is a technique used to enhance listening skills and improve speech understanding. It involves formal listening activities designed to optimize speech perception through training the cognitive processes that play a role in listening.

Procedures and techniques used in auditory training are continually evolving, and advances in technology have increased the range of services available for those with hearing devices. Due to adequate use of computer technology, auditory training can be possible at your own place. The auditory training program will help in strengthen the brain's auditory processing capability.

Due to scarcity of audiologists affects battle against hearing loss. Android based hearing test applications are providing alternative for auditory training and testing by providing low-cost solutions for early detection of hearing loss. This is particularly important in areas where audiology services are unavailable. A Smartphone hearing test is easy to perform and can be self-administered at any time.

II. REVIEW OF RESEARCH AND DEVELOPMENT:

Related work In recent years, several studies investigated many aspects of mobile devices in audiometry, such as automated screening [1][9], speech,[3][4] tele-audiometry [5] and game-based audiometry [6][7] using novel designed mobile applications. Particularly, studies of [7] and [2] validated automated audiometry using an iPad device equipped with a professional audiometric application, called "ShoeBOX Audiometry" [8]

Research in mobile audiometry was recently reinforced by the comparative studies of Saliba et al.[9] and Corry et al. [10]. Moreover, a preliminary study by [11] discussed the development and evaluation of AudCal, a manual application for measuring hearing thresholds on iOS devices, although it was not intended to be a substitute for conventional audiometry. The evaluation demonstrated promising results, despite the apparent lack of significant features available for conducting clinically accepted hearing assessment.

Evaluation studies revealed high accuracy and reliability of the iPad device in measuring air-conduction hearing thresholds in a clinical population. Also, research in mobile audiometry was recently reinforced by the comparative studies of Saliba et al. [9] and Corry et al. [10]. Moreover, a preliminary study by Larrosa et al.[11]discussed the development and evaluation of AudCal, a manual application for measuring hearing thresholds on iOS devices, although it was not intended to be a substitute for conventional audiometry. Despite the perceptible lack of significant features available for conducting clinically accepted hearing assessment, Smartphone based evaluation demonstrated promising results.

AudiTion[12] is an application that will help the hearing-impaired people to detect sound around them and to recognize the sound. Android based sound detection application for hearing-impaired using adaboostm1 classifier with REPtree weak learner.

The algorithms used in this application for Machine Learning are AdaBoostM1 functioning as a classifier and REPTree as weak learner, and it's built for Android operating system.AdaBoostM1 is one of the algorithms with Boosting method. Boosting uses all instances in each repetition, but keeping the load on any instance in the training set. REPTree is a fast decision tree learner which builds a decision /regression tree using information gain as the splitting criterion and prunes it using reduced-error pruning.

The sound prediction accuracy level testing is done in four conditions which are environments with low and high noise, far and near sound sources. It is equipped with indoor and outdoor databases containing 23 sounds. Extracted sound features are detected using Fast Fourier Transform (FFT) and then classified using AdaBoostM1 with the weak learner REPTree. In this study, the Mel-Frequency Cepstrum Coefficients (MFCC) and automatic speech recognition are applied to objectively estimate the phonemic confusions. In AudiTion[12] appropriate training material could be automatically generated by simple random process. Android based mobile phones are selected as a platform for auditory training.

Rohit Nambiar et.al.[13] describes an innovative Smartphone-based auditory training application. The application was designed to integrate a hearing aid mode and therapy mode. The hearing aid mode provides high quality amplification and therapy mode assists the parent to train the child in the first two components of speech therapy, namely auditory localization and discrimination.

The application design process included interaction with medical/domain experts and gaining deeper insight into the entire rehabilitation process. Various stakeholders were observed during habitat study and journey from diagnosis to adopting a hearing aid and attending therapy sessions was mapped.

The application was evaluated under various criteria such as need, content of the application, appropriateness to context, ease of navigation among others. The experts rated the application high for novelty of the concept and found it to be of relevance in the Indian context.

In [14] Handheld Device Based Personal Auditory Training System to Hearing Loss: the proposed handheld based personal auditory training system is described in this section. First, the perceptual discrimination analysis is developed to analyze the phonemic confusions. In this process, MFCCs and HMMs are integrated to represent the perceptional parameters and models of speech for a specific language. The phonemic confusions between each phoneme can be estimated, then, they are transformed to a normalized similarity matrix in Euclidean space by MDS.

Second, automatic test item generation algorithm is applied to generate the test items of auditory training according to the normalized similarity matrix and the speech perception of a subject. Moreover, the difficulty levels of the test item are suitable to a subject. An auditory training system is implemented on an android based handheld device.

MyEardroid[15] Has been developed to detect and identify common surrounding sounds. Various sound notification modes are incorporated, such as vibration, text and image. This Hearing Loss Simulator app developed by Starkey is a wonderful tool to demonstrate how speech and environmental sounds might sound to different individuals with hearing loss.

Hear Coach[16] targeted for persons with HL, new and experienced HA users. Provides listening games for auditory training with varying types of background noise. In this app periodic updating, track progression, difficulty levels and background noise adjustment available. It has simple layout, easily visible large font size is provided but instructions with App are not provided once downloaded. Hear Coach utilizes listening techniques that focus on both cognitive and listening activities. Games include multiple levels of varying difficulty for auditory training.

Angel Sound [17] Interactive auditory training program, self-paced with at least 2000 stimuli. Can be used with children and adults. Environmental sounds, music, phonemes, monosyllabic words. In adequate color contrast for older adults. No instructions with App once downloaded, the many options for training may be confusing. Angel is unique because it is derived from the Computer Assisted Speech Training (CAST) program which has evidence to support its effectiveness.

Auditory Processing Studio [18] is an engaging and colorful app that includes over 2,400 audio exercises. It can be easily modified for adults by turning off the child-oriented reward system. Auditory Processing Studio includes 2400 stimuli for the activities like: Auditory Discrimination, Auditory Closure, Phonological awareness etc. These activities can be practiced in the presence of competing noise.

Articulation Games [19] Is a comprehensive, flexible, and fun speech-therapy, iPad app that was created by a certified speech and language pathologist for children to practice the pronunciation of over forty English phonemes, organized according to placement of articulation. It includes thousands of real-life flash card, accompanied by professional audio recordings and capability of audio recording.

Auditory Workout [20] was created by a certified speech and language pathologist for students ages 4–10 who show signs of auditory processing disorders or other related disorders like receptive language disorder or autism. It is research-based application which focuses on improving auditory attention ,memory and auditory processing of verbal directions. This app includes over 1,000 audio instructions using various colors.

Auditory Memory Ride[21] this app is a comprehensive and fun app for students aged 6 to 13 years with central auditory processing disorder (CAPD) or other related disorders (e.g., receptive language disorder or autism).The Auditory Memory Ride app includes over 1000 stimuli with pre-recorded audio and the ability to introduce background noise. With ability of delayed presentation of stimuli, this app provides audio recognition and recall tasks.

Auditory Reasoning[22] this app was created by a certified speech and language pathologist for students, ages 6 and up with central auditory processing disorder (CAPD) or other related disorders (e.g., receptive language disorder or autism), to improve auditory processing requiring reasoning and high-level thinking. All the tasks are presented orally so the students can work solely on their auditory skills and processing.

III. CONCLUSION:

The focus of this article was on describing currently available mobile apps for use by adults with hearing loss independently. These could be used as a supplement to therapy provided in the clinic or in lieu of such service given the lack of access to auditory training for most clients. In this regard, this summary is practical and useful to practicing hearing health care professionals so that they can more confidently recommend mobile apps that might be the most relevant for any given client.

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Dengue Disease Prediction with Deep CNN and Flask

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ABSTRACT

Dengue is a viral disease caused due to mosquito bites of species Aedes. When infected Aedes species mosquito bites to human then that person get infected by dengue disease. It is difficult to detect dengue disease fast and accurately so there is a need for a computerized automated system. In this research, the Deep CNN model is used to detect dengue disease via the flask web app. This app can detect dengue disease anywhere anytime accurately and fast. It gives 100% accurate results. The purpose of this paper is not only to detect dengue but aware of its symptoms, treatment, and prevention techniques.

Keywords: Deep CNN, flask, Deep learning.

2   INTRODUCTION

Dengue disease is caused due to 2 types of Aedes mosquito namely Aedes aegypti and Aedes Albopictus. Another name for mosquito Aedes aegypti is the yellow fever mosquito. This mosquito has some white color marks on its legs and also some marks in the form of a lyre on the upper part of the surface of its thorax. This mosquito is very small in size its size is nearly 4 mm [11]. Aedes-type mosquitoes not only spread dengue but these mosquitoes also spread chikungunya, zika, etc. Near about half of the world's population stays in very high-risk areas. Every year nearly 400 million people suffered from dengue disease.

Symptoms of dengue disease are nausea, vomiting, aches, and pains like eye pain, joint pain, etc., fever, headache, swollen glands. Symptoms of dengue persist in the body for up to 2 to 7 days. Most people get relief after a week from a dengue disease.

Some of the warning signs of dengue disease are belly pain, vomiting, bleeding from the nose, feeling tired, restless, or irritable this kind of symptoms started from 24 hours to 48 hours.[12]

The traditional way to check the dengue disease is by using blood samples but it requires an expert person and total manual work is done this may cause human error So, this research gives a computer-aided deep CNN model to detect dengue disease with the help of flask web app. This flask web app can be used anywhere at any time to detect disease and it also gives accurate results. There is no proper treatment for dengue disease right now but you can control their symptoms like fever, pain and that can be controlled by taking paracetamol, taking as much as water, use liquid food to stay hydrated. If anyone has severe dengue then internal bleeding happened in patients or sometimes results in shock or death.

A prevention technique that can be done for avoiding dengue is to protect yourself from mosquitoes, for that purpose you can use mosquito repellants. We can also avoid going to high-risk areas. Proper sewage disposal. Keep water sources clean and dry at least once a week. Use abate powder in water containers. Abate powder is a pesticide that does not allow the growth of the Aedes types to the adult stage and spreads the disease.

3   RELATED WORK

(Philip, n.d.) The author Does the comparison between SVM and two-layer feed-forward network to detect dengue disease automatically they found that feed-forward network gives better accuracy than SVM. In this research, the author uses white blood cells as well as the CNN model also. By the proposed method author gets accuracy up to 75%.

(Sajana et al., 2018) The author uses different machine learning algorithms like Classification and Regression Tree(CART), Multi-layer perception (MLP), and C4.5 algorithms. The machine learning algorithms CART algorithm give 100% accuracy to the author so, the author uses the CART algorithm to detect the dengue disease.

(Shaukat Dar & Ulya Azmeen, 2015) For this research author used a dataset from District Headquarter Hospital (DHQ) Jhelum Author uses different data mining techniques like Naïve Bayesian, REP Tree, Random tree, and SMO. To detect dengue fever author uses a weka tool. After comparing all the techniques author conclude that Naïve Bayes is best as it gives 92% accuracy and other techniques like REP tree gives 76%, Random tree gives 76%, J4.8 gives 76%, SMO gives 76% accuracy.

(Zafra, 2020) In this paper, the author stated that dengue disease is caused due to Aedes mosquito and it is usually spread in tropical and subtropical areas. The author uses the ANN model to detect dengue disease in the Philippines. The author also stated that other environmental factors like rainfall, humidity, temperature are also responsible for dengue disease.

(Shakil et al., n.d.) In this paper, the author stated the symptoms of dengue disease. The author uses a weka tool to detect dengue disease. The author's main aim behind this paper is to classify the data and aid end-users to detect which model gives the best result. From the Author's research, they concluded that Naïve Bayes and J48 technique is the best method as it gives 100% accuracy.

(Sarma et al., 2020) Author collected real-time raw data samples like patients diagnoses, patients' medical history, symptoms, from the Medicine Department of Chittagong Medical College Hospital and Dhaka Medical College Hospital, Bangladesh, and then apply machine learning algorithms like Decision Tree and Random Forest in the proposed model. After comparing techniques results, author concluded that the Decision Tree algorithm gives 79% accuracy which is more than random forest. So, the author uses a decision tree algorithm for dengue disease detection.

(Rajathi et al., n.d.) In this paper author uses many machine learning algorithms and weka tools to detect the dengue disease. Accuracy got for different machine learning algorithms used by author are Naive Bayes algorithm gives 63.3%, Random Forest 83.3%, REP tree 76.6%, LWL 56.6%, AdaboostM1 56.6J48 gives 76.6%, SMO gives 80%, Zero R gives 76.6%, Among all the accuracies random forest technique gives the highest that is 83.3% accuracy.

(Saleh & Baiwei, 2021) Author stated that dengue is also spread due to environmental factors. So, the author proposes a model to forecast the weather, and depending on that prediction of dengue cases can be done by the LSTM method. The author also compares other techniques like SVR, with R2 and MAE scoring 0.75 and 8.76. LSTM method gives the best result so the author uses this method to detect weather using time series data.

(Aburas et al., 2010) In this research author uses the ANN model to detect a number of confirmed cases for dengue disease in Malaysia. In this study author stated major factors like mean temperature, mean relative humidity, total rainfall to confirm the number of cases of dengue disease from six-year record data.

(Salim et al., 2021) In this study author used 5 districts in Malaysia country and Selangor for the years 2013 - 2017 to obtain the data and then apply machine learning algorithms for detecting dengue disruption.ML algorithms used for this research are, ANN, Naïve Bayes. CART and SVM. Based on the author's study they stated that SVM gives a better result.

4 RESEARCH METHODOLOGY

Dengue disease detection is mostly done by different machine learning technique in previous researches. Some of them used data mining tools with weka tool. The data mining algorithms or machine learning tools gives better accuracy but, it requires expert person in recognizing what features are good to select as input and to get proper output it is somewhat difficult to recognize features manually. So, in this proposed model deep CNN model is used to detect features automatically and also gives better accuracy than machine learning models.
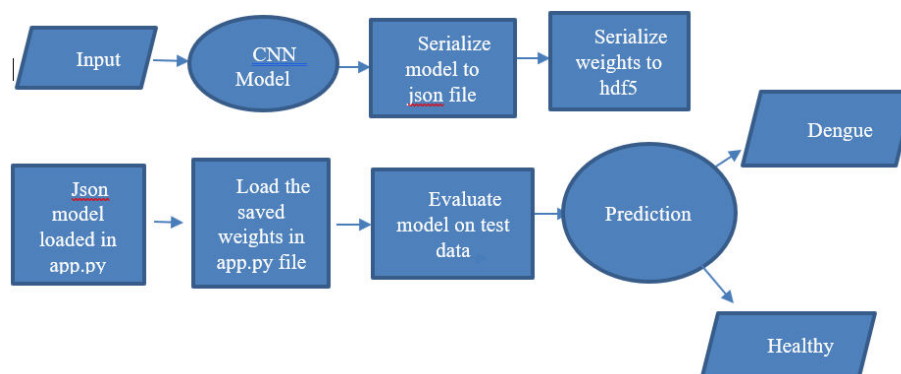
Fig. 1. Proposed model for dengue disease prediction.

In proposed model deep CNN model is used then model is saved using json model and weights are saved which is used to train the model. After saving the model it is loaded into app.py file and weights are also loaded into app.py file, lastly evaluate the performance of the model to detect how much the model is accurate to detect the

dengue disease. Proposed model gives 100 % accuracy with 400 epochs and using binary_crossentropy as a loss function and rmsprop as an optimizer.

4.1 Experimental Results
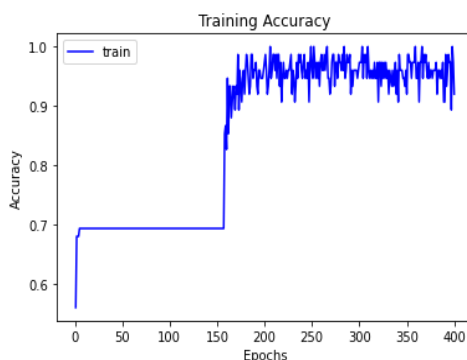
Fig. 2. Training Accuracy of dengue disease prediction proposed model.
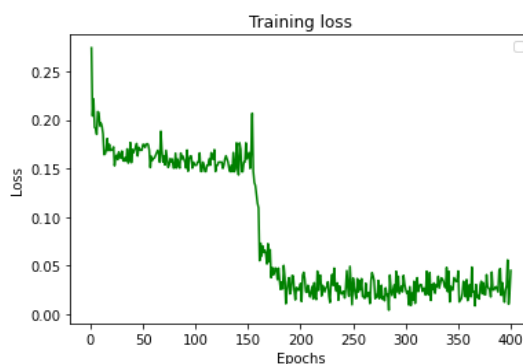
Fig. 3. Training loss of dengue disease prediction proposed model.

5 CONCLUSION

In this research dengue disease prediction is done by deep CNN model and flask web app. This web app is used to detect the dengue disease anywhere anytime. It saves the doctors workload and time. It can also be used to take second opinion of doctor. Sometimes manual mistake can be happened that can be avoided using this automated system. If number of cases of dengue is suddenly increasing and there is less man power who is expertise in this field then that time this web application is also useful. Main intention behind this research is not only to detect the dengue disease but also to aware about its symptoms and prevention techniques.

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A Novel Threat Detection Framework for Cloud Computing Environment

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ABSTRACT

Recently cloud computing is getting worldwide recognition, but security is the main barrier to its acceptance. Cloud service users are mainly concerned about data loss, security risks and availability issues. Recently, machine learning-based methods of threat detection are gaining popularity in the literature with the advent of machine learning techniques. Therefore, the analysis of threat detection and prevention strategies are a necessity for cloud protection. With the help of the detection of threats, we can determine and inform the normal and inappropriate activities of users. Therefore, there is a need to develop an effective threat detection system using machine learning techniques in the cloud computing environment.

In this paper, we propose a threat detection framework, which is a combination of feature selection and classification. We suggest using Pearson's correlation coefficient based feature selection and linear Support Vector Machine based classification method to detect attacks in a cloud computing environment. This will increase the accuracy of the classification and reduce the complexity of the system by extracting only 18 key features from the original 42 features in the dataset. The performance assessment of the proposed framework was conducted using tests conducted on the UNSW-NB15 database. In this work, we compared the proposed framework with other machine learning models including Support Vector Machine, Decision Tree, Naive Bayes, Random Forests and the K-Nearest neighbor. The results obtained show that our proposed framework can effectively reduce the number of features with higher classification accuracy compared to other machine learning-based classification methods. Also, this proposed framework tends to reduce the total processing time and energy consumption during threat detection compared to other classification methods.

Keywords: cloud computing, cloud security, machine learning

1. INTRODUCTION

Recently the use of cloud computing has become increasingly popular. The personalized data centers have become popular as an inexpensive infrastructure solution for business plans. Cloud computing offers a wide variety of resources in the form of Internet services. Cloud computing assists users in reducing infrastructure costs by providing various on-line resources. Cloud services like IaaS, PaaS and SaaS are still widely used by end users. As a result, users do not need to know, control and own the cloud computing infrastructure, nor do they need to manage or control the infrastructure to deploy applications. Instead, user simply access or lease services that pays only for what user use. Pay-as-you-go capabilities, widely required by cloud hosting providers, are gaining popularity in business computing models. [1].

Even though Cloud computing is visible as a great infrastructure exchange, greater protection is required to lessen its failures. Since sensitive data of users is stored in cloud data centers, cloud security vulnerabilities need to be identified and avoided. Due to the fact cloud infrastructure makes use of standard Internet protocols and visualization techniques, it can be vulnerable to threats. Such threats can come from conventional sources which include address resolution protocol, IP spoofing, Denial of Service (DoS)[2], [3]. The conventional methods used for detection and prevention do no longer work well to control the threat while working with large data flows. Machine learning (ML) strategies are beneficial in detecting attacks. Numerous techniques primarily based on machine learning have been proposed in literature to detect cloud threats. A main challenge in machine learning-based frameworks is detecting these threats with high accuracy.

In order to protect the cloud computing environment from threat by an adversary, various threat detection models have been proposed by researchers. These threat detection model defense solutions are categorized into signature-based and anomaly-based. The former relies on signatures of known attack patterns while the latter profiles a statistical usage model over a certain amount of time to classify data packets as either normal or anomaly using various techniques such as data mining, machine learning, and statistical modeling. This has necessitated the novel solution to detect threat.

In this work, we propose a threat detection framework, which is a combination of feature selection and classification. We suggest using Pearson's correlation coefficient based feature selection and linear Support

Vector Machine based classification method to detect attacks in a cloud computing environment. This will increase the accuracy of the classification and reduce the complexity of the system by extracting only 18 key features from the original 42 features in the dataset. The performance assessment of the proposed framework was conducted using tests conducted on the UNSW-NB15 dataset. In this work, we compared the proposed framework with other machine learning models including Random Forest (RF), K-Nearest Neighbors (KNN), Decision Tree (DT), Naive Bayes (NB), and Support Vector Machine (SVM). The results obtained show that our proposed framework can effectively reduce the number of features with higher classification accuracy compared to other machine learning-based classification methods. Also, this proposed framework tends to reduce the total processing time and energy consumption during threat detection compared to other classification methods.

The whole paper is organized as follows: Section 2 presents a literature review of the latest techniques used to detect the threat. Section 3 discusses the proposed framework for detecting threats, Section 4 discusses the threat detection system based on the proposed model, and Section 5 discusses the dataset, implementation and test results. Finally, the conclusion of the study is given in Section 6.

2. LITERATURE SURVEY OF MACHINE LEARNING APPROACHES-BASED THREAT DETECTION SYSTEMS

This section describes the Machine learning approaches-based threat detection systems.

Moustafa et al. [10] suggested a Collaborative Anomaly Detection Framework (CADF) for big data processing in cloud computing. The authors provide technical and deployment services for this framework. The suggested method consists of three modules: capturing and logging network data, preprocessing of this data, and a new decision engine using the Gaussian Mixture Model and lower-upper interquartile distance limit to detect threats. The UNSW-NB15 dataset was used to evaluate the proposed classification method to check its accuracy when modelling in a real-time paradigm and was compared to three ADS strategies. The authors used SaaS for easy installation of the proposed method in cloud computing.

Osanaiye et al. [19] suggested an ensemble-based multi-filter feature selection method. This method achieves a good selection by combining the output of four filter methods. The suggested method has been used to use cloud computing and is used to detect DDoS threats. Testing of the suggested technique was performed using NSL-KDD database and DT classifier. The results indicate that the suggested technique effectively reduces the number of properties to 13 from 41. In addition, it gives higher classification accuracy than other classification methods.

Mobilio et al. [9] suggested cloud-based threat identification as a service that uses a standard rule used in cloud systems to declare control of the concept of incorrect discovery. Authors also propose first results with lightweight machines that show a promising solution to better control the concept of detection of malformations. The authors provided instructions to apply the suggested method as a service model to the threat detection concept and gain threat detection as a service. Authors recommend building a model that supports as a service and can work in conjunction with any observable system that stores data in a series of times. The author says that preliminary testing of the proposed method with Clearwater cloud has achieved good results and efficiently handle threat identification logic. This model is interesting, incorporating new technologies for the use of unconventional real-time detection.

Aldribi et al. [21] suggested hypervisor-based cloud for intrusion detection gives a key properties extraction method based on user status and their hypervisor related behaviour. The suggested technique was aims to detect a threat in the cloud following mathematical sequences using a collection of gradient descent and E-Div algorithms. The new database is presented as an intrusion detection database collected in a cloud that is also publicly available to investigators. The database includes multistage threat scenarios that allow for the development and testing of cloud computing threats. The authors performed tests using the Riemann rolling feature extraction system and produced promising results. The database carries several connections over encrypted medium, for example, using protocols such as SSH.

Zhang [27] introduced multi-view learning strategies for finding threats in cloud computing using ML model. Authors work with a gap created as two-phase classification in real-time, which is trained by developing many properties of the ELM model. The suggested method automatically integrates many properties from different sub-systems and gets an improved classification by increasing training accuracy. Conflict calculated between sums is indicated by the relationship between the samples and the separation boundary, and the weighted samples set the recurrence rate of the separation model. The suggested model faces a variety of challenges in

detecting inaccuracies, such as distribution imbalances, high-magnitude features, etc., well with Multi-view learning and feed control.

Fernandez and Xu [24] discussed a case study using the Deep learning network to discover the threat. The author said he got good results in detecting network threats. The authors point out that the use of the first 3 octets of an Internet protocol address can be effective in managing the use of dynamic Internet protocol addresses, which is a DNN oddity with DHCP in place. The author used auto-encoders for classification and trained models in the expected flow.

Kwon [20] suggested Recurrent Neural Network (RNN) and Deep Neural Network (DNN) for network threat detection. The authors test the feasibility of a DNN method for analysis of network traffic with their FCN method. This survey also investigated the effectiveness of DNN models in network traffic analysis by introducing research into their FCN model. The suggested method gives better results compared to standard ML strategies, such as SVM, RF, and Ad boosting.

Garg et al. [23] introduced a hybrid data processing method for network malfunction detection that affects the performance of Gray Wolf Optimization and Convolution Neural Network. The development of GWO and CNN training methods has been enhanced by testing initial capabilities and retrieval performance failures. These other expanded methods are called Improved-GWO and Improved-CNN. The suggested model operates in two phases of network threat detection. In the first phase, the enhanced GWO used feature selection to find the best trade between the two objectives to reduce the failure rate and reduce the properties set. In the second phase, CNN is used for the classification of threats. They say that the accuracy of the suggested method was tested with DARPA'98, KDD'99 and artificial databases. The authors demonstrated the results obtained, which indicate improvement over other threat detection models. The suggested model indicate an improvement of 8.25%, 4.08%, 3.62% in detection rate, false positives and accuracy, respectively, related to the standard GWO and CNN.

Nisioti et al. [22] give a study on unsupervised intrusion detection systems. Properties of this method are extracted from various sources of evidence such as network traffic, logs from different devices. Unsupervised techniques are suggested to be considered as flexible in the additional features extracted from various sources of evidence and do not require repeated training. The authors also suggested and compared the options for selecting IDS features. This survey finds and uses the lower set of features for each class to reduce computer time and stress.

Peng et al. [29] introduced intrusion detection based on DT. They compared the result of the work on the whole database. Test results showed that the suggested approach gives improved results. The suggested approach was trained and tested on the older version of KDD cup 99.

Manna and Alkasassbeh [31] have introduced the method based on the J48 decision tree, random forest and REP tree. They suggested the use of SNMP-MIB data for intrusion detection systems to detect denial of services threats. Classifiers and features are used in the Internet protocol set. The authors say that the REP tree algorithm provided the highest efficiency at Internet protocol set times. The average efficiency of these three techniques was enough to be an intrusion detection system. However, it is limited to the fact that the database has expanded and requires more real-time challenges.

Rathore and Park [8], have suggested a method based on a combination of extreme learning machines and a semi-supervised fuzzy c-means algorithm. ELM is trained using a training database and the membership rate of samples of unlabelled data is calculated using semi-supervised c-means. Samples with a higher membership value than the confidence level were further subdivided using ELM. In ELM classification, samples divided with higher confidence than the ELM confidence scale were included in the training database. This process continues until all unlabeled data samples are labelled.

Myint and Meesad have suggested a method known as the incremental learning algorithm based on SVM [11]. In this case, predictions are made using SVM and will reduce the steps required for calculation and complexity of the algorithm, error set, and time is saved for repeated data training. In this way, the author has used the KDD Cup99 dataset to evaluate system performance. The suggested system can predict 41 aspects of incoming data.

Nabila Farnaaz and M. A. Jabbar raised the model using the Random Forest to detect intrusion [12]. In this way, the author views the RF as the ensemble classifier and the model offers better performance compared to another traditional classifier of threat classification. To test the performance of the model, the author used the NSL-KDD dataset, and the suggested model works well with a low level of false alarm and a high level of detection.

Majjed et al. promote an effective and comprehensive STL-IDS deep learning approach that supports a self-taught learning framework [13]. With feature learning and size reduction, a suggested system can be used. In this way, To get high predictive accuracy of SVM training and testing time is reduced. The suggested method provides an improvement in network threat detection.

Sandhya Peddabachigari et al. examine the decision tree for intrusion detection [14]. This model was tested with the 1998 DARPA database, and the system offers better performance compared to traditional models with accuracy. Also, the results show that the training time and testing time are better compared to the support vector machine.

Mrutyunjaya Panda and Manas Ranjan Patra suggested a framework for NIDS based on the Naïve Bayes [15]. The implementation of KDD Cup 99 is used as a database and from the results, it is determined that the planned system offers high performance in terms of false-positive rate, process time and price.

3. PROPOSED THREAT DETECTION MODEL FRAMEWORK

In the field of machine learning, feature selection is the process of reducing the number of input variables when constructing a hypothetical model. It is desirable to reduce the number of input variables to reduce the calculation costs of modeling. Methods of statistical-based feature selection include examining the relationship between individual input variables and target variables using statistics and selecting those input variables that have the strongest correlations with the target variable. Feature selection options can be divided into the filter, wrapper and embedded. Filter-based selection methods use statistical measures to determine the correlation or dependence between input variables that can be filtered to select the most suitable features. Correlation is a commonly used mathematical term meaning how close two variables are to having a linear relationship. Correlation is a measure of the linear relationship of 2 or more variables. Through correlation, we can predict one variable from the other. The idea behind using a correlation in selecting a feature is that the good variables are highly correlated with the target. In addition, variables should be associated with the target but should not be associated with each other. When two variables are linked, we can predict one another. Therefore, when two factors are correlated, the model requires only one of them, as the second does not add additional information. In this work, we used Pearson's correlation coefficient to quantify numerical features. In statistics, Pearson's correlation coefficient is the measure of linear correlation between two sets of data. It is the ratio between the covariance of two variables and the product of their standard deviations; thus it is essentially a normalized measurement of the covariance, such that the result always has a value between -1 and 1. Here, we select 18 of the most important features out of the 42 found in the UNSW-NB15 dataset.

As shown in Fig. 1, we have divided our proposed framework for detecting cloud computing threats into three steps. The first phase in implementing a lightweight threat detection model is to introduce an initial preprocessing stage for the dataset before training. To achieve this, we used Pearson's correlation coefficient to rank features. By ranking, the features that are strong in determining the output class of the dataset are obtained and 18 rated features are selected. These selected features represent the most important features of all 42 features. In the second phase, the training phase, the features selected after pre-processing the UNSW-NB15 dataset are used to train the threat detection model to detect possible cloud attacks. This threat detection model is used in the cloud to monitor data from the router to the cloud server. The final stage, the attack detection phase, is the process by which a non-labeled test dataset is used to test one of the class labels. In this task, we used the linear SVM classification algorithm to detect the occurrence of an attack. The SVM classifier is used for classification and regression. In SVM, data are spat into the data point by using a hyper plane and are used to determine the data point category. The distance from the boundary to the nearest data point is called the margin and the data point near the dividing line is called the support-vector. When dealing with SVM, then we must consider two things: 1) The margin should be as large as possible, and 2) The support vectors are very useful data points because they are the most probably incorrectly classified.

The SVM working steps are as follows:

Step 1: Define the optimal hyper plane: maximize margin.

Step 2: Extend the definition mentioned in Step 1 for nonlinearly separable problems: have a penalty term for misclassification's.

Step 3: Map data to high-dimensional space where it is easier to classify with linear decision surfaces: reformulate problem so that data are mapped implicitly to this space. [31]
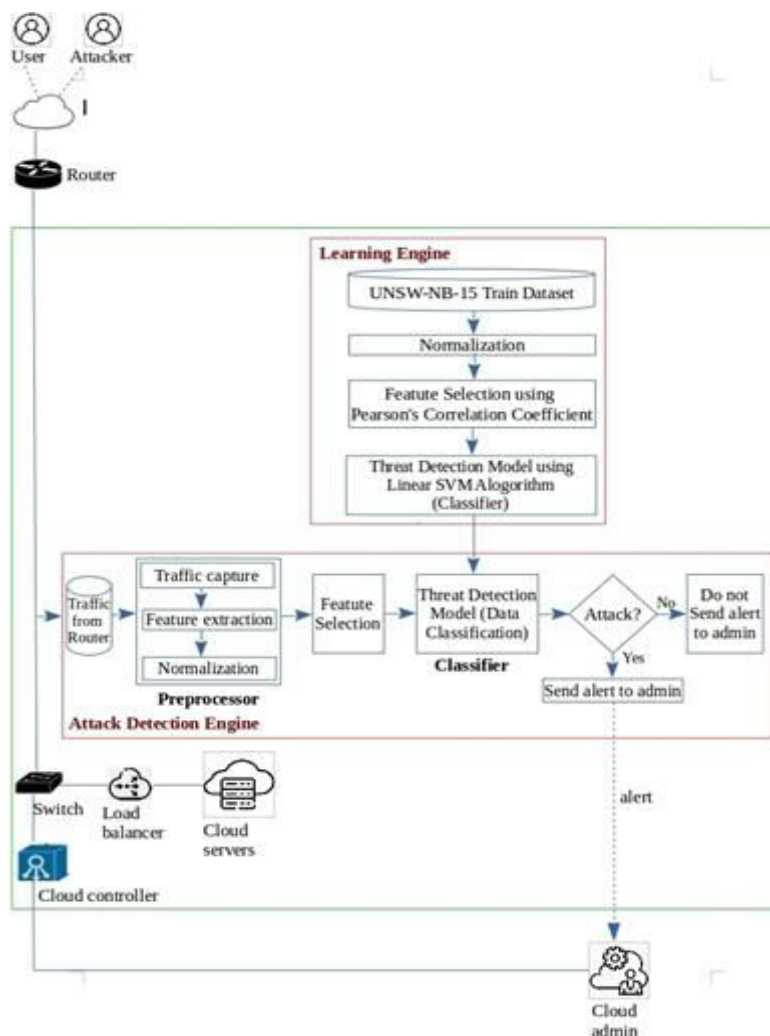
Fig**.** 1**. Proposed** threat detection framework.

4.   THREAT DETECTION SYSTEM BASED ON THE PROPOSED MODEL

Fig. 1 shows the proposed model for detecting threats. The attack detector is installed near the router that connects the cloud network to the Internet. In the present case, we assume a single on-line connection. Multiple connection cases can be handled in the same way by installing a separate detector on each connection. The attack detector has two components preprocessor and a classifier.

4.1. Preprocessor

This module captures incoming traffic in the cloud from the Internet. Then, it converts captured traffic into a batch of samples. These groups are used in the classifier to detect attacks. The first step is to extract the useful features used to classify samples as an attack or normal. After that, normalization is performed, which scales the feature values in the range [0,1]. The next step is to address the symbolic features of the data. One-hot encoding is used to convert symbolic features into discrete features. In this case, one feature value is represented as a binary value vector. After this, a feature selection is made, in this work, we use Pearson's correlation coefficient to rank the features. The most relevant features that are strong in determining the output class are ranked and chosen to be used by the linear SVM algorithm to classify traffic packets as either normal or anomaly.

4.2. Classifier

The classifier used in the proposed attack detection system is linear SVM. It takes sample groups with 18 key features prepared by the preprocessor as input and separates each sample group as either normal or attack. It is a supervised model and requires training with labeled samples before it can be used for attack detection. To train the classifier, the UNSW-NB15 training dataset is used.

4.2.1.   Attack detection

During the attack detection, the samples prepared by the preprocessor are applied to a trained classifier and output is calculated. The output of the model classifies each sample as an attack or normal. When the samples

applied to a classifier are classified as an attack, it indicates that the attack was launched in the clouds. Here, the cloud controller is notified about the attack.

5. EXPERIMENTATION

We use UNSW-NB15 dataset to evaluate the effectiveness of threat detection methods designed using machine learning techniques. The tests were performed in Google Co-laboratory under Python 3 using TensorFlow and Graphics Processing Unit (GPU).

5.1. Description of the dataset

The UNSW-NB-15 dataset was built with the help of the 'IXIA PerfectStorm' application at 'Cyber Range Lab of UNSW Canberra' to produce a hybrid of real normal and attack patterns. The 'tcpdump' application was used to get 100 GB of raw traffic. UNSW-NB-15 database contains attacks like Fuzzers, Analysis, Backdoors, DoS, Exploits, Generic, Reconnaissance, Shellcode and Worms. Monitoring applications like Argus, Bro-threat were used and twelve algorithms were developed to produce 49 features with a category label. Total 2 million and 5,40,044 samples are available in the dataset. The whole database is divided into two parts i.e. training and testing. The training set consists of 1,75,341 samples and the testing set consists of 82,332 records of types attacks and normal [4], [5].

5.2. Threat detection model methodology used in experimentation

The details of the proposed threat detection model framework used in experimentation are illustrated in Fig. 2. Specifically, the method consists of five stages: (1) datasets stage, (2) preprocessing stage, (3) feature Selection stage, (4) training stage and (5) testing stage.
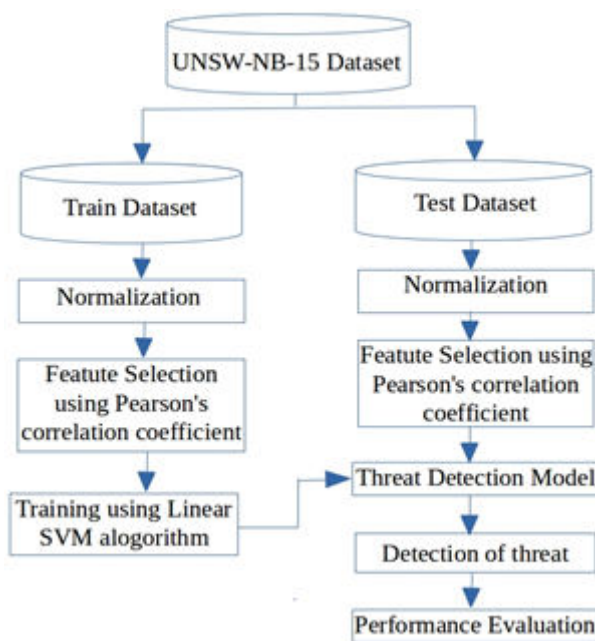
Fig.2. Flowchart of the proposed security threat detection framework.

5.3. Performance Metric

We use the most important performance indicator accuracy (ACC). We can calculate the performance metric using the following

Accuracy (ACC): It is a metric that is used to indicate the proportion of correct classifications of the total records in the testing set.

Accuracy = (TP+ TN)/ (TP+ FN+ TN+ FP)

Where,

True positive (TP): It can be outlined as anomaly instances properly categorized as an anomaly.

False-positive (FP): It can be outlined as normal situations wrongly categorized as an anomaly.

True negative (TN): It can be outlined as normal situations properly categorized as normal.

False-negative (FN): It can be outlined as anomaly instances wrongly categorized as normal. [6]

5.4. Results and Discussion

In this work, in the first phase, Pearson's correlation coefficient during the preprocessing stage to select features from the labeled dataset, UNSW-NB-15. The most relevant features that are strong in determining the output class are ranked and chosen to be used by the linear SVM algorithm to classify traffic packets as either normal or anomaly. During the evaluation, we determine the performance of our proposed framework by using an UNSW-NB-15 dataset. The output of the feature selection process is shown in Table 1.

Table 1. Output of Pearson's correlation coefficient based Feature Selection Method.

Feature selection method	Feature selected
Pearson's correlation coefficient	*2, 3, 4, 9, 10, 13, 20, 21, 22, 23, 31, 32, 33, 34, 35, 36, 40, 41.*

In the second phase, the training phase, the features selected after pre-processing of the UNSW-NB-15 dataset are used to train the threat detection model to detect possible attacks in the cloud. In this work, we used the Linear Support Vector Machine classification algorithm to detect the occurrence of an attack.

Table 2.Comparison of the proposed threat detection model framework with other machine learning-based threat detection models.

Algorithm	Accuracy
Proposed Framework	*90.3*
Support Vector Machine	*89.87*
Random Forest	*89.49*
K-Nearest neighbour	*88.23*
Decision Tree	*85.24*
Naive Bayes	*47.89*

To compare the Proposed threat detection model framework, five algorithms of machine learning were considered, namely Support Vector Machine, Naive Bayes, Random Forest, Decision Tree, and K-Nearest neighbor. For comparison purposes, accuracy were considered, and their comparison results are shown in Table 2, we can say that the accuracy of the proposed threat detection model framework is highest as compared to other approaches.

6. CONCLUSION

In this paper, we have proposed the threat detection model framework which is a combination of feature selection and classification. Feature Selection is based on the Pearson's correlation coefficient technique, to per-process dataset before attack classification. The proposed threat detection model reduce the complexity of the system by selecting important features in the dataset, thus reducing the features from 42 to 18 before classification, using a linear Support Vector Machines algorithm. Experimental results obtained show improved performance with a reduced feature set from 42 to 18.

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Comparison of Artificial Neural Network Model and Deep Learning Model for Predicting Commodity Market Prices

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ABSTRACT

In recent years, researchers have extensively used system learning strategies such as Artificial Neural Network (ANN), Conventional Neural Network (CNN), and Recurrent Neural Network (RNN) to build prediction models. The paper shows ANN and LSTM network models for process modeling based on historical commodity prices from 2012 to 2020. The results show that both of these networks are suitable for price prediction in the commodity market. The LSTM model outperforms the ANN model with values of R squared of 0.9 and mean square error of 0.00. Given other runtime simulations, the LSTM model is also more stable than the ANN model, giving better simulation performance. A special forgetting gate block makes the LSTM model more accurate in simulation and more intelligent than the ANN model. In this study, we would like to propose a new data-based product prediction method.

Keywords: Deep learning, LSTM, ANN, commodity market prices, prediction.

1 INTRODUCTION

Commodities are vital to the global economy, with the oil and gas industry alone accounting for 5%, not to mention the significant contributions of other energies, metals, minerals, and agricultural products. As a result, it is clear that commodity prices have a significant impact on inflation, economic activity, and the balance of payments [1]. Forecasts are essentially educated guesses based on previous data or facts. Many other factors influence forecasting, such as social, trade, and industry conditions, political issues, rumors, and media plug-ins. Professional traders have made predictions and developed a variety of technical, fundamental, and quantitative analytical methods [2].

2 RELATED WORKS

The loss gradient problem is addressed by the LSTM model, which allows for long-term dependencies. It is derived from the RNN architecture. It was created to be more accurate than CNN [3]. This method not only analyses time series with a wide range of predictions, but it also solves problems with missing gradients in data. The LSTM model has been shown to be the most effective [4]. Price forecasting data may be large and, more than likely, nonlinear. Models like LSTM, which can investigate hidden patterns and dynamics in large datasets, are required for good forecasting [3, 5].

Previously, traditional econometric approaches, such as the auto-regressive integrated moving average (ARIMA), were widely used in research on the behavior of foreign exchange and stock markets [3, 6]. Many people have chosen ANN and regression prediction algorithms based on the lowest error percentage [7]. Kumar et al. proposed a system for applying prediction by analyzing past soil and rainfall datasets [8], whereas Aakunuri proposed crop prediction using weather forecasting, pesticides, and fertilizers [9].

The neural network forecasting problems are based on an examination of the investigated parts, which primarily focus on interval forecasting of agricultural commodity futures prices [10]. For starters, the emphasis is on interval prediction, and point forecasting of agricultural commodity futures prediction in neural network fields has been ignored [10]. Second, due to gradient vanishing, these existing methods are incapable of capturing very long-term information [10]. Furthermore, the dynamic dependencies between multiple variables are not taken into account [11]. Deep neural networks, a neural network-derived approach, can be divided into three categories [12]. The first category is to identify statistically significant events, the second is to discover and predict inherent structure, and the third is to make accurate numerical value predictions [13]. Studies have shown that LSTMs are on average 85% more accurate than ARIMA predictions [5].

3   ANN MODEL
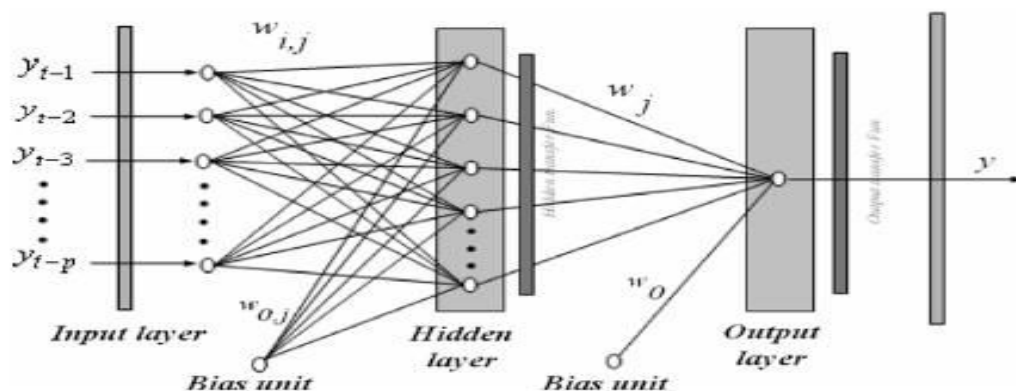
Figure 1: Neural network structure [14].

Theoretical Introduction of ANN Model

The ANN model is widely used in function approximation and predictions; advantages of net-work of three layers of simple processing units connected by a cyclic links as shown in Figure 1[14]. The relationship between the y_t (is the output variable) and $y_{t-1}, y_{t-2}, \ldots, y_{t-p}$ (are the input variables) has the following mathematical representation:

$$y_t = w_0 + \sum_{j=1}^{q} w_j g(w_{0,j} + \sum_{i=1}^{p} w_{ij} y_{t-i}) + \varepsilon_t \qquad (4)$$

Where, $w_j(j = 0,1,2, \ldots q)$ and $w_{ij}(i = 0,1,2, \ldots p; j = 0,1,2, \ldots q)$ are parameters commonly known as the connection weight, p and q are the input and hidden nodes, respectively [16]. Under normal circumstances, the used activation function has several forms and indicated by the condition of neurons in the network [16]. In general, input layer neurons do not have an activation function, as they are used to transmit the input variables to the hidden layer [16]. The linear function, in the output layer, is widely used as they are unlikely to introduce distortion into the output of the predicted value [16]. Logistic function given in equation 5 and hyperbolic function in equation 6 are used as the transfer function of the hidden layer [16].

$$L(x) = \frac{1}{1+e^{-x}} \qquad (5)$$

$$f(x) = \frac{1-e^{-2x}}{1+e^{-2x}} \qquad (6)$$

4   LSTM MODEL

4.1 Theoretical Introduction of LSTM Model

The problem of gradient disappearance, which is common in traditional RNNs, is primarily addressed by LSTM model so that it can analyze longer time series data [16]. The operational principles of LSTM includes; (i) processing the input information at prescribed time, (ii) select useful information with a certain probability, and finally extract useful information through the output gate as the state of the final retention layer, and (iii) then participate in the calculation of the next time [16]. The entire process in mathematical form can be stated as

$$i_t = \sigma(W_i h_{t-1} + U_i x_t + b_i)$$

$$f_t = \sigma(W_f h_{t-1} + U_f x_t + b_f)$$

$$o_t = \sigma(W_o h_{t-1} + U_o x_t + b_o)$$

$$C_t = \tan h \ (W_C h_{t-1} + U_C x_t + b_C)$$

$$C_t = C_{t-1} \odot f_t + i_t \odot \overrightarrow{C_t}$$

$$h_t = o_t \odot \tan h(C_t)$$

Where

W_i, W_f, W_o, W_C are the weights of h_{t-1},

U_i, U_f, U_o, U_C are the weights of x_t,

b_i, b_f, b_o, b_C are bias factors,

σ represents the sigmoid function making sure that the values of i_t, f_t, o_t are between 0 and 1,

and tan h represents the hyperbolic tangent function.

It can be seen from the above equation that the size of h_t is jointly affected by the present condition of the cell C_t and the information h_{t-1} contained in the hidden state at the previous moment. W_C is the main cause of the disappearance of the gradient, which has no influence on the calculation of the current cell state. Therefore, the issue of the gradient disappearing in the training process is effectively reduced by adding a gating structure, which improves the accuracy of prediction model [16].

5   COMPARISONS BETWEEN ANN AND LSTM MODEL

Previously, a few coworkers reported that stock price predictions using LSTM models had been made. When the prediction results of the LSTM and ANN models are compared, the LSTM model outperforms the ANN model [15]. This could be due to improvements made to the vanishing gradient issue in it [15]. Furthermore, it could be caused by the addition of indicators to better understand market fluctuations as well as unintentional fluctuations in the input variables [15]. Furthermore, the LSTM model has some advantages that have not been thoroughly investigated. This may be due to the fact that current data processing is better suited to the ANN model [16]. Unprocessed data, on the other hand, produces unsatisfactory predictions in the LSTM model [3,16].

6   DATASET DESCRIPTIONS

International prices for eight commodities, namely energy (natural gas, crude oil), agriculture (wheat, rice), industry (cotton, copper), and precious metals (gold, silver, and platinum), were used in this work. Our goal is to include items that are frequently discussed in the literature, and all of the data comes from the Yahoo fiancé commodity prices dataset. All prices are based on daily data collected from 02/01/2012 to 02/06/2020.

7   PREDICTION MODEL

In Python 3.8, the numpy and pandas packages will be used for research, preparation, and data manipulation. In contrast, keras, which is built on Google TensorFlow, is used in ANN and LSTM networks for large-scale machine learning on heterogeneous systems [17]. Separate the training and test data now. The last 500 data points will be the test data, and the rest will be the train data. We define the LSTM for discharge prediction as 50 neurons in the first hidden layer and 1 neurons in the outer layer. The input shape will have one time step and sixteen features. The MAE loss function will be used, as well as the efficient Adam version of stochastic gradient descent [18]. The back propagation learning algorithm is used to train the multi-layer-feed-forward perception (ML) in this study. The MLP network is composed of three layers: the input layer, the hidden layer, and the output layer [18].

8   RESULTS AND DISCUSSION

The values for MSE were obtained when evaluating the LSTM model's train score and test score, where the score is the evaluation of our chosen loss function, which in our case is MSE [17,18]. In figures 2, 3, and 4, we can see the comparison of the ANN and LSTM models' predictions for the adjusted closing price (orange line) compared to the actual adjusted closing price (blue line) [19] for gold, silver, and wheat, respectively.

Table 1: Obtained MSE and R^2 values from ANN and LSTM

Commodity	MSE Value		Train set R^2 Value		Test set R^2 Value	
	ANN	LSTM	ANN	LSTM	ANN	LSTM
Gold	0.005002	**0.001147**	0.913	**0.962**	0.806	**0.956**
Silver	0.006764	**0.002730**	0.941	**0.967**	0.854	**0.941**
Copper	0.004376	**0.003794**	0.937	**0.964**	0.919	**0.930**
Platinum	0.032539	**0.012938**	0.927	**0.971**	0.658	**0.864**
Natural gas	0.001801	**0.001575**	0.758	**0.796**	0.607	**0.657**
Crude oil	0.012359	**0.006209**	0.806	**0.935**	0.630	**0.814**
Cotton	0.035105	**0.008530**	0.949	**0.971**	0.631	**0.910**
Wheat	0.000879	**0.000128**	0.982	**0.991**	0.793	**0.970**
Rice	0.005738	**0.002760**	0.953	**0.984**	0.911	**0.957**
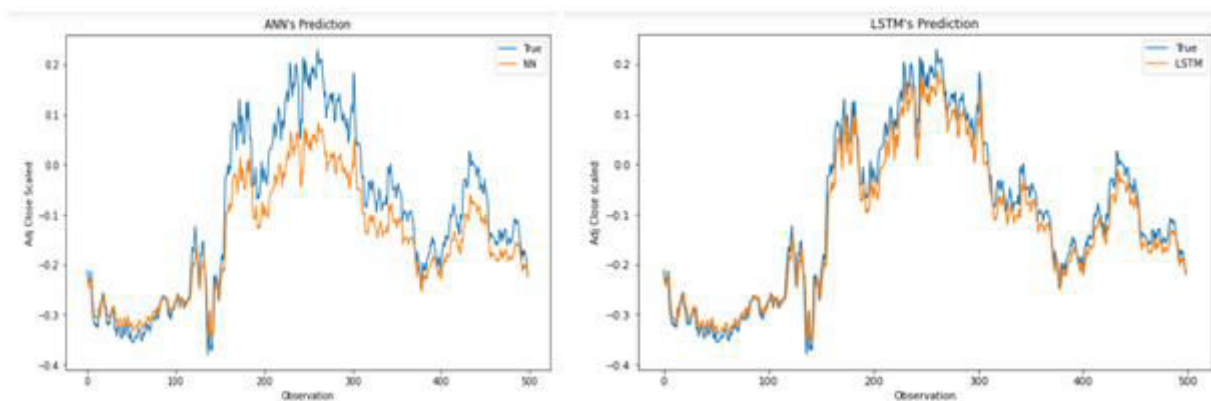
Figure 2: Comparison of actual and predicted gold price with ANN and LSTM model.
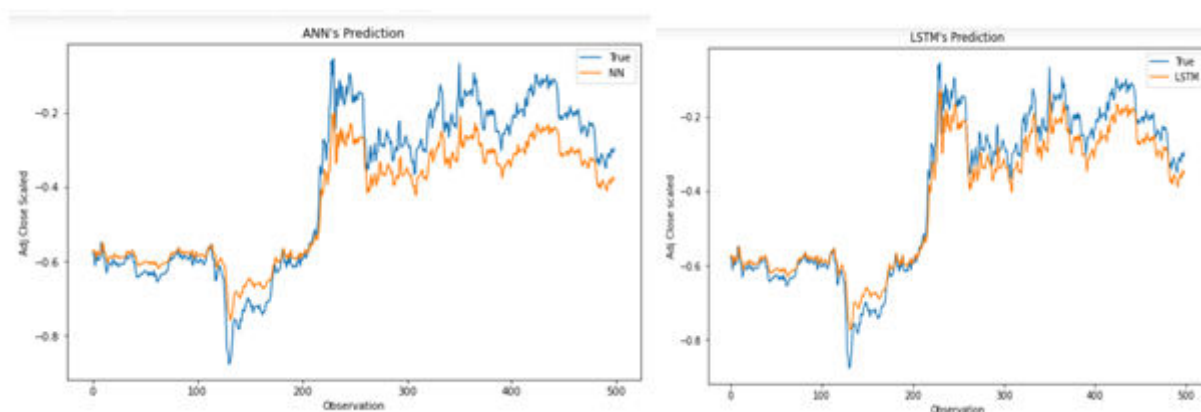
Figure 3: Comparison of actual and predicted Silver price with ANN and LSTM model.
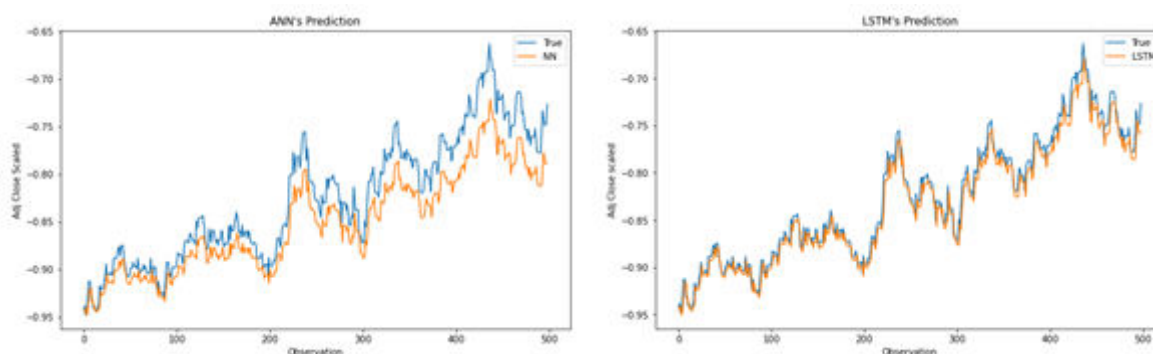
Figure 4: Comparison of actual and predicted Wheat price with ANN and LSTM model.

9   CONCLUSIONS

Conclusions can be drawn during the analysis of the process and the results of these two models. The LSTM model is better than the ANN model. The downside is that, as we all know, commodity price fluctuations are not only related to changes over time, but also affect economic, socio-political, and other factors.

10   FUTURE WORK AND LIMITATIONS

Deep learning methods are computationally intensive. The actual work was completed in Google Colab, which has 8 Tensor Processing Units (TPUs).If dedicated computing resources were available, more experiments could be performed using more data and higher epochs. This can make hyperparameter tuning clearer. Current work is limited to establishing a basic LSTM architecture. Other types of LSTM models can be constructed in a similar way [20].

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A Survey on Authentication and Encryption Mechanisms in an IoT Environment

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ABSTRACT

In recent decades, internet of things (IoT) devices have emerged and are widely deployed in various life domains. Currently, IoT devices deal with a huge amount of data and this makes such data vulnerable to a variety of different attacks that should be avoided. Different techniques can be used such as authentication and encryption to enhance remote administration of IoT devices. Some studies used different IoT architectures to secure and manage data, but the most used are three and five layers of IoT architectures. In this survey, we analyzed, classified, explored different security issues alongside, as well as cutting-edge approaches to address these challenges.

Keywords: IoT Architecture, Security Issues, Authentication and Encryption Techniques, Machine Learning in IoT Security.

6   INTRODUCTION

Generally, the new emerging developments based on the Internet and embedded technologies have made it possible to connect the things around us everywhere. Internet of Things (IoT) devices are invisibly implanted in the environment around us, which results in huge amounts of data [1]. To make the data understandable and valuable, it would have to be kept and processed. Mobile operators, software developers, access technology suppliers, and other actors are all involved in an IoT model [2]. IoT networks can be used in a variety of industries, including manufacturing, utility management, agriculture, healthcare, data analysis, business intelligence platforms, cloud computing, and many others [2]. The Internet of Things is a next-generation model that allows communication between machines, programs, and people's tools, to carry out orders and procedures without human intervention [3]. The IoT world's success necessitates the merging of several communication infrastructures. As a result, smart gateways have been developed to connect IoT devices to the regular Internet [3]. A study showed that, in 2022, the expected number of connected devices to the Internet might reach 28.5 billion devices, this number is greater than the number obtained in 2017 when it was 18 billion connected devices. It is also expected that by 2022, the average number of connections and devices used by users will increase by up to 51% [4]. The rising computational resources in diverse application domains, along with the disruptive use of IoT devices, have resulted in a wide range of aggressive vulnerabilities or attacks. Such attacks can result in fatal failures and data loss across multiple domains. As a result, the security of IoT environments has become a hot topic in recent years, attracting the attention of the research community [5]. Different levels or layers should be taken into our consideration to secure IoT environments such as application, network, edge layers that will help for remote administration.

This study aims to conduct a comprehensive survey to facilitate remote management of IoT devices based on secure communication by applying authentication and/or encryption techniques. This survey presents a comprehensive analysis of IoT's threats and challenges, as well as showing how users' privacy and security can be compromised by such threats. Different layers of IoT architecture have existed and each one has some attacks; therefore, some countermeasures should be used. We start by reviewing potential architectures, threats, and attack scenarios, categorizing them, and presenting the suggested countermeasure procedures.

The rest of this paper is organized as follows: Section 2 shows the related works. IoT Architecture is presented in section 3, while the research methodology is presented in section 4. IoT security requirements and machine learning for user authentication are discussed in section 5,6, respectively. Finally, section 9 holds the conclusion.

7   RELATED WORK

The Internet of Things ecosystem is made up of a wide network of real-world objects, actuators, sensors connected to create an intelligent entity that is capable of interacting with the external environment and end-users. Under the scope of IoT environments, everyday objects, appliances, and devices are networked together and can be managed remotely via smartphones. IoT devices have limited resources and are designed to consume less power at a reasonable cost when performing basic functions. Though IoT solutions are not yet matured,

there are numerous issues to overcome. Consequently, corporations and organizations that use IoT technologies must have well-designed security IoT architectures. Furthermore, a new trend has emerged to analyze real-time threats based on the techniques of machine learning. Novel algorithms are proposed based on machine learning to monitor the behaviors of users or software over the network, even if the right password is provided but the behavior is an anomaly, accessing a service in an IoT network is not permitted.

A brief taxonomy of current security vulnerabilities in IoT architecture, communication, cloud-based IoT applications, has been provided [1]. While the authors in [2] identified, classified, and explored many security concerns, as well as cutting-edge techniques to address these challenges. Similar to [2], the authors in [3] presented a cutting-edge review of IoT security and related problems by legal technical solutions that can be used by organizational, private, and governmental entities. Furthermore, a systematic way to understand the security needs for IoT systems in order to create future secure IoT systems was highlighted [4]. The authors in [5], examined IoT security concerns, limitations, requirements, and present and future solutions in depth too. In [6] the authors have presented IoT devices' security challenges and ransomware attacks. On the other hand, the researchers in [7] presented a study that aims to address the rising awareness of security and privacy concerns in IoT systems. Through an investigation of edge computing, a comprehensive review was undertaken to improve the performance of IoT networks [8]. In [9], the authors presented a survey that looked at traditional and advanced IoT application layer protocols improvements. The authors in [10] presented a review that compares IoT devices' operating systems in the terms of their programming models, architecture, networking technologies, scheduling methods, power and memory management techniques, and other factors needed for IoT applications. A review that shows the IoT security requirements was presented, with a focus on sensor-related challenges [11]. On the other hand, A detailed literature review to cover IoT architecture was introduced by the authors in [12]. The history of IoT systems and security indicators explored by the authors in [13], to study various security and privacy issues, current security solutions, securing IoT components in an environment based on new approaches, and appropriate privacy models for each IoT layer. Continuous authentication (CA) based on behavioral biometrics is applied in IoT nodes that include autonomous vehicles, smartphones, robots, wearables. In this trend, a summary of continuous authentication was comprehensively discussed by showing privacy and security concerns and solutions [14]. Various heterogeneous approaches were studied that use multi-factor authentication in the A-IoT, in which well-established and new approaches are intelligently integrated to reliably permit or reject access [15]. The benefits and drawbacks of various solutions were presented, as well as tools for merging authentication variables with the focus on smart city issues environment. Furthermore, a comprehensive study based on IoT security architecture was conducted [16], as well as the major challenges and technologies that include wireless sensor networks (WSN) and radio frequency identification (RFID), were analyzed and discussed.

On the other hand, the authors in [17] presented a study that focuses on techniques of the key establishment process at the application layer, especially the ephemeral Diffie-Hellman over COSE (EDHOC) protocol was assessed. Moreover, CompactEDHOC was proposed based on EDHOC, which is a lightweight alternative that uses the core protocol to collect the security parameters. In other trends, authors emphasized the significance of specialized approaches and architecture in designing secure IoT networks [18]. Besides, the requirements of security, current, and future development were addressed. In [19] IoT-Keeper was proposed, which is a sophisticated system capable of safeguarding the network in real-time against any malicious threats by using semi-supervised machine learning techniques. An existing blockchain-based IoT solutions to create an effective framework for the integration of blockchain and IoT were analyzed by [20] to create a system that is able to protect IoT devices from zero-day attacks without the need to use a trusted third party. On another hand, the pluggable and reprogrammable (PLAR) software to secure IoT devices in an IoT environment was investigated by [21]. In [22], the authors utilized Trusted Execution Environment (TEE) software to protect cryptographic keys in the IoT perimeter and also is supported by various embedded systems. Additionally, an adaptive intrusion detection system (IDS) was proposed to detect if a fog node has been compromised and to ensure that communication is available in fog computing [23]. In [24], a web service was developed to monitor the IoT devices' status for improving the security of such devices by continuously analyzed the internal logs, so anonymous requests will be blocked or the system will inform the manager of IoT devices about the current status. In [25], a lightweight Cancelable biometric authentication framework was proposed based on the cloud, which is able to be used in the real world and achieved high accuracy with less time which makes it appropriate for IoT contexts. In [25], the authors suggested using Cancelable Biometric System (CBS) as a highly-secure authentication mechanism, which is a biometric template protection technique based on frequent transformations or distortions at the level of feature or signal.

8   IOT ARCHITECTURE

For IoT contexts, various architectures have been presented in the literature. Many of them advocated a three-layer architecture that contains the perception, network, and application layers [5]. While other researchers offer a four-layer design that includes a sensing layer, an application-interface layer, a network layer, and a service layer [4]. Moreover, a five-layer design for IoT applications and services has been presented as shown in fig 1. User interface, application, service composition, network management, and device sensing layers are the five-layer architecture [5]. Furthermore, extra basic security requirements are presented such as authorization, authentication, trust management, identity management as shown in fig. 1.
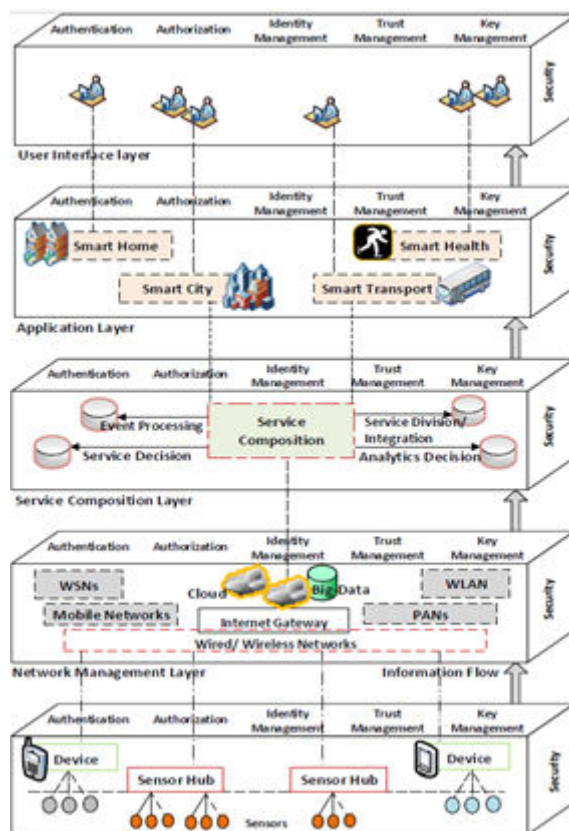
Fig. 1: An IoT architecture based on five layers [4].

There are two dimensions to improve the level of security in the system: the horizontal and vertical dimensions. The horizontal dimension provides the required level of security that should be implemented at each level, while the vertical level shows the required system functions. For each layer, the components, major functionalities, and well-known security matters are depicted in fig. 1. The user interface layer is responsible for delivering the functionalities of the application layer (activities or services) to the end-users interfaces, by using standard web services for service composition and service protocol [7]. While the application layer has a variety of services and applications can deliver such as healthcare, smart cities and homes, autonomous cars, and smart grids [8], [9], [17]. The service composition layer iss in charge of data analysis and processing that was previously collected at the layer of network management [4]. Furthermore, the network layer consists of cloud computing services, various wired and wireless networks, and big data repositories [4], [16], and responsible for data aggregation, Quality of Service (GoS), data sending to the next layer, scheduling, so on [4], [12]. GSM (Global System for Mobile Communication), 3G, 4G, Bluetooth, and UMTS (Universal Mobile Telecommunications System), RPL (Routing Protocol for Low-Power and Lossy Networks), IPv6, 6LoWPAN (IPv6 over Low-Power Wireless Personal Area Networks) are used in this layer. Finally, the device sensing layer, which consists of smartphones, actuators, RFID tags, and sensors, make up this layer [11] and this layer can sense, gather, and measure a variety of physical factors, such as temperature, humidity, and location. Table 1 summarizes the common security issues based on the required functionalities of each layer of architecture [4].

Table 1. The common security issues, functionalities, component of each layer.

Layer Name	Major Functionalities	Security Issues	Core Components
Device sensing	data acquisition, data	Access control, authorization,	RFID tags, smart sensors,

	sensing	and authentication.	actuators.
Network management	QoS scheduling, data aggregation	changing of routing paths, unauthorized access. .	Big data repositories, wired, wireless networks.
Service composition	Data's analysis and processing.	Data confidentiality, service/group authentication. .	Heterogeneous objects, middle-ware technology.
Application	Specifies massage passing protocols	Integrity, privacy Leakage, unauthorized access.	Many applications such as smart home, smart city.
User interface	End-user services are exported.	Data confidentiality, authentication and authorization,	Users

9 SEARCH CRITERIA

The general purpose of this survey is to conduct several studies that are related to securing IoT environments by applying authentication and/or encryption approaches in which help for remote administration. Only one electronic database was explored at the first stage, Science Direct (Elsevier). A search was performed on the Science Direct database search engine to collect any related survey, review, or paper, in a period started between January 2010 to October 2021.Second, another search criteria were implemented on the google scholar search engine to be used as a complementary stage to the first search results. One hundred eighty-nine papers were retrieved using the proposed search terms criteria.

10 IOT SECURITY REQUIREMENTS

Many security threats must be overcome to make IoT services accessible at a cheap cost and secure to be connected. Some of such difficulties include scalability, connectivity, end-to-end security, authentication and trust, identity management, attack-resistant security solutions, confidentiality, integrity, availability, authorization [4], [26]. The scalability means that the ability of a system to process rising workloads [27]. The end-to-end security considers how to secure the complete system, including the infrastructure, all the hardware, cloud, firmware and software, and all the links that connect them [26]. Moreover, the connectivity is regarded with securely linking numerous devices of different capabilities over various types of communication technologies such as long-range and short-range low power networks [26]. Attack-resistant security solutions based on lightweight security solutions is of major importance that can be worked with limited resources of IoT components [26]. Besides, the confidentiality means that only authorized users have access to sensitive and protected information, while the integrity of data refers to the completeness, accuracy, and assurance of data during transmission. Availability is a measure used to evaluate the repairable system's performance, taking into account both the maintainability and reliability characteristics of a component or system. The authorization is a method for associating a certain device with specific permissions, while encryption can be used to ensure data integrity during data transmission by utilizing low processing power techniques [28]. The table 2 shows some of the security requirements for each IoT layer.

Table 2. The security requirements for each IoT layer [4].

Layer	The security requirement
User interface	Applying scalability; heterogeneity; incremental deployment/Composition; end-to-end security; Mobility; interoperability/decentralized management/privacy.
Application	Using heterogeneity; End-to-end security/Privacy; reliability, self-healing, real-time, robustness, data freshness/Composition; interoperability; Light-weight solutions.
Service composition	Using ephemeral; reliability, self-healing, real-time, robustness, data freshness/scalability, heterogeneity; incremental deployment/ Composition; interoperability/decentralized management/transiency.
Network	Applying heterogeneity; composition; incremental deployment/federation of administration domains/mobility; interoperability/Light-weight solutions/Scalability.
Device sensing	Using heterogeneity; light-weight solutions/support for composition; interoperability/ reliability, self-healing, real-time, robustness, data freshness, identity management/Mobility.

11   MACHINE LEARNING FOR USER AUTHENTICATION

Machine learning techniques have been used to help in the process of user authentication in IoT environments. A variety of supervised, unsupervised, and deep learning methods have been utilized for user authentication including support vector machines (SVM), naive Bayes, K-nearest neighbor (K-NN), CNN, Random Forest (RF), k-means, many others. One solution was created based on deep learning to be as an intrusion detection system (IDS), to monitor the traffic of the network and can prevent most DoS attacks [29]. While others are mainly used to detect and learn the behaviors of hardware and software. For example, if a user wants to access the Internet of Things service, the user must first register in the system using the software and hardware of his/her own. The system based on machine learning records all user data such as the type of hardware and software used, the time of registration, the type of services required, the number of times to enter the system, and other data to identify the user's behavior. Some machine learning techniques are applied to remove false or incomplete data during the pre-processing step. After that, the extraction of important data will be done at the extraction phase. The training and testing phases are occurred until achieving a very high detection accuracy. Now the authentication phase that will prevent abnormal access even if the right password is provided as shown in fig. 2.
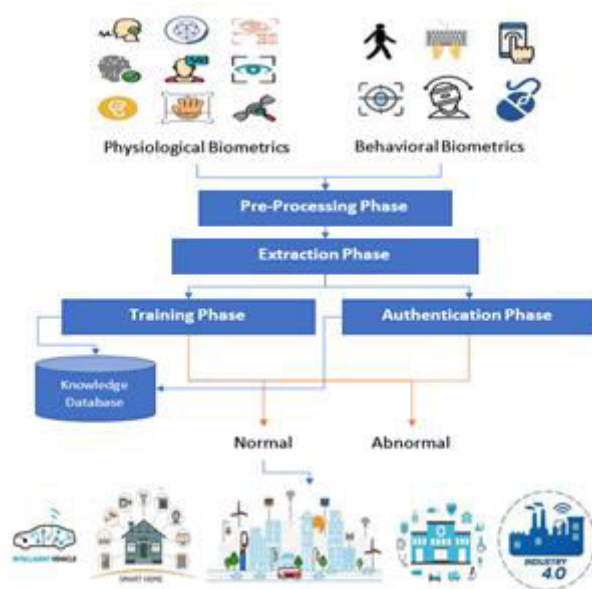
Fig. 2: Overview of user authentication based on machine learning techniques.

12   CONCLUSION

The internet of things (IoT) gadgets have arisen and have been adopted widely in a variety of life sectors. Currently, IoT devices deal with massive amounts of data, making them subject to a range of various threats that should be avoided. A wide range of vulnerabilities has evolved because of resource constraints and the diversity of components in many IoT contexts. The majority of the reviewed vulnerabilities can cause a system failure in the IoT environment. A group of attacks was analyzed in the state-of-the-art studies including intrusions, DoS attacks, spoofing attacks, distributed DoS (DDoS) attacks, malware, jamming, and eavesdropping. Many studies have implemented many procedures to enhance authentication such as using continuous authentication (CA) and cancellable biometrics. In this work, a comprehensive review of IoT security needs, and issues in a five-layer architecture is conducted. In addition, a taxonomy for cutting-edge IoT security needs, issues, and potential solutions for each layer of the IoT architecture is presented. The purpose of this research is to perform a complete survey to simplify remote control of IoT devices based on a secure connection using authentication and/or encryption mechanisms.

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Nutrition and Breast Cancer: A Literature Review

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ABSTRACT

Breast cancer is nowadays the most common disease found worldwide, it usually shows the symptoms at a very later stage. With the help of the latest advanced technology, it can be diagnosed and reduce the mortality rates. We have to educate and make them understand the symptoms of breast cancer which can be detected at an earlier stage and diagnosed before it gets incurable. We conducted a literature review to evaluate the awareness levels of risk factors for breast cancer among Indian women and health professionals and give some measurements on how to prevent it.

Keywords: Breast cancer, Awareness, Nutrients, food, Prevention.

I. INTRODUCTION

Breast cancer is the most seen invasive cancer found in women's globally; its cells are formed in the breast, which forms as a tumor and that often detected through diagnosing by x- ray or mammography .It physically visible as a lump around the breast. If it is spread outside the breast through blood vessels; it becomes advanced- stage breast cancer. If it spread to other parts of the body (such as Liver, Bones, or Brain) said to be metastasized breast cancer. Majorly breast cancer is caused due to differences in geography and delays or early in pregnancy and it also depends on lifestyle.

In Indian society breast cancer awareness is very low may be due to the presence of stigma, gender inequality, hesitation to share, reduced engagement in screening behaviors such as breast self- examination which contributes high uncertainty. We have conducted an awareness program and evaluated breast cancer knowledge in Indian women. Breast cancer risk factors include age, family history, age at first birth, parity, and duration of breastfeeding, adiposity and alcohol use. Breast cancer (BC) is the second one disease maximum everyday most cancers international and the most customarily going on malignancy in women (22.9% of woman cancers), with greater than 1.five million of latest instances recognized in 2018 , it's far growing in countries, due to extended existence expectancy, citified, and the adoption of western lifestyles or metabolic disorders. Several elements had been identified: non-modifiable elements encompass older age (>sixty five versus genetic predisposition (including DNA mutations and BC family history), early menarche (<12 years), late menopause (>55 years), age at first pregnancy over 30 years, infertility and not having children, use of contraceptives, hormonal treatment after menopause, and no history of breast feeding. Among modifiable lifestyle factors, dietary choices and being overweight or obese are associated with different risks of BC incidence and recurrence ;In particular, weight problems is related to poorer average survival and multiplied mortality in post-menopausal BC women . According to (1) Preserving a healthful frame weight. (2) Being bodily active. (3) Following a healthy lifestyle. (4) Prescribing the consumption of fats (in particular, saturated fatty acids) can also additionally enhance average survival after BC diagnosis. In addition, way of life adjustments consisting of weight loss plan and workout can lessen the long-time period aspect outcomes of remedy protocols and sell long-time period average fitness with the aid of using lowering BC co-morbidities (e.g. weight problems, hypertension, hyperlipidemia, and diabetes mellitus). Indeed a ability new function for vitamins as armamentarium of the current oncologic healing procedures is emerging. Thus, the purpose of this evaluate is to offer a top level view of cutting-edge proof on the connection among dietary elements and BC. In detail, we can spotlight the impact of unique foodstuffs at the danger of BC prevalence and recurrence. We may even summarize current findings at the impact of weight loss plan all through therapy, in an effort to benefit higher information of the significance of dietary intervention for most cancers affected person management.

II. PROPOSED WORK
Dietary Factors in Breast Cancer Incidence and Recurrence

(Table 1)

Sufficient /convincing evidence	Insufficient /weak evidence	No conclusion evidence
Increase Risk	Increased risk	
Alcohol consumption	Total dietary fat	Meat
Body fatness(post menopausal)	Greater birth weight (premenopausal)	Fish

Adult height(post menopausal)	Tobacco smoking	Folate
Any use of oral contraceptive pills(OCP) Hormone replacement therapy		
Age at first child birth		Calcium, selenium
Decreased risk	Decreased risk	Glycemic index, soya based foods
Lactation	Fruits and vegetables	Total energy intake
Body fatness(pre-menopausal)	Physical activity	Milk and dairy product

2.1 Fruits and Vegetables

Women who ate more amounts of fruits and vegetables every day may have a lower risk of breast cancer especially of aggressive tumors than those who eat fewer fruits and veggies. In fact, an article published in the American Society of Clinical Oncology 2015 Education Book estimated that changes to eating and exercise habits could prevent 25 to 30 percent of cases of breast cancer.

Veggies like broccoli, cauliflower, kale, and cabbage are high in vitamin A and vitamin C. These are antioxidants that help offset the toxins and carcinogens that can trigger breast cancer and try to get your antioxidants from food instead of supplements.

Healthy diet in general -

• A variety of fruits and vegetables including salad.

• Foods rich in fiber, whole grain, beans.

• Food rich in vitamin D and other vitamins.

• Dark and green leafy vegetables like kale, spinach, fenugreek, dill leaves, etc.

• Fruits like blueberries, blackberries, raspberries, strawberries are rich in antioxidants and anti-inflammatory compounds that could aid in breast cancer prevention.

• An Apple a day keeps doctors away.

• For breast cancer prevention we add carrots, cantaloupe and sweet potatoes.

• Pomegranate helps to fight cancers growth especially estrogen-dependent cancers.

• Citrus fruits contain vitamin C, beta-carotene,folate,beta-cryptoxanthin,and antioxidants like quercetin, naringenin, hesperetin, these provide antioxidants, anticancer and anti-inflammatory effect. Citrus fruits like lemon, limes, grapes, orange, tangerines.

• Garlic, onions, leeks are all alliums vegetables that boost an array of nutrients like flavoxidents; vitamin C.These may have powerful anti-cancer properties.

2.2 Red Meat

Number of Women who absorb the most red meat in too early adulthood that had a peak risk of growing breast cancer later in life. Red meat consumption may enlarge the risk of breast cancer. Restrict intake of red meat and use as a replacement of combination poultry fish, nuts as a protein source for red meat during early stage good for prevention of breast cancer.

Although there is no conclusive evidence, common recommendations are to not completely avoid eating meat (because it is a source of nutrients, like proteins, iron, zinc, and vitamin B12), but instead, to limit consumption of red meat to no more than about three portions per week.

We don't say that red meat was the only reason, but analysis took into account it is one of them. Women don't become to vegetarian and don't eat the red meat but only decrease the amount of consumption. we said that adapt healthy lifestyle don't take alcohol, don't smoke, don't consume tobacco products., don't use processed foods,etc. "Reduction of less intake of red meat in the diet not only prevent the risk isf breast cancer ,become less risk factor of other diseases like coronary heart disease ,stroke, diabetes, other types of cancer" Farvid said.

2.3 Alcohol

Alcohol intake is the variable that is maximum continuously related to BC onset and average mortality. Drinking alcoholic products like beer, wine, liquor increase a women's risk of hormone-receptor-positive breast

cancer. Alcohol can increase the level of estrogen and other hormones; it also increases the risk of breast cancer by damaging DNA in cells. Women who have three alcoholic drinks per week have major risk of breast cancer. Girls aged 9 to 15 who have 3 to 5 drinks per week have three times the risk of developing benign breast lumps.

Low folate level may have a link between increased risks of breast cancer. Alcohol may reduce how well the body absorbs certain nutrients, including folate. Folate is an important vitamin for keeping cells healthy. Heavy drinkers have low absorption of nutrients and low folate levels. Such as substances in tobacco smoke. It also increased how easily these chemicals enter cells in the lining of the upper section of the digestive tract, consuming alcohol can increase calorie intake, which may be factor in developing obesity. This may increase breast cancer risk.

Alcohol can slow down how well the body is able to rid of harmful chemicals,

Ethanol has additionally been proven to boom estrogen concentrations via numerous mechanisms: (I) Increase of aromatase activity. (II) Inhibition of enzymes concerned in estrogen degradation. (III) Decrease of melatonin secretion, which inhibits estrogen production.

(IV) Increase in a hepatic oxidative strain that ends in inhibition of steroid metabolism. As a result, estrogens may also exert their carcinogenic impact on breast tissue. Heavy alcohol purchasers typically display insufficient consumption of many critical nutrients, together with folate, that is important for DNA synthesis and repair, as a consequence keeping genomic stability. Alcohol is a famous folate antagonist, as a consequence lowering the bioavailability of the latter.

2.4 Good fat, soya, Dairy product
Fatty foods can lead to obesity and people with obesity have the risk of developing cancer, including breast cancer.

Some dietary fat is necessary for the body to work properly, but it is important to consume the right type. polyunsaturated and monounsaturated fats can be beneficial in moderation they are in olive oil,avocados,seeds,nuts,cold-water fish, such as salmon and herring, contain a healthful polysaturated fat called Omega -3.

Soya is a healthful food source that may help reduce the risk of breast cancer .it is a plant based product that is rich in protein, vitamins and minerals.

Soya is present in foods such as tofu, soya milk, and soya nuts.

Dairy products decrease the risk of breast cancer, it includes milk and its products like curd, paneer etc.

Dairy product contains protein and vitamins that are good for health.

2.5 Fast food, fried foods, added sugar, refined carbs
- Eating fast foods regularly is associated with many downsides, including an increased risk of heart disease, obesity, breast cancer, diabetes, risk of breast cancer.

- Number of research shows that a diet high in fried foods may significantly increase the risk of breast cancer.

- Refined sugar in the diet may increase the risk of breast cancer by increasing inflammation and the expression of certain enzymes related to cancer growth and spread.

- Diet very high in refined carbs, typical western diet, like white bread, sugary baked goods, cakes, buns, biscuits; butter with bread may increase breast cancer risk.

III . CONCLUSION
In this paper we are summaries different factors which causes and how to avoid Breast cancer. Breast cancer just reading those words can make many women worry and its natural.

Treatment keeps getting better and we were aware of how to prevent it.

- Keep weight in check.

- Be physically active.

- Eat fruits and vegetables and avoid too much alcohol.

- Don't smoke.

- Breastfeed, if possible.

- Avoid birth control pills, after age 35.

- Don't forget regular checking.

- Avoid too much eating fast food, refined sugar, and processed foods.

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A Multi-Modal Fusion Data Analysis for Ear and Face Identification Technique Using Digital Image Processing

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ABSTRACT
Biometrics is a discipline of identifying a singular based on the person behavioral or physiological structures. Inclusion of multiple sources of data for establishing identity can beat some of the boundaries of unimodal systems. The biometric systems permit the fusion of two or more categories of biometric treats. Based on matching, decision about recognition was made. The fusing of information of biometric characters can take place in any of the levels. In this paper many fusion systems are available for multimodal biometrics such as sensor level, feature level, score level, rank level and decision level fusion. In this paper primarily key objective is to elaborate fusion techniques. The fusion techniques are feature level, match score level, rank level & decision level fusions were observed.

This paper compromises six sections these are namely introduction, literature review, objective, future scope, followed by conclusion and references.

Keywords: Ear, face, Recognition, vérification, validation and fusion.

1. INTRODUCTION

More than one biometric collective to research high performance multi-biometrics recognition system. Multi-biometrics has addressed some issues associated with unimodal this make its some benefits over unimodal biometrics like recognition accuracy, privacy and biometric data enrollment. Multi-biometrics systems have two basic categories: synchronous and asynchro- nous. In synchronous, two or more biometrics combined within one authorization process. The elementary task of biometrics is that identification the article and the way natural object, behav- ioral emotion is verified using the varied techniques & algorithms. Multimodal biometrics re- duces the limitation of unimodal system by using multiple instances of same biometric or fusing two or more biometric. A multi-biometrics system is one within which multiple categories of information are collected and used for various purposes like fusion and plenty of more other purposes. Multimodal biometrics hooked in to the combo of two separate face and ear biometric modalities offer differently to cater to non-obtrusive biometric validation. To choose face and ear for a multimodal biometric recognition, there are many inspirations. Using traditional cam- eras, ear and face data are often collected during image acquisition. The biometric modals face and ear are in close physical proximity, during image acquisition, the information will be cap- tured using conventional cameras.

2. LITERATURE REVIEW

In this literature review we elaborate the fusion techniques which are able to use in future devel- oping systems. In this paper trying to explain views of various authors which are faced and exe- cute some algorithm and techniques. So this paper is useful to the researcher to use their research in biometrics area. Here some systems which are taken in this paper really well and we can use in future.

Author (Year)	Technique	Database	Biometrics	Results in percent- ages
Ms. Gayatri U. Bokae, Dr. Rajendra, D.Kanphade (2019') [1]	Feature Interleaving Technique	Own database	Face, Palm print and Ear	Acceptance Rate for face images is found to be 91.66%.For palm print GAR is found to be 81.66% whereas for ear images was found to be 88.33%.
Steven Cadavid, Mohammad H. Mahoor, Mohamed Abdel-Mottaleb(10') [2]	Gabor filters (Gaussian modulated complex exponentials), transform based tech-	West Virginia University, where in each clip the cam-era moves in a circular mo- tion	Face and Ear	rank-one iden- tification for the 2D face recognition 81.67%, 3D ear recog- nition 95%, and the fusion are 100%, As the figure shows, by fusing the face and ear bio- metric, the performance of the system is in-

	niques.	around the subject's face.		creased to 100%.
Dogucan Ya- man, Fevziye Irem, Eyiokur, Hazım Kemal Ekene (2019') [3]	CNN Models and Loss Functions	Multi-PI E face dataset, FERET, UNDF UND-J2 Database	Face and Ear	100% accuracy on the UNDF dataset and 99.79% accuracy on the UNDF-J2 dataset For age classification, they have obtained 67.59% accuracy, with spatial fusion, that is around 9% better than present-ed
Yogesh Kumar, Aditya Nigam , Kamlesh Tiwari , Phalguni Gup- ta (14')[4]	ROI for ex- traction, Viola Jones algo- rithm, for face SURF based feature match- ing of palm- print and knuckleprint.	Taken own generated database by camera	Ear, Face, palmprint and knuckleprint	Ear + Face + RK (CRR 99.807) (ERR 0.77444), Ear + Face + LK + RK (CRR 100)(ERR 0.17251)
Sumegh Tha- rewal, Hanu- mant Gite, K. V. Kale(17')[5]	PCA, Eigen faces, Ada Boost based detector	Own database 57.5 x 45 VGA depth map (640 x	3D Ear and 3D Face	99.89% on the UND profile
		480) USB 2.0 Color SENSE 3D SCANNER PROPERTIE S Scan Vol- ume (Width x Height x Depth)		
Milos Oravec (14')[6]	1) Holistic methods (full region of face is processed) 2)Local meth- ods (local face features are used for recognition), (2DGabor filters).	Own Database	Face and Iris	Result is pending not completed et.
Puja S Prasad , Prof G N Puro- hit , Dr.Sourabh Mukherjee(17') [7]	Levels of Fusion, Score level fusion 2.Decision level fusion 3.Rank level fusion, True Accept Rate (TAR) while minimizing the False	Only ex- plained bio- metrics fusion techniques	Fusion Tech- niques	In this paper the author have discussed the various levels of fusion that are used in fusing information in multi- biometric systems.

	Accept Rate (FAR):			
Arindam Mon- dal , Amanpreet Kaur (16') [8]	Feature Level Fusion, Deci- sion Level Fusion, Image Reception From Sen- sor	UPOL iris , AMI Ear , Face Data, University Of Essex, UK	Face, Ear and Iris	The OR adaptive fea- ture fusion offered the most accurate results, according to the find- ings.
Ahmad Zarkasi, Siti Nurmaini, Deris Stiawan, Firdaus*(18')[9]	Face recogni- tion, template matching, movement face detection	Own Database	Face	
Subhash V.Thul1, Anu- rag Rishishwar, Neetesh Raghuwanshi (16') [10]	Log-Gabor filter method premapping fusion (before the matching phase) and	Sample data- base are used for the pur- pose of exam- ples	Fingerprint and Iris	Fusion can be applied to enhance the perfor- mance of system and security level, after working on some tech- niques he decided that
	postmapping fusion (after the matching phase).			the Log-Gabor filter is effective method.
Advances in Multi Modal Biometric Sys- tems: A Brief Review(17') [11]	Facial region Biometric modalities, Behavioral Biometric modalities, Soft Bio- metric Modal- ities are ex- plained	No any data- base used because of he only reviewed biometrics systems.		The current market trend portrays the popu- larity of biometrics. Therefore, the increas- ing trend of interest from government and private stakeholders depicts a promising future in the field of biometrics.
Bing Huang,Feng Yang , Mengxiao Yin,Xiaoying Mo and Cheng Zhong(20') [12]	spatial domain ,the principal component analysis method, IHS Domain, Pulse-Coupled Neural Net- work (PCNN)	MRI and PET source imag- es, respective- ly. Medical image pairs are obtained from http:// www.med.har vard.edu/aanli b/home.html. Atlas data- base (http://www. med.harvard.e du/aanlib/hom e.html	MRI and PET	In this paper author explained PCA method Authors favor the re- search of MRI/CT fu- sion methods
Dr.M.Gopila, Dr.D.Prasad (20') [13]	SIFT feature Extraction, Haar classifi- er, eigenface method	IIT Delhi Ear Database taken from groups where ages are be- tween 14 and 58 years.	Face	Accuracy =(TP+TN)/ Total = 0.87 = 87% Precision = TP / (TP+FP) = 0.89 = 89%

Yuqian Zhou, Ding Liu, Thomas Huang(18')[14]	R-CNN, Haar Cascade and HoG, tradi- tional and deep learning methods	benchmark FDDB	Face	In thie paper author explained Haar-like Adaboost cascade and HoG-SVM as tradition- al methods, and faster R-CNN and S3FD as deep learning methods on low-quality images.
Kirti Dang, Shanu Shar- ma(17') [15]	Compari- son of Viola Jones Face det	Own database created in authors lab	Face	The selected algorithm produced a different result Precision=
	ection algo- rithm, Neu- ral Network Based Face D etection, Sup- portVector machines, and Gabor filters.	using camera		0.01392850 Recall=.00 835708
Poornima Bya- hatti, Sanjeev- kumar M. Hat- ture(17') [16]	Different fusion ap- proaches are studied in literature. Like Match- ing score level fusion, Rank level fusion, Decision level fusion Vari- ous fusion model how			The author has ex- plained various fusion levels with different modalities. Various fusion technique's limitations and ad- vantages are understood by literature survey
Divyakant T. Meva , C. K. Kumbharana, PhD.(13')[18]	In this paper author deals with the com- parative study of different techniques which per- forms fusion of information after match- ing.	He is ex- plained fusion levels before matching and after matching score levels such as score level, feature level, rank level.	Face, Voice	Rank level fusion is better than all approach, as it provides rank to different matches and also researchers can assign weights to some classifiers. The re- searcher has concluded that for better results, one should prefer either rank level or score level fusion.
Yan-Ying Li 1 , Yi- Ping Hung (19') [19]	Facial Feature Extraction, long short- term memory (LSTM) Net- work Archi- tecture, Fea- ture vectors		Face and Body	MSE (mean Square Error) 0.0439 0.7547
Ke Meng, Zengxi Huang* , Xiaoming Wang, Kun Wang (18') [19]	Multimod- al fusion methods, like likelihood ra-	Two virtual m ultimod- al databases, name- ly multimodal	face and ear	100%

	tio (LLR), sup port vector ma- chine (SVM)	databases II and I (MD II and I), USTB III ear database		
		I), USTB III ear database		
Shradha D.Jamdar, Prof. Yogesh Golhar (17') [20]	PCA and histogram algrothium, feature extrac- tion, viola Jones face detect SVM classification used.	The author used his own created data- base images taken by the camera	Face, Iris and Ear.	Achieved significant improvement in the verification perfor- mance

3. OBJECTIVES

Now a day's biometrics is very powerful techniques for the security purpose. In research area researchers had done the research on the biometrics or an in security issues. For ex. Face Recognition, Thumb impression, Iris, Retina etc.

Our aim is that to solve these types of problems such as ATM security, class attendance, and forensic lab for evidence, bank security, and military area for security purpose. Ear biometrics is convenient because their acquisition tends to be perceived as less invasive. It is accurate and allows for high enrolment and verification rates. It does not require an expert to interpret the comparison result.

4. FUTURE SCOPE

In future work using the biometrics ear and face recognition techniques, our aim is imple- ment human identification technique using Multi-biometrics system using image processing tool we are ready to work on image enhancement, filtering and have extraction, edge detection, segmentation, and classification. Various edge detection methods give best results for the ear images which are appropriate properly captured and has proper light. During this reviews techniques, method gives poor results for the ear images and face images which don't seem to be captured properly or has high intensity this easy method we will obtain outer shape of ear and face.

5. CONCLUSION

In this study, we describe various strategies for ear and face recognition and conclude that these techniques, which include preprocessing, edge detection, face detection, feature extrac- tion, and classification techniques, can be used to investigate this sort of research. The reasons for future work now include identifying the person using alternative and novel ways. Based on the findings, we can deduce that each person's ear and facial form and structure is unique. This ear image's uniqueness attribute can be used in biometrics. Ear and face recognition algorithms let the biometrics system identify the person.

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Brain Tumor Segmentation Methods: Survey

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ABSTRACT

Visualized the structure of human body physician prefer the MRI (Magnetic Resonance Imaging) images. Hence segmentation is required; to detect boundaries of the abnormal regions in MRI images. The main objective of the segmentation method is to obtained accurate results and required less complexity. The segmentation is the process to find disjoint sets depend on the similarities and dissimilarities in the tissues. Tissues like white matter, gray matter and cerebrospinal fluid are split from normal tissues. The process of segmenting the tumor is the challenging task for the detection of tumor based its shape, size, intensity of pixels and location of tumor in the human brain. Now a day's medical advancement in the technology tumor segmentation remains more tedious and complex task to doctors. The Magnetic Resonance imaging is the most commonly used techniques for the radiologist to detect the internal activities of the human body to diagnose any types of the diseases, but manual detection of the tumor is required more time. So we discussed some techniques for tumor segmentation using MRI images. Here we have focused on few techniques with constraints, methods, advantages, disadvantages and challenges. We have more elaborate on active contour detection methods and its challenges.

Keywords— Segmentation; Region of interest; clustering; active contour method

I. INTRODUCTION

The tumor may cause the death of human; basically two different types of brain tumor: the first one is primary tumor and second is secondary tumor. Primary tumor does not cause the death of the human but the secondary tumor may cause the death of human. Secondary tumor affect on life of human and its spreads faster in the different part of the body. So at the early stage, detection of tumor is very significant role in the human life. The growth of primary tumor is slow and less harmful. But contradictory of the secondary tumor growth is faster and harmful to human. As per the American In the year of 2015, brain tumor association estimated that, approximately 78,000 new cases of benign tumor are diagnosed. Out of 78000 detected tumors; 25,000 are primary malignant and 53,000 are nonmalignant brain tumor. The lack of technical development of the brain tumor among the people and people get died every year due to brain tumor and Its found by NBTF (National Brain Tumor Foundation [1].The World Health Organization (WHO) has issued four grading policy for brain tumor [2]. First two that is Grade-I and Grade-II are under primary tumors and Grade-III & Grade-IV are categorized under secondary tumors. The survey has been done the range of the year from 2016 to 2020. Here we discussed the different methods, advantages and future challenges. This article will help the researchers those who are working in the field of medical image processing to design automatic segmentation of the brain tumor.

1. RELATED METHODS

Magnetic Resonance Imaging is used to detect tumor for diagnosis and proper treatment in the clinic by the doctors. MRI helps the doctors to easily identify where the tumor is located, what is the size of tumor, how much area affected by abnormal cells in the body. Based on these parameters doctor diagnosed the proper treatment to the patients. So we discussed some existing techniques, algorithm, advantages and disadvantages of following methods.

A. Background

The process to obtained Magnetic resonance imaging (MRI) image is to emit the radio frequency pulse at the given resonant frequency. Then the resonant frequency used with the hydrogen atoms in the water molecules. The antennas are used to sends radio frequency pulse to the area of human body and to produced MRI image. The obtained MRI images are classified into four different types: 1) T1-weighted MRI with relaxation (spin lattice), 2) T2 weighted MRI relaxation (transverse) ,3) proton density (PD) and 4) FLAIR (fluid attenuated inversion recovery). T1 MRI image is used to distinct healthy tissues of the brain.T2 is used to get accurate outline of the edema regions to obtained brightness on the image   . In proton density (PD) is used to produced the tumor border with accurate tumor for active cell regions of the tumor tissues. FLAIR is used to distinguish

edema regions with cerebrospinal fluid (CSF). Few of the MRI image types are shown in figure 1. In the survey magnetic imaging techniques used such as computed tomography (CT), Single-photon emission computed tomography (SPECT), Positron Emission Tomography (PET), Magnetic Resonance spectrograph (MRS) and Magnetic Resonance Imaging(MRI) all these techniques gives valuable information along with features of the image such as shape, size, intensity to diagnosis the tumor[4].
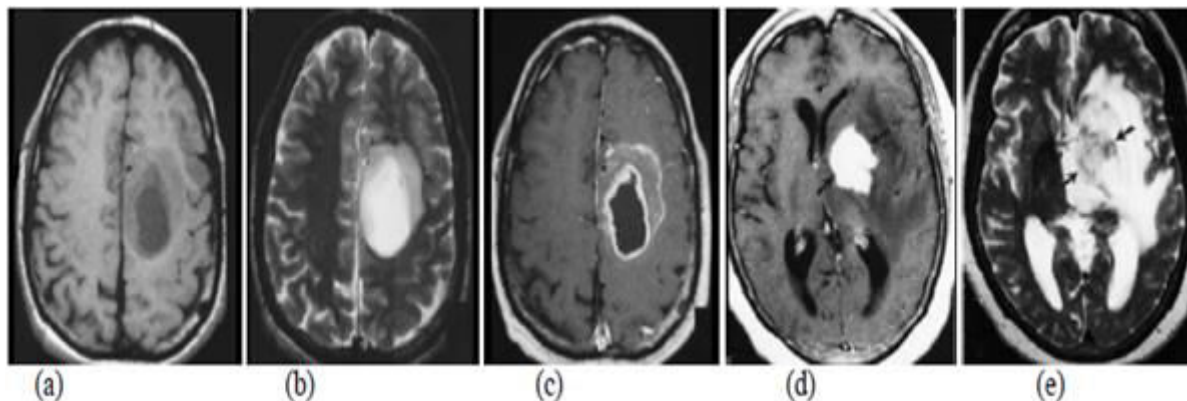
Figure 1. shows that the collection of brain tumor images with output results [7] : a) first figure : Axial T1-weighted with detected tumor, b) second figure : T2-weighted for central positioning tumor results, c) Third figure shows: Contrast enhanced T1-weighted image with ring type tumor, d) fourth image: Contrast enhanced T1- weighted image result with high grade(grade-III & IV) glioma e) Fifth image:T2-weighted image with high grade from the same patient.[3]

B. Thresholding Method

The thresholding method is the most famous method of segmentation which compares image elements i. e. pixel intensity with one or more than one intensity thresholds. There are two types of thresolding techniques: 1) local thresolding and 2) global thresolding [3]. The global thresholding method is based upon the single threshold value through the entire image because intensity level of such images is same. Global thresholding method can apply if the intensity of the image is same throughout image and high opposition between the fore ground and background regions. If we increase the number of region in the image then we apply local thresholding method for better results [4]. To the preprocessing and enlargement of the images, the global thresholding is used binary image. After the first step then brain tumor are segmented using morphological operations. With this two problems are possible over-segmentation and under-segmented. Some part of the image may visible as black and white in global segmentation.

C. Edge-Based Method

Detection of the edges based on the change in the intensity value to performed edge based segmentation. Edge detection is the most common method, sudden changes in the intensity of image. The canny edge detection method first remove the noise to smooth the image, then calculate image gradient. Canny edge having some significance like less error rate, localized edge points at proper place and only one edge point response. Yet few methods are still exists for the edge based segmentation such as canny edge based, sobel prewitt, gradient based edge segmentation. An automatic segmentation is developed by aslam using thresolding method, in this method author was combined sobel operator and gradient based techniques to detect edge of the brain tumor[5].Then tumor regions is extracted from closed contour edge algorithm and objects splits segmentation. The proposed methods results are good and efficient than convolution method [6]. Author was developed K- means fuzzy rule system [6] using automatic thresoldind method. The edge based segmentation is very simplest algorithm and very easy to implement. Sometimes segmentation results produced open contour and it's highly sensitive to the threshold value. Many researcher works is going on, to overcome the drawbacks of the existing methods.

D. Region Growing Method

This region growing algorithm is extracting the feature as regions based on similarity of the pixels. Here first select seed selection from the given image. The selection of the seeds may select manually or automatically. For the segmentation of region in the image is based on the seed feature point. The higher intensity of pixel is available in the brain tumor area. So this area is segmented using region growing method. The property of region growing is very simple and good performance techniques due to this region, these methods become more popular in the medical discipline. It consist of set of initial seed point is the basic criteria to growing the region in incremented forms.[4]. Selected initial seed the added to the next region growing process this procedure is

repeated until the seed cannot be added to the neighboring region[3].In the lina[7], the author is proposed seed region growing to multispectral MRI images using Fuzzy algorithm. To partition of brain tumor MRI images using fuzzy edge and similarity in the regions. In Jaykumari [8] region growing method based on texture is used. The proposed method, local texture information of the neighbored pixel is extracted. To consider intensity threshold and texture threshold are used for region growing to extract the brain tumor in the MRI. The main advantage of the region growing method is to obtained similar pixel. The lacunas of the region growing method is to difficult to select of initial seed pixel and it is very sensitive to the noise [3].

E.   Morphological-Based Method

The feature of the image is extracted from the two morphological operation performed on the MRI image. These operations are used to represent the shape of the image. Basically, there are two different morphological task performed on the image: 1) Dilation operation and 2) Erosion operation. Dilate a size of the image and increase the brightness of the image using dilation operation. Erosion is involved the removal of the pixels at the edge of the pixel. It decreases the size of the image. In sudharania [9], the proposed method is solved the using lower intensity of image to segment tumor. The author is used the following steps to extract tumor form image such as 1) enhancement of the image, 2)re-sampling of the image, 3) color plane extraction, 4) histogram applications and 5) extract tumor regions using advanced morphological operation . In the proposed technique, filter is used to remove noise, the low –frequency pixels and edge pixels using advanced morphological operations. The tumor area, size, shape and other parameters of the tumor are identified and diagnose a tumor effectively.

F.   Fuzzy Clustering

In the Fuzzy clustering, every pixel is assigned the membership function value to its attributes in the existing classes [3].The value range of pixel is 0 and 1for each membership function. This value gives the common and uncommon pixels between the pixel and its centriod of an image. If the pixel value is 1, then we said the pixel is closely near to the center of the clusters. The total grouping of the cluster is done using the membership values of the pixel. The research work done using fuzzy clustering [11]. The main attraction of the neighhood pixels, is based on the location of the cluster and relation to neighboohd pixels, this is achieved using Fuzzy C Means (FCM) methods. Result of the segmentation is obtained using neighbors pixels and their locations. To determine the optimum value of the pixel and degree of the neighborhood is calculated using Genetic algorithm and particle swam algorithm (PSW).The Aina[12] author has proposed a multi-stage system for the clustering segmentation. In this paper authors apply two steps: 1) Brain tumor diagnosis and 2) Tumor region extraction. The tumor diagnosis steps: 1) noise free MRI images are used for an extracting textual features from the MRI image. 2) Tumor region extraction performed using Support Vector Machine (SVM) classification is used to classify a tumor. Tumor region Extraction is proposed the following steps: 1) Skull removal from MRI image 2) brain region extraction using region features and 3)Tumor extraction using Fuzzy clustering method. The demerits of the common fuzzy clustering are to loss some spatial information. In Verma[13], an improved FCM (IFCM) clustering techniques , that include the local spatial information and local gray level information in IFCM.

G.   K-Means Clustering

A K-means clustering technique is very simple and easy technique to cluster the data. Firstly identify the initial cluster k from group of the data. Then, find value of k randomly in whole image and said this is the initial center of the image. The main aims to locate centeriod and find another cluster that are close to them. Calculate mean of all objects in each center and labeled it as new clustered. The same process is repeated until all the objects are converting into a cluster. In Nimeesha and Gowda [15], here author used T1 weighted contrast axial plan MRI images of brain tumor with histogram guided initialization of cluster using K-means and FCM techniques. K-means clustering is better results compared to FCM method. FMC calculated three clustering tissue classes but, K-Means identified all six clustering classes. So K-means best suitable for Brain tumor segmentation

H. Artificial Neural Network

Artificial neural network (ANN) technique is the combination of   input node, intermediate node and hidden nodes. The processing performed using intermediate node by taking features as input from the input node and final output can be viewed in output node [3]. To determine the values of parameters based on training sets. Artificial Neural Networks (ANN) is fully connected neural nets with multi-layer architecture. The exact architecture shown in the figure 2.
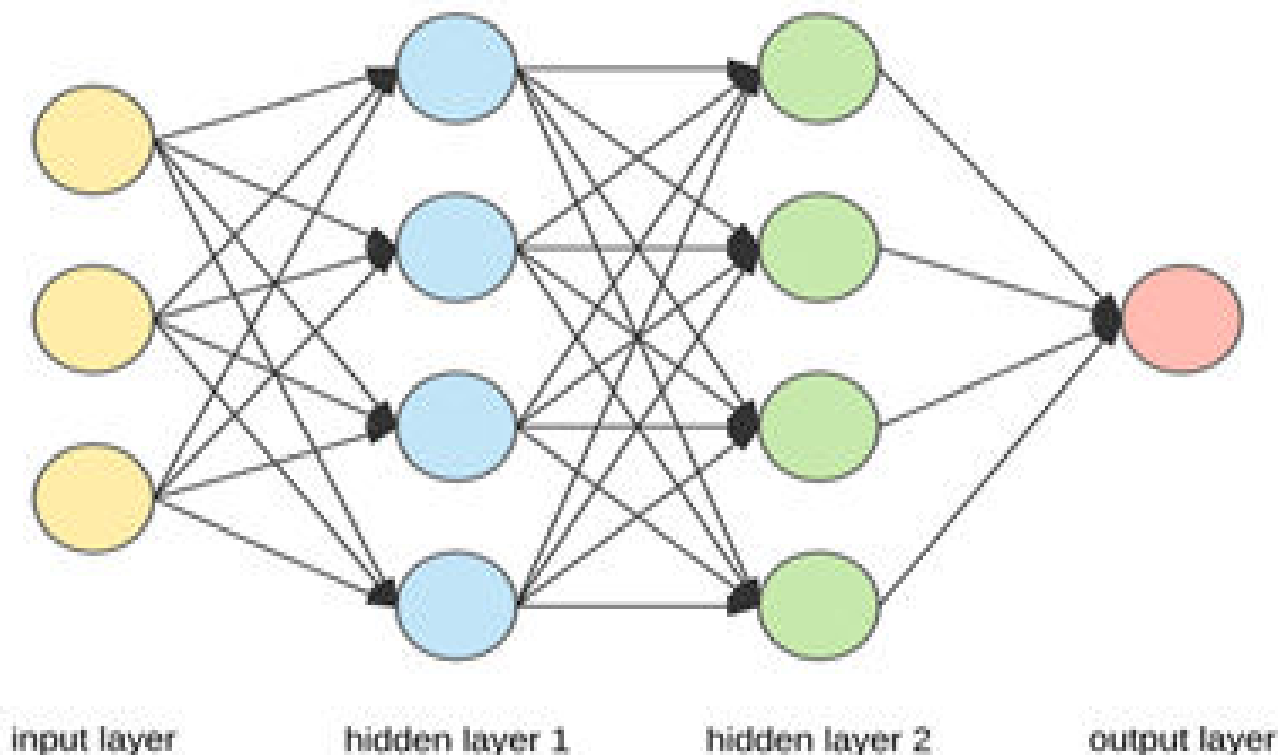
Figure 2. shows the architecture of ANN net

Each node in always connected to every node inter connected in the next layer of the net. To increase the number of hidden layer inside input and output layer to obtained accurate segmentation. A given node takes the addition of weighted sum of the inputs and sends it over the non-linear function to produced output. The obtained output node, which then considered as input for the next layer, same process carried out till the final output layer. Here the information flows from left to right direction. In the deep neural network, calculates the weights assigned to the all edges. The forwarded pass is used to predicted value after completing the whole training [16]. In Havaei et al. [24], for the effective segmentation we have implemented deep neural network. We use local and global conceptual feature are used to segment brain tumor.

I.   Active Countour Method

Computerized brain tumor segmentation in MRI images is a challenging task in the medical discipline. Because the brain tumor have distinct features such as shapes, size, intensity and location of the tumor. The author will proposed computerized brain tumor segmentation using Greedy active contour detection and Fuzzy C means clustering techniques. Here the preprocessing has done using median filter then apply morphological operations on preprocessed image using erosion and dilation. Erosion removes the non-timorous tissue from brain and dilation is used to increase the size of brain tumor. Masks are formed by the thresolding for the reconstruction of the image and then improve the accuracy of segmented region using greedy active contour detection method. Initial contour of the snake selected using mask boundary and further new boundaries obtained using Greedy snake algorithm. The obtained boundaries are more accurate in region where as ramp edges are very less accurate edges. Use Fuzzy C- Means algorithm to optimize an inaccurate boundaries to performed highly accurate resultant output of the segmented brain tumor. The experimental results have been implemented on the T1-weighteed contras enhanced (T1-wce) image database. Use the metric such as dice score, specificity, sensitivity and hausdriff distance calculation [25]. Author proposed the following steps:

i)   Pre-processing using median filter
ii) Snake Contour detection performed based on minimization(morphological operations such as Erosion and dilation) of background and thresholding

iii) Segmentation performed using greedy snake algorithm

iv) Optimization of segmented results using Fuzzy C Means algorithm

v)   Select accurate segmented tumor region
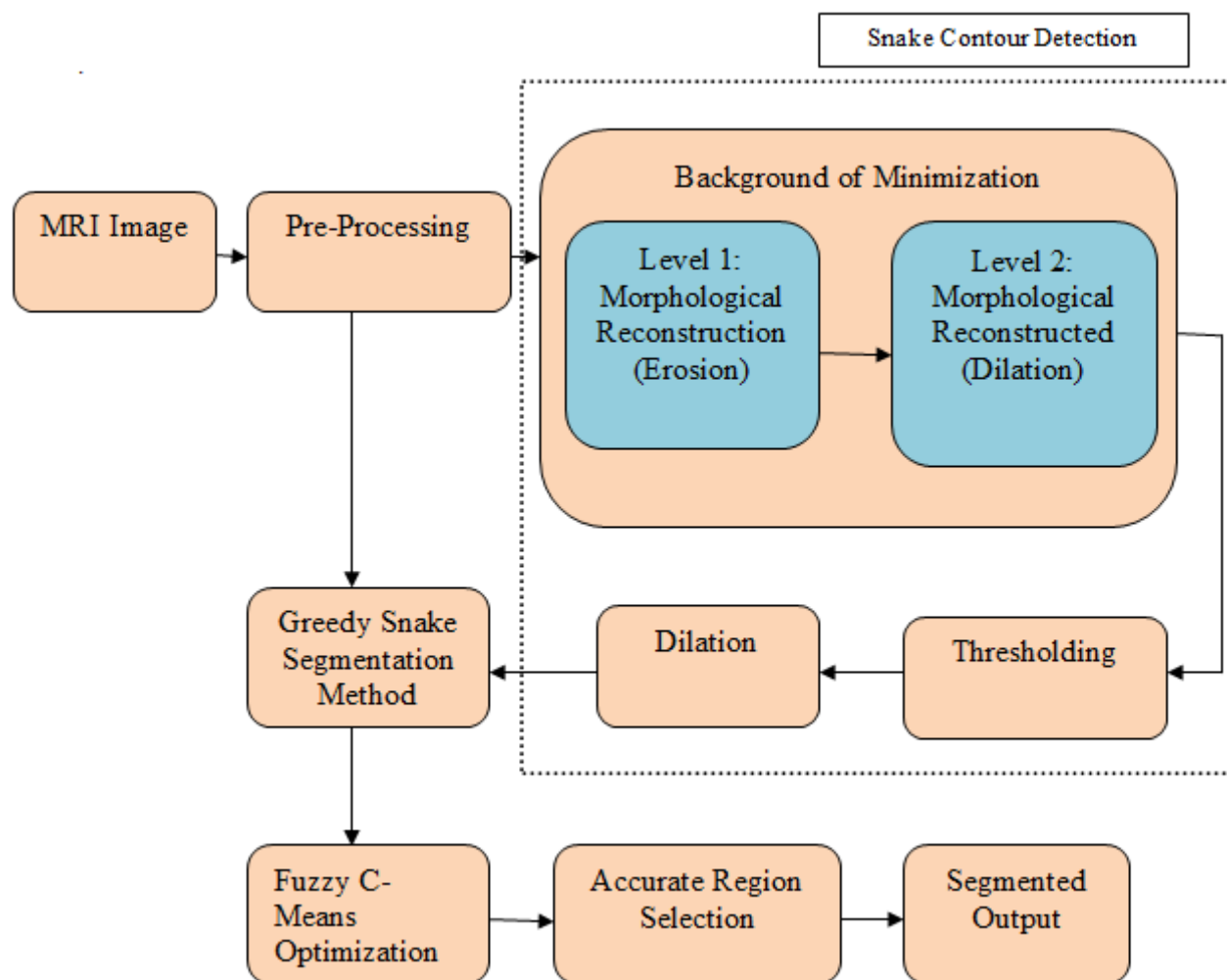
Figure 2 shows proposed work plan[25]

Figure 2. Shows that step wise implantation of active contour segmentation results. Active contour method gives more efficient results compared to K-means, KNN, FCN methods. Accuracy of this method was 85%. The demerit of active contour method is difficult to select initial seed point and it requires more time complexity.

Table 1: Table Styles

Table 1: Comparison table of methods used in literature survey[15,16,17,18,19,20,21,22]

Sr. No.	Name of Author	Year	Method	Advantages
1	Lamia Sallemi, Ines Njeh, & Stephane Lehericy	2015	Region of the tumor have been extracted based matching global pixel with fast distribution and convivial algorithm for glioblastoma modelization.	Less complexity required
2	V. Anitha, S.Murugavalli	2016	Using KNN filting operation performed, feature extraction using DWT, Segmentation using K-Means method and preprocessing using non local mean filters.	Computational time is less i.e. half. Through this real time applications are possible.
3	Fuyong Xing,Yuanpu Xie,Lin Yang	2016	The HySIME algorithm Initial filtering by deep CNN followed by iterative region merging segmentation by selective sparse shape model.	Reduction of computing time, suitable for real time applications.
4	Daniele Ravì, Himar Fabelo,	2017	Following steps: 1) Pre processing performed using calibrated white and dark	Quick computation time. Real time

	Gustavo Marrero Callicò & Guang-Zhong Yang		reference images. 2) To reduce dimensionality using manifold embedding framework by FR-t-SNE to remove noise. 3) Semantic Texton Forest (STF) is used for segmentation.	application makes it suitable for surgical use.
5	Adel Kermi, Khaled Andjouh, Ferhat Zidane	2018	Following steps performed: 1) Preprocessing of image is done to remove noise. 2) Using FBB method, detection of tumor is done automatically. 3) Geodesic level set based 3D deformable model is applied to detect the edge boundaries of tumor, regardless of its shape and size.	The average calculation time of detecting and segmenting tumor, including the skullstripping peration from 3D head MRI, is about 5 min.
6	Munendra Singh, Ashish Verma, Neeraj Sharma	2018	The optimum enrichment of MRI data through MSSR-MOALO based hybridized algorithm.	Clarity of the image is good.
7	Guoqing Wu et al	2018	Following steps performed: 1) CNN is utilized to segment. 2) KSVD is used dictionary training methods. 3) Sparse representation solved using OMP algorithm. To select few crucial features, Sparse representation-based feature selection method is used. The SRC model to combine the multi-model feature information and the internal relationships among the sparse representation coefficients. to optioned new co-efficient of regularization term.	Optimum results. High precision and specificity.
8	Chao Ma, Gongning Luo, Kuanquan Wang	2018	In this paper, feature scheme learning, segmentation is made and it is then formulated as hybrid problem of voxel classification and boundary contour evaluation of tissue. Afterward both models are fused employing ccRFs to create highly Precise soft segmentation mapping.	Good overall result on all major parameters such as accuracy sensitivity etc.
9	Sheela, C.J.J., Suganthi, G	2019	Initially preprocessed MRI image using median filter then reconstruct MRI image using Morphological operation, apply thresolding method, detect contour using snake detection and finally optimized segmented results using Fuzzy C- Means algorithm.	Segmented results are more accurate compared to other methods and accuracy is 85.00%

J.   Future Challenges of MRI

Now a day, the accuracy, robustness, opacity and interpret with human and machine in the computerized segmentation procedure is the most important challenge for clinical acceptance. Next, physical and motion artifacts are very common challenge in MRI images. If lower the signal-to-noise rations, the higher the resolution of the segmentation result of brain tumor. Another challenge of the segmentation of the tumor is due to different shape, size, and location of the brain tumor. The accuracy of the segmentation technique is proved by the validating the results with state of art methods using standard tumor image database.

II.   CONCLUSION

Here we disused different computerized brain tumor segmentation methods using MRI images. Each method elaborates its algorithmic steps, constraints of the algorithm, advantages and disadvantages and the future challenges of each method. Most of the researcher preferred MRI images for brain tumor segmentation because MRI produced soft tissue contrast and noninvasive of MRI. Due to the less of communication between developers and physicians, the percentage of clinical application of computerized brain tumor segmentation is less considerable. Few of the technically sound methods are difficult to apply in real world applications. Hence more user friendly tools should be included in clinic in future. Real time based application is one of the major

factor to choose the brain tumor segmentation methods. Detection of the brain tumor is a very complex and sensitive task. , so selection of appropriate method for real world application is difficult. So any improvised method is always welcome.

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Computer Vision for Leaf Disease Detection: A Review

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ABSTRACT

Computer vision is one of the leading technologies with wide scope of application. Indian agriculture plays important role in social and financial growth of the nation. Over 70% of Indians directly or indirectly engaged with agricultural based industry. Plant crop diseases are measure threat to this industry causing major loss in production. This review paper is to explore several numbers of researchers working on automated detection of mainly plant leaf disease detection using various techniques from traditional method of image processing, using features like texture, color, shape and Machine Learning (ML) to new holistic approach of Deep learning used for leaf disease detection systems. These are discussed concisely with a review for further studies in sector of Automated Agriculture.

Keywords— ML, Deep learning, ANN, CNN

1 INTRODUCTION

Computer vision is one of recent advances in the field of computer science with wide application. Agriculture sector is prime sector that has wide scope for computer vision Leaf diseases are major threats to plant crops and overall production. India being mainly dependent on agriculture sector for its economy. Early disease detection in the field crop can ease the suitable remedy to get rid of disease and save production loss. Computer vision uses different approaches like machine learning (ML), Artificial intelligence (AI), deep learning (DL) and Convolution Neural Network (CNN). In this paper an attempt is made to take a broad review of contribution of researchers in this sector.
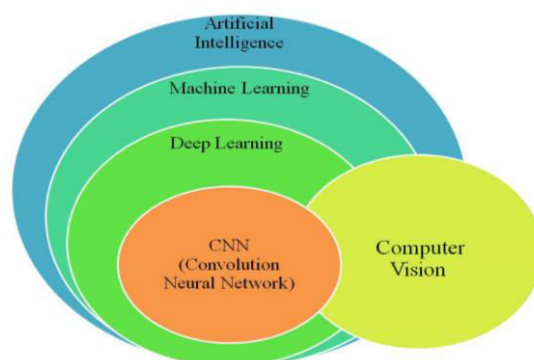
Fig.1 Relationship between Computer vision, Artificial Intelligence, ML, DL and CNN

1.1 Different types of leaf diseases

Leaf is very important part of plant. overall development of plant depends on leaf, if in early stage the leaf disease detection is done then it will be useful for farmer and pathologist to avoid hefty smash up by identifying leaf disease in early stage. Following fig.2 shows different types of diseases.
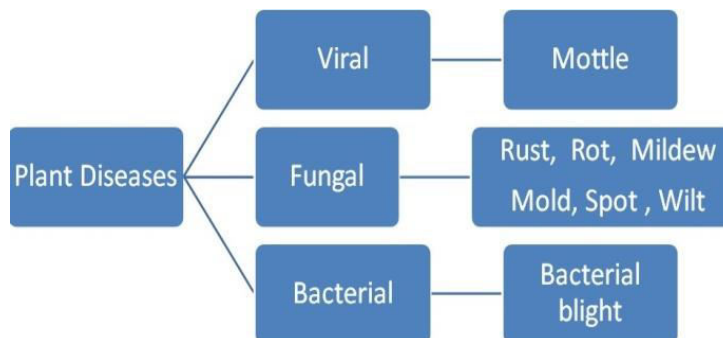
Fig 2.Classification of Leaf Diseases.

These different types of diseases can be recognized by using image processing. Mainly leaf disease classification done according to size, color and shape of leaves.

1.1.1 Viral Diseases

The virus particles are so minute that only an electron microscope can see them. Viruses are obligatory parasite, which means they can only develop and proliferate if they have a living host. Plant viruses require a wound for their initial entry into a plant cell since the membrane is surrounded by a hard cell wall. The organism that causes the wound can sometimes also carry and transmit the virus. In most cases, viruses spread throughout the plant and cause a systemic infection.

Mosaic formation, leaf rolling and curling, spotted leaf, yellowing and vein clearing, dwarfing and stunted growth are some of the symptoms of plant virus diseases

1.1.2 Fungal Diseases

A fungus is a type of eukaryote that digests food from the outside and absorbs nutrients via its cell walls. Fungi are heterotrophic, meaning they get their carbon and energy from other organisms, just like animals. Parasitic fungus obtains their nutrition from living hosts (plants or animals), while saprophytic fungi get their nutrients from dead plants or animals.

Parasitic fungi cause different diseases to plants like rust, smut, early blight late blight, white spots etc

1.1.3 Bacterial Diseases

Bacteria are single-celled microorganisms that are typically 1-2 micro meters in size. Bacteria found on plants can either be beneficial or dangerous. Microbes (called epiphytes) exist on all plant surfaces, and some microbes reside inside the plants (called endophytes). A vast population of bacteria can be seen as aggregates in liquids, biofilms in plants, viscous suspensions that clog plant channels. Bacteria, as plant pathogens, can cause a variety of serious, economically destructive diseases, including wild, spots and blight. [1]

2 LITERATURE REVIEW

2.1 Detection of disease by Machine Learning Approaches

Machine learning means we are training the machine to do some task (image processing) by providing set of trained data [2-6].

Vijay Singh et al. (2017) [7] proposed a genetic algorithm for extricating the highlights like Shape, size and surface of each wheat leaf image. These images of unhealthy wheat leaf would be caught with various shape and size. All the wheat leaf tests were taken as the RGB images.

Award Hollaway (2014) [8] utilized a procedure of histogram evening out to upgrade the differentiation of the images. It gives clear image to natural eyes. It is utilized to accomplish better quality images in dark scale which is utilized in different clinical applications, natural applications, for example, computerized X-beams, wheat leaf disease, plant disease and so on.

J.D. Pujari et.al (2015) [9] worked on fruit crop with k-mean clustering for segmentation and Artificial Neural Network (ANN) for classification got accuracy 90% they also worked on cereal crop used k-mean clustering & foe edge detection used canny edge detector SVM classifier used and got accuracy of 83%.

Machine Learning Approach
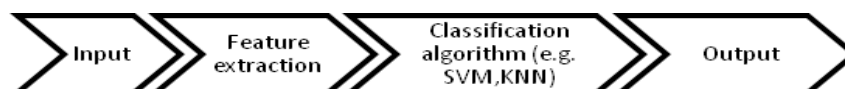
Deep Learning Approach
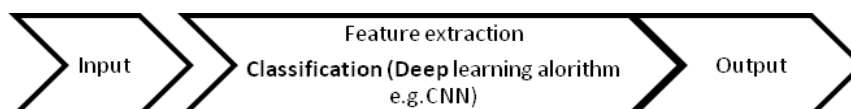
Fig.4 Traditional and deep learning flow for computer vision

2.2 Detection of disease by Deep Learning Approaches

Yang-Yang Zheng et al. (2019) [10] worked on classification and detection of crop for precision agriculture using deep learning classification. They presented classification and detection dataset which consist of large number of image dataset with different number of classes.

Hsieh T.H. and Kiang J.F. (2020) [11] hyper spectral images [HSIs] of agricultural lands were classified by using various versions of Convolution Neural Network (CNN).

Jun Liu and Wang (2021) [12] analysed future trend for identification of plant diseases using deep learning.

Qimei Wang et al. (2021) [13] developed tomato disease detection using object detection and deep convolution neural network. R-CNN with mask and faster these two different methods were used to identify type of tomato disease and to detect infected area of tomato.

Mahmoud A. Alajrami et al. (2020) [14] researchers proposed a system to determine kind of tomato by deep learning (CNN) model with dataset of training and validation got accuracy of 93%.

Karthik R. Menaka R. & Hariharan, M. (2020) [15] It was the first attempt for them to learn custom filters Outcome, there work has important potential for testing COVID-19 X-ray set using CNN.

Agarwal M. et al. (2020) [16] CNN was applied for disease detection and classification of tomato crop proposed models were using VGG16, MobileNet and Inception V3 with accuracy of 91% for 9 classes of diseases.

D. R. Sarvamangala and Raghavendra V. Kulkarni (2020) [17] worked on medical image understanding generally which is done by expert medical professionals. They used CNN for image understanding and observed it is an effect tool for image processing.

Karthik R. et al. (2020) [18] proposed a method for detection of real time tomato disease and pets recognition using GPUs.

Following table summarizes various researches' work on different plant diseases with accuracy.

Table 1. Comparative study of diseases with its accuracy.

First Author , Year	Classification Algorithms	Accuracy	Pros	Cons	Future Direction
Pooja Pawar, 2016 [4]	Artificial Neural Network	80%	Good for more than one crop of different types	Difficult feature selection	To integrate Gabor filter
Mukherjee, 2017[1]	Back propagation Multi layer perceptron Neural Network	80%	Classify medicinal plants Tulsi and Kamlesh based on morphological character.	Task was tougher due to Dithering present at the edges.	To work on other medical plants
Jia Shijie, 2017[19]	VGG 16 + SVM	89%	Regular discovery of tomato pests and disease based on leaf surface	Works only on high quality images only	To work on low quality images
Melike Sardogan, 2018[20]	CNN with Linear Vector Quantization	86%	Worked on four different tomato leaf diseases with training dataset of 500 images	Training consumes much time and requires high end hardware configuration	To improve recognition rate
Robert G. de Luna. 2018[21]	Deep learning	92%	Worked on four different tomato leaf diseases with training dataset of 4923 images	High end hardware configuration	To develop model which requires less time
Azeddine E., 2019[22]	CNN with MobileNets Google Model	90.30%	Worked on ten different tomato leaf diseases with training dataset of 7176 images	Training consumes much time and requires high end hardware configuration	To extend the model for fault diagnosis and improve accuracy

Kumar, Akshay, 2019[23]	CNN with LeNet	91%	Worked on different tomato leaf diseases with training dataset of 14903 images	Training consumes much time and requires high end hardware configuration	To reduce training time
Deepak, Aditi H.2019 [24]	Deep learning CNN with IoT	92%	Worked on three different tomato leaf diseases with training dataset of 200 images	High end Hardware Configuration	To pin point the location of the diseased plant.
Mim, Tahmina Tashrif,2020 [25]	CNN with ReLu	92.33%	Worked on five different tomato leaf diseases with training dataset of 5000 images	Training consumes much time and requires high end hardware configuration	To develop android based application

3   KEY ISSUES AND CHALLENGES

In above table I various image processing techniques are given for leaf disease detection.

Some key issues and challenges are as follow –

To reduce training time

To improve recognition rate

To work on low quality images

To work on large data sets with accuracy

High configuration hardware required.

Along with above issues and challenges there is need for open source software that can be used for image processing. Students who are not capable of purchasing high end configuration system they can also do research from home. Maximum Research was done on image processing using MatLab which is not open source platform. Therefore, there is scope of improvement in the existing further research.

4   CONCLUSION

There is a lot of scope of research in leaf disease detection using Computer Vision and Deep learning. This paper gives an outlook of some of the previous research on Leaf disease detection on different leaves through different algorithm and their results. More focus on Convolutional Neural Network is given because it has breaking results over past decades in various fields such as Image processing using deep learning. It will be helpful for further research.

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DDOS Attacks Detection on the Web and IoT Using Deep Learning Algorithms: A Short Review

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ABSTRACT

With the rise in web usage and access to devices such as the Internet of Things. Hackers are continually attempting to disable web technologies and IoT devices in order to disrupt service. The attacks of Distributed Denial of Service (DDoS) occur at the application layer HTTP protocol when requesting web servers. The IoT is also vulnerable to traffic disruption (DDOS) attacks by botnets, one of the most severe Internet attacks, which can confuse the webserver, slowing it down or totally eliminating it. This study examines DDoS attack detection algorithms in online and IoT devices that have the highest accuracy results when applied to datasets. In addition, the most relevant types of attacks and datasets accessible for deep learning algorithm training and testing were summarized.

Keywords: DDoS attack, Web Server, application layer, IoT, Machine Learning, and deep learning.

1   INTRODUCTION

The distributed denial-of-service attack (DDoS) is disrupting regular traffic on a targeted web server, or network by the flooding of the victim's system with internet requests. The DDoS attacks work well because they use a lot of infected computers as traffic sources for the attacks. Examples of exploited machinery are the Internet of Things and computer devices [1]. DDoS is spread because it is obtained from a variety of sources, such as botnet involvement in order to generate a huge amount of traffic to be delivered to the server. Authors in [2] describe how the botnet attacks on HTTP requests, which makes tracing the botnet architecture defined as command and control. Because the web receives instructions on a regular basis during a web request, a botnet is produced by HTTP protocol, which eliminates the need for a command-and-control server. Web-based botnets are more stealthy because they can blend in with legitimate traffic. This type of attack happens at the network layer; the attacker's flood servers and poorly configured devices inside the network with a massive amount of traffic and requests, to the point where the servers are unable to handle any requests from legitimate users on the web or IoT network. This form of attack compromises the web server's accessibility and the IoT device environment's availability[3].

Attacks in the Q4 of 2021 climbed by 52% over the preceding quarter and by more than 4.5 times over the same period last year, according to SecureList Kaspersky [4]. Increased at online access to commercial websites, educational institutions, and electronic currency speculators has resulted in a rise in cyberattacks. Also, from the IoT side because of the IoT revolution in the information network, which includes smart devices, smart things, data, and information. The development of the Internet of Things is still ongoing, and there are numerous related issues that must be addressed. The Internet of Things has the potential to improve the world's accessibility, availability, scalability, and operability. The protection of the Internet of Things, on the other hand, remains a major challenge and a difficult task in security. Lu, Y., & Da Xu, L.[5] reviewed the main cybersecurity considerations for the IoT in terms of smart device integration, information communication technologies, and the structure and classification of cybersecurity for the Internet of Things. Jaafar, et. al. [6] described the detecting steps for DDoS attacks. They listed some approaches such as clustering, pattern matching, statistical approaches, associations, deviation analysis, and correlation are some of the detecting techniques used in DDoS detection.

This paper discusses recent methods based on machine learning and deep learning for detecting DDoS attacks on the web and Internet of Things, In addition to many suggestions for future research. In this review, the findings of recent studies were summarized and compared for attacks of DDoS using machine and deep learning on specific datasets. The remaining of this paper is structured as follows: In section 2: Literature Review, Section 3: Conclusion with future work.

2   METHODOLOGY

In this section, we present a methodology[7] of this review for detecting a DDoS attack on the web and IoT devices using Deep learning and most recently datasets used. Also questions of research, the search mechanism was as follows:

- Relating the context of DDoS attacks, its types, machine learning deep learning detection.

- Some following keywords are chosen for searching in order to find the required papers articles.

keywords strings were searched about DoS and DDoS attacks reviews, Intrusion survey, Deep Learning models articles applied for DDoS on Web and IoT devices.

Deep learning was used to detect DDoS attacks in surveys, systematic reviews, and journal articles published between 2015 and 2021. As shown in Table 1, many database engines were searched for recent publications, the majority of the articles papers and scurvies for this review were obtained from Elsevier, IEEE, and Springer publications. Furthermore, Table 2 discussed the questions of this review, as well as the reasons why they are followed. These questions can be helpful in identifying the issues DDoS attacks detection by deep learning and directing in the right way for future studies.

Table 1. Database engine search libraries

Index	Site	URL	Search Keywords
1	Hindawi	http://www.hindawi.com	"DDoS attacks" "DoS" "Deep Learning", Year: 2015-2021.
2	Emerald	http://www.emeraldinsight.com	
3	Wiley	http://www.onlinelibrary.wiley.com	"DDoS attacks Survey", Year: 2015-2021.
4	ACM	http://www.acm.org	"DDoS attacks", Year: 2015-2021.
5	Science Direct	http://www.sciencedirect.com	"DDoS attacks Detectio" and "DNN", Year: 2015-2021.
6	IEEE explorer	http://ieeexplore.ieee.com	"DDoS attacks A Systematic review", Year: 2015-2021.
7	Google Scholar	https://scholar.google.com/	"DDoS attacks" "Detection" "Deep Learning", "Datasets CICDDoS2019" Year: 2015-2021.

Table 2. Questions review

Index	Question	Reasons
1	What contributions did deep learning make to detect of the DDoS attack?	http://www.hindawi.com
2	In studies, what kinds of deep learning models and methods are used?	http://www.emeraldinsight.com
3	What kinds of datasets are used and supported for deep learning model training?	http://www.onlinelibrary.wiley.com
4	What factors are taken into account in the evaluation?	http://www.acm.org

3   WEB ARCHITECTURE

An HTTP GET request is sent to a server when an online service request is made. Before obtaining a response from a web server, a client must first establish a TCP connection. The researchers [8] described the HTTP GET request processes. First, monitor the web server for incoming requests, including TCP connections. Second, a socket queue holds the request of HTTP GET until single thread assigned it. Third, each request must be processed and responded to by the request queue. After that, the response of HTTP receives from web server. In flood attack of HTTP GET, the request queue quickly fills up, causing valid requests to be dropped. Figure 1 displays the web server architecture through request of HTTP GET.
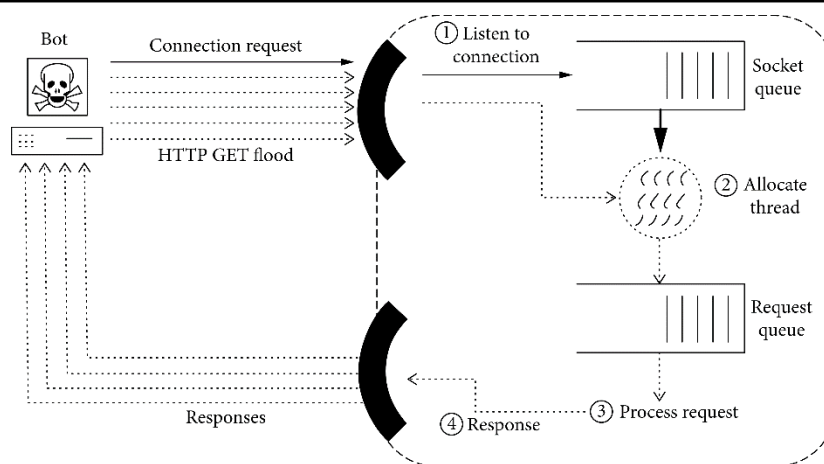
Figure 1: architecture of web server [6]

4 DDOS ATTACK TYPES:

The studies [6], [8] have classified HTTP request attack types into several types:

4.1 Sever Load

Server resources become depleted as the bots continue to distribute requests at a breakneck pace. These queries rapidly deplete the request queue's buffer capacity, resulting in the cancellation of valid requests. On other hand, the attacker utilizes a botnet to aggressively transmit requests of malicious against a web server, leading the server to drop genuine requests as its resources deplete.

4.2 Increasing

This attack begins with a minimal rate; the aggregate request rate gradually increases. This type of attack is hard to detect since malicious requests are not sent to the server once aggressively during the attack.

4.3 Constant

The attacker initially sends a constant number of requests to the victim machine. The process is carried out by bots in a constant and consistent manner that does not change over time.

4.4 Target Web Page

A DDOS attacks can arise on an individual or numerous websites, where the attacker mimics a valid user's access pattern in order to evade detection of the attack. Botnets, which mimic human behaviors, visit the web pages.

4.5 Single Web Pages Attack

Hackers focus their efforts on a single web page as a target, sending malicious HTTP requests to the website in order to prevent access to it.

4.6 Main Page Attack

Hackers target the main page of a website that is linked to from the rest of the pages as a target for sending malicious HTTP requests in an attempt to disable the site's access domain.

4.7 Dominant Page Attack

The server is getting a lot of queries for the same web page that legitimate users are now more interested in. However, it's easy to tell them apart because they use a simple attack strategy.

4.8 Multiple Attack

In this type of attack, bots send repeated attack requests on multiple web pages. The hacker's access pattern mimics the legitimate pattern of humans.

4.9 Web Proxy Attack

A web proxy acts as an intermediary and routes requests and responses rather than the attacker directly contacting the target system.

Detecting bots and people is more difficult when using web proxies that completely conceal the identities of their users.

5   RELATED WORK

Many papers and researchers have proposed various methods and strategies to protect the web and IoT network to avoid risk the attacks. This section will present some of these related methods and how they help to secure the web and IoT systems.

Singh et al.[9] suggested a technique for detecting HTTP DDoS attacks using an approach of machine learning to differentiate authorized users from botnet in detecting offensive traffic and real traffic. Instead of monitoring all traffic, their proposed model was a proxy that inspects the behavior of users and identifies the botnet then examines user behavior to identify malicious requests sent to the webserver.

Sreeram and Vuppala [10] developed a bio-inspired bat algorithm using matrix machine learning that can quickly and accurately detect HTTP DDoS attacks. A detection technique was created using time periods, rather than user sessions, and packet patterns. In order to detect the attacks of DDoS in the application layer, the time interval uses a ML matrix that assigns a max session value once per interval and computes the number of sessions in one-time interval. Two pages of HTTP GET requests are also taken into consideration in the matrix. User behaviors can be tracked by looking at how often they visit a certain web page and how long it takes them to move from one page to the next.

A DDoS attack on an IoT network will result in the denial of most services, which is considered a serious threat. Machine learning techniques can be used to prevent this. For example, Rohan Doshi et al. [11] proposed a machine learning-based model for detecting DDOS attacks in IoT networks by collecting network traffic and applying feature selection to it before classifying it with a pertained neural networks ML model. Their results of classification using K-NN, SVM, DT, RF, and NN were 0.999, 0.991, 0.999, 0.999, and 0.999 respectively. CHA et al. [12] proposed a blockchain design linked with a gateway that ensures the privacy and security of IoT devices. It can protect the user's privacy and confidentiality by preventing unauthorized individuals from accessing personal sensitive data. And, for authentication and securing control of the IoT network. [12] They presented a robust digital signature technique based on bilinear pairing. Chesney S., Roy K., Khorsandroo S. [13] used a machine learning model to investigate the vulnerabilities of IoT devices in the face of cyber-attacks. In order to examine the CICDoS2019 dataset, their model was created using a logistic regression approach, which had a prediction accuracy of 0.997.

Aamir, M., & Zaidi, S. M. A. [14] developed a machine learning-based clustering algorithm to discriminate between network traffic flows that comprise DDoS or both. They use the k-means and clustering methods with Principal Component Analysis (PCA) for feature extraction. After labelling supervised algorithms RF, SVM, and k-NN, they applied them to a subset of benchmark datasets. 96.66 percent, 92 percent, and 95 percent were the outcomes.

Ferrag, Mohamed Amine, et al.[15] suggested a deep learning model for intrusion detection that comprises of three algorithms: CNN, DNN, and RNN. They used the datasets of TON for IoT and CIC-DDoS2019 with binary and multiclass classifications. Their results showed the best accuracy performed by the CNN model for binary traffic detection is 99.95% and is 99.92%. for multiclass traffic detection.

R. Priyadarshini, et. [16] proposed mechanism to defense DDoS at fog cloud environment deployed on SDN Deep Learning-based model. Their results applied on Hogzilla Dataset using LSTM deep learning algorithm were 99.12% for training data sample and 98.88% for testing data sample. M. Shurman, et al. [17] proposed LSTM deep learning model and intrusion detection system to detect DrDoS and Dos attacks in IoT devices. CICDDoS2019 datasets were used with an 80% training rate and 20% testing rate. Their results were for training set are 92.05% accuracy and 91.54% for the testing set in one layer LSTM. For two layers of LSTM, the average is 97.27% for accuracy on the training set and 96.74% for the test set. In the three layers of LSTM, the results were 99.85% accuracy for the training set and 99.19% accuracy for

the test set. A. Agarwal, et, al. [18] applied a feature selection-whale optimization algorithm-deep neural network (FS-WOA–DNN) method to mitigate DDoS attacks. Then pre-processing using a min-max technique before input to the proposed model. The result of accuracy was 95.35% by MATLAB software to detect attacks of DDoS. A. E. Cil, et, al. [19] applied an effectively model based on deep learning which used deep neural network (DNN). the model detected DDoS attack for packets captured on network traffic. the results of accuracy were 94.57% by DNN applied on CICDDoS2019 datasets.

Table 3. Summary of the related studies.

Paper	Method	Accuracy	Dataset
[14]	RF, SVM, and k-NN	96.66 – 92% - 95%	benchmark datasets
[15]	CNN, DNN, and RNN	99.95% for binary and 99.92% for multiclass	CIC-DDoS2019 and TON IoT datasets
[13]	logistic regression	prediction accuracy of 0.997	CICDoS2019 dataset
[11]	K-NN, SVM, DT, Random Forest, and Neural Network (NN)	0.999, 0.991, 0.999, 0.999, and 0.999 respectively	Collecting by authors
[12]	**Digital Signature Scheme with sensors devices and Raspberry PI which linked to JDK java application**	Improve the privacy of users	Blockchain Connected Gateway
[16]	**LSTM**	99.12% for training data sample and 98.88% for testing data sample	on Hogzilla Dataset
[17]	**LSTM 1,2 and 3 layers**	91.54%, 96.74% and 99.19%	CICDDoS2019 datasets
[18]	**FS-WOA–DNN**	95.35	CICIDS2017 dataset
[20]	**RNN-autoencoder**	99%	CICDDoS2019 dataset
[19]	**DNN**	94.57%	CICDDoS2019

6   DDOS DATASET

CICDoS2019, it is the recent datasets for last studies about DDoS intrusion. It contains benign and current DDoS attacks, which closely reflects real-world data (PCAPs). Additionally, CICFlowMeter-V3 reports with tagged flows based on three features: time stamp, source and destination Ips [21].
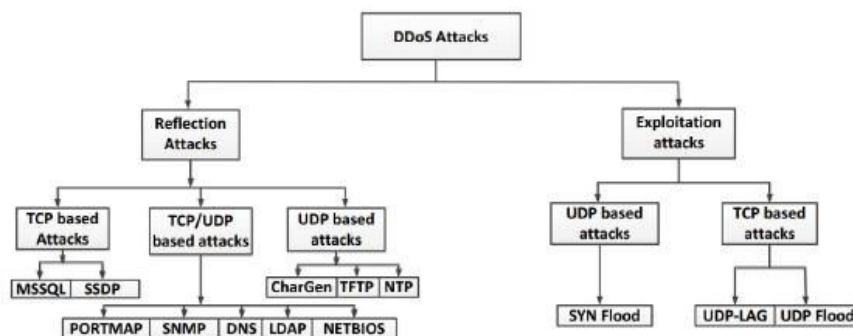
Figure 2. The DDoS attacks in CICDDoS2019 Dataset [7]

The SDN DDoS assault image dataset is made up of network traffic picture instances. The SDN DDoS assault image collection contains 5x5 pixel traffic image instances.[22]

SDN Dataset, the data collection The SDN Dataset contains 23 features, some taken from switches and others calculated. A list of extracted features are IP source and destination IP, source and destination of IP Port, transmit and receive bytes.[23]

NDSec-1 (Botnet), the NDSec-1 dataset contains traces and log files from cyber assaults created at the Network and Data Security section at the Applied Sciences University in Fulda.[24]

NSL-KDD, The NSL-KDD dataset was offered as a way to process the KDD'99 data. Still, researchers can utilize it as a useful benchmark data set to compare various intrusion detection systems.

In the NSL-KDD train and test sets, the number of records is adequate. Running experiments on the complete collection rather than just a tiny portion is possible because of this advantage.[25]

7 DEEP LEARNING TECHNIQUES FOR INTRUSION ATTACKS

- **CNN**

Convolutional Neural Networks (CNN) are a type of artificial neural system that has become popular in the fields of discourse analysis and image recognition. Its weight-sharing network structure makes it more like a natural neural network, reducing the network model's complexity and the number of loads.[26]. A convolutional neural network (CNN) adds more "filtering" layers, the weights and biases for each filter can be learned, too. The filter weights can also be learned.[27] A CNN has a lot of different filters that can be changed to find different things of interest. The authors [28] designed an intelligent detection system capable of detecting various network intrusions using a deep learning model, CNN, and RNN. The researchers [29] employed the CNN to identify Denial-of-Service (DoS) assaults in a hybrid network-based intrusion detection system. In addition to convolutional layers, there are also two dense layers, one SoftMax layer, and two dense layers in this algorithm. It is tested using the Wireshark and Weka tools, and datasets such as the ISCXIDS 2012 and the NSL-KDD are utilized to gather information. In their paper, the authors claim that if they apply the CNN, their system can be more accurate than other machine learning techniques.

- **Long Short-Term Memory (LSTM)**

The LSTM is a type of RNN in which the same network is trained across "time" using a sequence of inputs.[27] The method of dividing the input vector into time sequences and then looping through them to train the network. Get an LSTM network if you replace the single dense layer in RNN with a "LSTM layer." [30] proposed a LSTM bidirectional intrusion detection system to handle User-to-Root (U2R) and Remote-to-Local (R2L) attacks on the NSL-KDD dataset, a performance model was applied.

- **RNN**

The RNN or LSTM in the input vector captures the dependency across time sequences. The same effect can be achieved with DNN, but it would necessitate collecting the input vector over time and then feeding it to a large layer, resulting in a larger set of parameters to train than RNN. In [31] the authors used an RNN deep learning model to detect intrusions in order to detect intrusions. Their results for multiclass and binary classification were examined on the NSL-KDD using j48, naive Bayes, and RF, and they were shown to have good accuracy for detection and classification.

8 CONCLUSION

This paper provides an overview of recent detection approaches for detecting DDoS attacks on the Web and IoT devices. Because of the widespread use of online access with application layer protocols and Internet of Things devices. The DDoS attack exposes a security flaw in cyber security. Using machine learning and deep learning approaches, the results of DOS detection investigations were compared. In addition to outlining the different forms of DOS assaults and datasets used, as well as the available access. In this paper, we offer ways to improve DDoS detection algorithms and feature selection. Using new deep learning algorithms, improve the prevention of an attack before it occurs.

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A Survey on Breast Cancer Detection Using Neural Networks and Thermography

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ABSTRACT

Breast cancer has a significant impact on female mortality rates. Researchers are working hard to develop breast cancer early detection tools. Many technologies have helped to reduce the disease's fatality rate, but early discovery is the most important factor in reducing disease spread, breast amputation, and death. The use of artificial intelligence (AI) in conjunction with thermal images is an excellent approach for detecting early-stage breast cancer and is expected to have high predictability. Thermography, which uses thermal cameras with great resolution and sensitivity, is a potential tool for early detection. In the literature, a variety of artificial neural networks (ANNs) and deep learning models were used to process thermo graphic images of breast cancer, including the Radial Basis Function Network (RBFN), K-Nearest Neighbors (KNN), Probability Neural Network (PNN), Support Vector Machine (SVM) and so on.

KEYWORDS -Breast Cancer, Thermal Images, Artificial Intelligence (AI), Neural Networks.

INTRODUCTION –

Cancer is the second leading cause of mortality among women worldwide. Healthcare providers are still unsure of the actual cause. Cancer cells can travel to other parts of the body once breast cancer has formed, making it life-threatening.

A)HISTORY OF BREAST CANCER –

Breast cancer was identified by Egyptians 3,000 BC [1].When a woman was brought to Hippocrates, she had a bloody discharge from her nipple and died. Hippocrates linked menopause to breast cancer, which he dubbed "hidden cancer" because it did not show up on the surface. Hippocrates, about 450 BC, used mud to detect a patient's hidden diseases by smearing it all over the patient's body, and the spot that dries out first is the disease. In the medical field, it is the most basic form of thermal detection [2]. Breast cancer symptoms are abrasive. Jenny Mahoney was the associate editor in charge of coordinating the evaluation of this manuscript and approving it for publication. In the mouth, a loss of appetite, mental confusion, dry eyes and nostrils, and a loss of odor [3]. Breast cancer is a large swelling with a hard texture and irregular colour that ranges from grey to red, according to a surgeon from the Alexandria School of Medicine in the first century A.D. Breast cancer patients were first radio graphed in Germany in 1913. Surgeon Salmon conducted the research on 3,000 patients [4]. Ultrasound was first utilized as a research technique in 1951 to detect breast tumors and determine whether they were benign or malignant. The other study was published in 1952, and it was successful in identifying 21 cases of breast cancer. In 1954, ultra sonography was tried in the hospital as a diagnostic tool for breast cancer as a result of this research. Improvements to the ultrasound's internal structure were developed in the 1960s. System, as well as advancements in detection procedures, such as immersing breasts in controlled temperature water to detect tumors early. After 1980, the technological revolution influenced developments in tumor identification and blood flow to the tumor. It was created in the late twentieth century to use ultrasound to guide needle biopsy in the breast area [5].

B)TYPES OF BREAST CANCER IMAGING –
MAMMOGRAM -

Since 1960, mammograms have been the gold standard for breast cancer screening. However, numerous factors influence mammography diagnosis, including age, breast tissue density, and family history [6]. Breast cancer can be detected early by mammograms, which reduces mortality by 25%. Patients over the age of 70 are affected by the mammography doses employed in diagnosis, which result in the rupture of weak tissue in the breast. They may potentially cause cancer to develop in these arteries. Because of the density of breast tissue, it is also unable to detect cancer in younger women [7].

COMPUTERIZED TOMOGRAPHY (CT)

As the patient enters a closed machine, computerized tomography takes X-rays of the breast from various angles, and a computer collects the image of the breast. A chemical is injected into the patient's hand vein to improve the contrast of the image [8]. Modern image reconstruction techniques have decreased radiation by 70% and cut the time it takes to acquire photos in half [9]. However, there are certain drawbacks to this

approach, such as the inability of some patients to hold their breath. This is in addition to the patient's danger of radiation and the effects on pregnant women.

MAGNETIC RESONANCE IMAGING (MRI)

MRI stands for Magnetic Resonance Imaging, and it is a medical examination technology that uses radio waves and a magnetic field. A chemical is put into the patient's circulation to clearly display the tumor and calcifications. Before resorting to breast amputation, MRI is frequently used to monitor the response to chemotherapy in breast cancer patients [10]. Furthermore, in order to see the features of the blood arteries in the breast on an MRI, the patient must be injected with gadolinium. The syringe Gadolinium has the least amount of Gadolinium.

HISTOLOGY IMAGING

A microscope is used to create histological images, which allow researchers to examine the microanatomy of cells, tissues, and organs. organs by looking at the relationship between structure and functions well as functionality Breast tissue is dyed to identify malignancy. Eosin with Hematoxylin. The histology of breast cancer is used to make a diagnosis. Images stained with Hematoxylin and Eosin. It is time-consuming, labor-intensive, and frequently results in a disagreement [14].

ULTRASOUND

Ultrasound imaging, which uses sound waves to create an echo, is thought to be safer and more effective than X-rays. In the medical field, ultrasound was first employed in 1940 by France and Germany. Ultrasound can successfully diagnose breast cancer in women with dense tissue, with no side effects and is quick and comfortable [10]. This approach, on the other hand, has the disadvantage of being unable to detect breast cancer at an early stage and having a greater proportion of false-positive results [41].

AUTOMATED DIAGNOSTIC SYSTEMS MOTIVATION

The high percentage of human errors in assessing and identifying breast cancer prompted the development of automated diagnostic tools to detect breast cancer [31]. Furthermore, the automated diagnostic method detects breast cancer at an early stage, when it is too small to be discovered using traditional medical procedures. Early breast tumors diagnosed by automated screening and diagnosis technologies are, in fact, relatively straightforward to heal. Furthermore, new research [36]. It shows that the automated technique is significantly more sensitive than the manual procedure, with the manual procedure achieving a 68 percent sensitivity ratio vs a 100 percent ratio for the automated procedure.

COMPARISON WITH PREVIOUS WORKS

Surveys have been conducted on the use of automated systems in cancer detection, such as computer aided diagnostic systems [34] with precursor attempts in [35], thermography, infrared thermography, and electrical impedance tomography [37], highly diverse early attempts at automated systems [38], standards and protocols to Infrared imaging technology for breast cancer detection [39], CNN based thermal imaging for breast cancer detection [43] and different breast cancer screening technologies [40].

INNOVATION AND CONTRIBUTION

The main contributions of this paper are summarized as Follows : A comprehensive, up-to-date account of Breast Cancer Detection. Thermography is a new approach that uses thermography. Using Artificial Neural Networks and Deep Learning Models   for the extraction and classification of features, as well as the highlights of Thermal camera specifications were used, as well as a database and Images. Techniques for acquisition help to introduced the research difficulties, unresolved questions, and future research topic for Using AI in conjunction with thermal imaging to detect breast cancer early is displayed.

The uniqueness of this survey study is that it highlights the introduction of new open concerns such as the usage of mobile phone technology for Breast Image acquisition by patients. The utilization of off-the-shelf cloud computing, data security as well as the creation of new databases. This is in addition to providing a careful analysis of the majority of the past studies. Their strategy, database, and methodology have all been documented in the literature.

ARTIFICIAL NEURAL NETWORK(ANN)

An artificial neural network (ANN) is a network of tiny computing units known as neurons that seeks to replicate biological neural networks [14]. In many ways, artificial neural networks and biological neural networks are comparable [15]. Biological Neural Networks, on the other hand, work in asynchronous mode, whereas artificial Neural Networks work in parallel mode [16].Alan Turing presented a test to evaluate whether a computer was intelligent in 1950, and AI was born. Artificial Intelligence (AI) is a term the stages of

development that started in 1973 when experiments were conducted failed, and funding for research was halted. In the late 1990s.During the 1980s, a number of AI experiments were carried out using the fifth-generation computer, however it didn't achieve the results that were intended[17].

The outcomes A paradigm shift has occurred in the twenty-first century. Because of the large amount of data available in AI. Jeff was born in the year 2006.Hinton wrote a study report that sparked a debate. Inventiveness, followed by a succession of deep learning studies, it has aided huge corporations such as Google, Face book and Amazon are in the process of acquiring and applying [18].

The Deep Convolutional Neural Network was designed for image processing and consists of two networks: the first to extract features from images and the second to classify those features [19].

THERMAL CAMERA
The Greeks applied wet clay to the diseased area; if a certain spot dries faster than others, it indicates that it has more heat [11]. From the 16th through the 18th centuries, the same idea slowly evolved on the use of certain measurements that indicate the presence of heat. Williams Herschel discovered infrared light in 1800, and infrared imaging was first used in medicine in 1956. As a result, the thermal camera has been utilized to diagnose disease and detect recovery in the recent past [12]. A thermal camera is a device that detects infrared radiation emitted by things that are warmer than absolute zero. Electromagnetic waves are emitted by a body with a temperature higher than absolute zero. Plank's formula demonstrates the link between body surface wavelength, temperature, and radiation.[13] Because infrared radiation has a wavelength range that is not visible to the naked eye, a gadget is necessary to detect it.

PROCEDURE FOR GETTING A DATABASE
The Mastology Research with Infrared Image (DMR) database is used in the majority of IR-thermal image research [21]. There are 287 people in the DMR-IR database, ranging in age from 23 to 120 years old; 186 are healthy and 48 have a malignant breast. Mammography, ultra sonography, and biopsies were used to confirm the diagnosis.

RELATED WORKS
Researchers have previously employed a variety of thermal cameras with various specifications to detect breast cancer in previous experiments. It also demonstrates a variety of picture analysis and classification methods, including Artificial Neural Networks. It varied forms of Artificial Neural Networks, on the other hand, produce different levels of accuracy and sensitivity ratios.

Back propagation Network (BPN) and Recurrent Back propagation Network (RBFN) were utilized by researchers in to detect breast cancer[23]. In comparison to BPN, the RBFN findings suggested speedy training and a high ranking. In detecting breast cancer, RBFN accuracy was 80.95 percent, with 100 percent sensitivity and 70.6 percent specificity.

The researchers in compared photos from two thermal cameras to measure the change in breast temperature, with the first group of 27 patients photographed with the thermal camera Ti40FT and the second group of 23 patients photographed with the thermal camera Varioscan 3021-ST. MRI imaging is used to confirm cancer diagnosis[24].It compared Decision Tree (DT), Fuzzy Sugeno, Nave Bayes Classier, K Nearest Neighbor, Gaussian Mixture Model, and Probabilistic Neural Network classication approaches. For the early identification of breast cancer, just characteristics were retrieved. The results revealed that Decision Tree (DT) and Fuzzy Sugeno produced the best outcomes. A high accuracy of 93.30 percent, a sensitivity of 86.70 percent, and a precision of 100 percent specificity [26].

The Varioscan 3021-ST model was utilized by the researcher in who obtained photos of 40 patients and classified them as follows: Patients without breast cancer make up 26 percent of the population, whereas patients with breast cancer make up 14 percent. The efficiency of textural information possessed by mass areas was evaluated using a total of 20 retrieved features from thermo grams based on Gray Level Co-occurrence Matrices[27].

Using a Support Vector Machine classifier, Naive Bayes classifier, and K-Nearest Neighbor classifier, the capacity of feature set in identifying aberrant from normal tissue is explored. Cross-validation approach and Receiver operating characteristic analysis were used to assess the classification performance. The verification findings reveal that the suggested approach produces the best classification results with a 92.5 percent accuracy when utilizing the K-Nearest Neighbor classifier.

The researchers in employed the Ti20, which belongs to the same family of thermal cameras as the Ti40FT, but is of lower quality, with a sensitivity of only 0.2 and a resolution of only 12896 pixels[30]. The researchers collected Higher-order Spectral characteristics in order to assess their utility in breast cancer screening[26]. Artificial Neural Network (ANN) and Support Vector Machine are two classic methods for classifying normal and abnormal breast thermo grams (SVM). The results showed that SVM had a sensitivity of 76% and a specicity of 84%, whereas ANN seeded had better sensitivity (92%) and specicity (84%) values (88 percent).The researchers in used a specific thermal camera like the FLIR SC 45 to measure the temperature of the breast surface[28].

Their research concentrated on statistical and texture qualities that, on their own, produce satisfactory results; however, these results can be improved by combining the above features. Advanced pre-processing stage and integrated feature matrix were included in the suggested work. Filtering, edge detection, and morphological processes make up the pre-processing step.

To extract the features in the grey photos and compare the right and left breast characteristics, a new local texture feature extraction approach termed block variance (BV) was applied. Then, using a feed-forward neural network (FANN), they were classified as either malignant or benign tumors. The accuracy rate of the results obtained was 90%.These characteristics can effectively distinguish healthy breast thermo grams from abnormal thermo grams. The study looked at 30 normal and abnormal breast thermo grams from the DMR (Database for Mastology Research) database. The analysis and experimental results reveal that the mean difference, skewness, entropy, and standard deviation are the most efficient first-order statistical features that contribute the most to asymmetry detection.The position and size of a spherical tumor in a human breast were estimated using the temperatures collected on the surface of the tumor by researchers in [33].Using a thermo gram of the breast in conjunction with Artificial Neural Networks are a type of artificial neural network. The temperature on the ground was Heat conduction was numerically simulated and the results were obtained. Pennes bio-heat transfer was used to treat a malignant breast.

Researchers employed DCNN to detect breast cancer study looked at 521 normal and 160 aberrant breast thermo grams from the DMR database. DCNN was used to transform colour thermal pictures to grayscale, pre-process them, segment them, and classify them. Furthermore, the SGD optimization approach was applied, as well as a learning rate of 0.01. The accuracy ratio increased from 93.3 percent to 95.8%, while the sensitivity and specicity levels remained at 99.5 percent and 76.3 percent, respectively [42].

CONCLUSION

This report provides a comprehensive overview of research studies that use AI models in conjunction with thermography to detect early breast cancer. The study's findings highlighted four significant issues: the trials' short sample size, heavy reliance on the DMR-IR database, image enhancing techniques used, and the restricted number of advanced deep learning models.

The validity and possibility of employing theromography for early breast cancer screening by detecting changes in heat distribution across the breast tissue were highlighted in the review study. To locate the ROI in a 3D volume, image enhancement techniques could be applied. Furthermore, the study found that while ANN and deep learning models can attain adequate detection accuracy, they can also be inaccurate.

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Role of Data Linearization in Sequential Coding Algorithms for Image Compression

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ABSTRACT

A digital image is a numerical representation of visual perception that can be manipulated according to specifications. In order to reduce the cost of storage and transmission, digital images are compressed. Depending upon the quality of reconstruction, compression methods are categorized as Lossy and Lossless compression. The lossless image compression techniques, where the exact recovery of data is possible, is the most challenging task considering the tradeoff between compression ratio achieved and quality of reconstruction. The inherent data redundancies like interpixel redundancy and coding redundancy in the image are exploited for this purpose. The interpixel redundancy is treated by decorrelation using run-length encoding, predictive coding, and transformation coding techniques. While the entropy-based coding can be achieved using Huffman codes, arithmetic codes, and the LZW algorithm, which eliminates the coding redundancy. During the implementation of these sequential coding algorithms, the direction used for data linearization plays an important role. A study of various image compression techniques using sequential coding schemes is presented in this paper. The experimentation on 100 gray level images comprising of 10 different classes is carried out to understand the effect of the direction of linearization of data. Depending upon this study the inter-relation between the maximum length of the Run and compression achieved similarly the resultant number of Tuples and compression achieved is reported. Considering the imprecise nature of the variable, the Fuzzy Composition methods like Max-min, Min-max and Max-mean compositions are used to classify the results. In this way a rational comment on which kind of Linearization direction is suitable in which type of images is made in conclusion.

Keywords: Image Compression, Data Linearization, Sequential Coding, Fuzzy Composition.

1   INTRODUCTION

The digital image is a function of brightness that corresponds to the intensity of pixels. This representation involves large data associated so that the requirements of storage space, computing power and the related communication bandwidth are very high. The technique involved is called image compression to minimize these requirements, so that information can be depicted in a reduced form. The capacity of the compression technique to decrease the data size is called the compression ratio. To attain lossless and lossy compression respectively, the redundant and irrelevant data is removed. The techniques of lossy compression have relatively higher compression ratios than that of lossless compression. Compression ratio and reconstructed image quality is always a tradeoff.

Nowadays, with the rise in mobile phone popularity, images are becoming an important record form. Image compression is required for storing and processing large numbers of such images. Depending upon the requirement of data preservation and accuracy reconstructed data quality, DC techniques can be divided into lossless and lossy compression. Compressing the data without sacrificing its originality is the main objective of lossless image compression, the reconstructed data is identical to original data in lossless compression, and it is suitable primarily for applications in compression of Text, medical imaging, law forensics, military imagery, satellite imaging, etc. In lossy compression the reconstructed data is an acceptable approximation of original data, here higher compression ratio can be achieved its applicable in compression of natural images, audio, video, etc.

There is always a limit to the compression ratio that can be achieved in Lossless Compression. According to Shannon, on the other hand, in lossless compression techniques, the measure of the amount of information content (Entropy) in the data that can be used to find the theoretical maximum compression ratio for lossless compression techniques, data can be compressed into as small as 10 percent of its actual size, and as the compression techniques require less-complex encoders and decoders as compared to lossless techniques.

The Shannon Entropy concept is explored in the paper to point out different possibilities to increase the compression ratio to its maximum extent. The paper discusses the different concepts related to compression techniques. One alternative to deal with the tradeoff between image quality and compression ratio is to opt for Near-Lossless compression, where difference between the original and reconstructed data is within user-specified amount called as maximum absolute distortion (MAD). This may be suitable for compression of

Medical images, hyper spectral images, videos, etc.

In addition to the storage space requirements and the overhead of processing time, all users on a specific network are suggested to minimize the size of the data and use the network resources optimally. Since compression is both time-effective and cost-effective, it helps to share network resources to enhance network performance.

2   LITERATURE SURVEY

In 1999, Holtz gave a review of lossless image compression techniques, saying," Theories are usually the starting point of any new technology.' There are some lossless compression methods explained, namely Shannon's theory, Huffman code, Lempel-Ziv (LZ) code and data trees for Self-Learning Autopsy. Hosseini submitted another review in 2012, which discussed many algorithms with their performances and applications. It includes Huffman algorithm, Run Length Encoding (RLE) algorithm, LZ algorithm, Arithmetic coding algorithm, JPEG and MPEG with their applications.

Image Compression deals with the ways in which the data and space needed to represent and store the digital image are reduced. The elimination of data redundancy may be one of the strategies for achieving compression. Human Visual System Redundancy is categorized into three categories: Spatial Redundancy, Spectral Redundancy, and Temporal Redundancy. Spatial redundancy, which is the correlation of neighborhood image pixels. Spectral redundancy is a correlation measure of an image between different color planes (Spectral Bands). The Temporal Redundancy deals with the correlation between a video's consecutive image frames.

In lossless data compression, the removal of data redundancy is the key process, and the data redundancy (Rd) is given by equation 2.1.

$$Rd = 1 - \left(\frac{1}{CR}\right) \qquad (2.1)$$

Where,

CR (Compression Ratio) = n1/n2,

n1: Size of compressed data, n2: Size of uncompressed data

Types of data redundancy are as follows,

1. Coding Redundancy

2. Inter-pixel Redundancy

3. Psycho-visual Redundancy

1. **Coding Redundancy**: A code is a system of symbols used for information representation. The pieces of information are represented by a combination of symbols called a codeword, and their length is called the number of symbols in a codeword. The available grey levels in an image are assigned to various codewords. If the grey levels are coded by using longer codewords than needed, an image is said to have coding redundancy. An image's gray-level histogram is created to construct codes with reduced coding redundancy. It is suggested that the most frequent grey levels should be represented by shorter codewords and vice versa to achieve the shortest representation, *i.e.* to avoid coding redundancy in the data. This variable length coding process may result in an image being shorter overall than the representation of the fixed length code. And when probability-based method(s) are used to design the code, it guarantees the shortest representation. The present coding redundancy is less than optimal, meaning codewords are used for representation, not as short as possible. Below is the average number of bits required to represent each pixel, given by equation 2.2 and 2.3.

$$L_{avg} = \sum_{n=1}^{N} l(g_n).p(g_n) \qquad (2.2)$$

Where,

n – Total number of pixels

$l(g_n)$ – Number of bits used to represent gray level of individual pixel

$p(g_n)$ – Probability of occurrence of gray level g_n.

$$p(g_n) = \frac{N}{n}, n = 1,2,\dots\dots.L \qquad (2.3)$$

Where,

N – Number of times the nth gray level appears in image

L – Number of gray levels

Total number of bits: The total number of bits required to code an R X C image is given by equation 2.4,

$$L_{RXC} = R.C.L_{avg} \qquad\qquad (2.4)$$

2. **Inter-pixel Redundancy**: There is some connection between the pixel image data represented by the respective grey levels. It is possible to identify this inter-pixel relation of a particular pixel in terms of its neighborhood pixel. These inter-pixel relationships are responsible for the structural and geometric features of objects present in the image. In other words, by means of an Interpixel Redundancy, the intensity value of a particular pixel can be predicted by knowing the intensity value of its neighborhood pixels. An image's spatial resolution is directly proportional to the redundancy of the interpixels. As this increases the likelihood of two adjacent pixels having the same intensity value, the spatial resolution of an image increases. By transforming the 2-D image matrix into a more efficient representation, this redundancy may be taken care of. Mapping is called the operation involved in this process. If it is possible to reconstruct the original image from the mapped data, the operation is called reversible mapping.

Autocorrelation Coefficient:

The autocorrelation coefficients can be computed using equation 2.5,

$$\gamma(\Delta n) = \frac{A(\Delta n)}{A(0)} \qquad\qquad (2.5)$$

Where,

$A(\Delta n)$ – Scaling factor given by equation 2.6,

$$A(\Delta n) = \frac{1}{N-\Delta n}\sum_{y=0}^{N-1-\Delta n} \quad f(x,y).f(x,y+\Delta n) \qquad\qquad (2.6)$$

Where,

n - number of pixels on a line.

N- number of sum terms.

x - coordinate of the line used in the computation

3. **Psycho-visual Redundancy:** Some information is given more importance than others in normal visual processing and this is how the human visual system does not respond with equal sensitivity to all exposed information. This ignored data is viewed as redundant psycho-visual data. By means of a quantization method, this redundancy is minimized, but as quantization itself is a lossy process, we cannot precisely reconstruct the original image. The method of exploring psycho-visual redundancy is therefore classified under lossy data compression techniques.

3   VARIOUS COMPRESSION TECHNIQUES

Several ways can be employed to compress the images which are further divided into two major categories or compression techniques.

1. **Lossy Compression:** Here, some of the finer details in an image are compromised and an approximate representation of an input image is the resulting image. The psycho-visual capacities of human eyes should be restricted by this degradation. JPEG (Joint Photographic Experts Group), MPEG (Moving Photographic Experts Group) and MP3 (MPEG Audio Layer 3) are some of the algorithms for lossy image compression.

2. **Lossless compression:** The objective of this method is to reduce the compressed representation bit rate without any distortion in the input image signal. The entire set of values is the same as the input. PNG (Portable Network Graphics), TIFF (Tagged Image File Format) and JBIG (Joint Bi-level Image Experts Group) are some lossless picture compression algorithms.
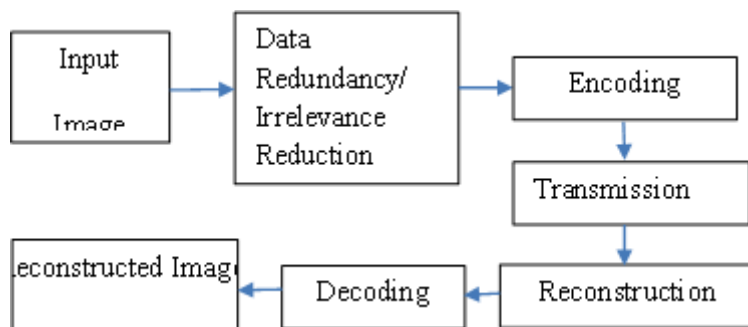
Fig. 1. Image compression model

The modified representation of data compression is basically a kind of coding and therefore consists of two separate functional components; an encoder and a decoder, as shown in Fig. 1. The encoder encodes the data in a compressed form, while the decoder decodes it in a decompression form called the original form.

The image signal f(x,y) is used as input of the encoder. The encoder compresses the f(x, y) data to a g(r, c) compressed representation. This information may be stored locally or sent for a specific purpose to some remote location. This compressed representation is used as an input to the decoder whenever necessary, which decompresses this data to f'(x, y). If f(x , y) and f'(x, y) are identical, the compression process used is otherwise referred to as a lossless compression.

4   SEQUENTIAL CODING SCHEMES

The lossy compression technique is used in certain image processing applications involving large image sizes, high resolutions such as satellite images and video processing to achieve a good compression ratio[9]. Lossless image compression is used in other applications where every data component is important, such as medical imaging and document images. We're going to discuss a few of the techniques for lossless image processing here.

1. **Run Length Coding (RLE):** Run length coding is based on sequential pixel redundancy. The number of adjacent pixels with the same grey levels are counted here, which is called Run of that particular grey level and the grey level snippet / tuple {gi, ri} and its run count are formed to represent the whole image. Due to the fact that the run value can vary from a minimum of 1 pixel to a maximum of m X n (total number of pixels in the image; m: number of rows, n: number of columns), this number will be very large and will require many bits to be represented. The highest size of a run is therefore considered to be multiple components in a row, i.e. n. It is obvious that in the images where the size of runs will be maximum, such kind of coding will be applicable. The kind of images suitable for RLE are graphs, plots, line works, facsimile data, icons and basic animation images. Some researchers also perform the RLE on bit planes of an image and also perform two-dimensional (2D) RLE. The image is processed row wise in 1-D RLE as pixel arrays, its grey levels are regarded as source symbols, and its runs are considered to be computed. But in 2-D, some characteristic pixel blocks are treated as source symbols, and for encoding, runs of those symbols are considered.

2. **Entropy Coding:** The good coding with entropy encoding results in the information in the message being represented in just enough bits. If an unlikely symbol appears rather than the appearance of a probable symbol, more information will be obtained. The entropy of information, or Entropy of Shannon, is given by equation 4.1.

$$I = p_i . log_2 \left(\frac{1}{p_i}\right) \hspace{3cm} (4.1)$$

Where,

p_i: Probability of occurrence of ith symbol.

N: Number of symbols in a particular message/codebook.

The base2 of the logarithmic function gives an idea here that the symbol's occurrence is represented by means of 0 and 1.

Before encoding the image data using variable length codes that obtain no-prefix condition, the probabilities need to be known. So, these algorithms are generally two-pass and consume more time. Compression of data

results from representing more likely symbols with shorter codewords and less likely symbols with longer codewords.

3. **Dictionary-based algorithms:** Symbol sub-strings are repeated in a file; these instances are recorded in a string table and referred to for encoding and decoding processes instead of repeating each time their position in the record. To prepare the dictionary, these string table techniques work on various approaches and LZW (Lempel-Ziv-Welch), LZ77 and LZ78 variants are created. In the data sequence, LZ77 uses a sliding window that generates a (position, length) tuple to point back to pre-existing substrings or symbols. LZ78 creates a string table dynamically and only replaces the substring in the message with the position index in the string table. Lossless coding systems are these coding schemes. Since some entries in the dictionary may not be referred to as frequently as others, the system is not optimal and the carrying of the dictionary in files is an overhead.

4. **Arithmetic Coding**: Arithmetic coding is a variable length coding scheme that performs better than Huffman coding with skewed probabilities for data with small alphabets[5]. Its implementation is a bit complex, but it is possible to segregate the modelling and coding features of the compression technique. It has two forms, Adaptive Arithmetic Coding, which is a method of lossy coding, and Binary Arithmetic Coding, which is a technique of lossless coding. The real number line is split into smaller intervals corresponding to the probabilities of source symbols in this encoding. The first symbol that appears in the message then selects its corresponding interval, which is further divided into the same number of smaller proportional intervals. The successive symbol selects the corresponding interval from the message and this process of further splitting the smaller intervals continues until the last symbol in the message. This way the entire message is coded most efficiently according to the source symbol probability. Huffman Coding: Huffman code is a well-known technique that is efficiently suited to almost all file formats[4]. This probability-based, variable length, optimally coded non-prefix code is used in lossless compression. For more likely codes, this minimum redundancy code uses shorter codes and vice-versa. Using a code tree, the symbols are encoded; the codeword starts from the root node and traverses until the leaf node, where the encoded symbol is placed. The codes of leaf nodes that are closer to the root node are shorter in length and more likely to occur in the given message. If the number of symbols and their probabilities are very close, then the achieved compression ratio is less and far from the entropy of the source. In this case, it is possible to create symbol pairs / group of larger size and to codify these meta-symbols using their joint probabilities. This is a two-pass algorithm that works faster if probabilities are previously known, providing excellent average codeword length otherwise the two-pass procedure is followed. Faller and Gallapher have proposed one-pass adaptive Huffman codes and Knuth and Vitter have further developed them. If we want to code the $(i+1)^{th}$ symbol using earlier i^{th} symbol statistics, the two binary tree parameter procedure is proposed and later developed as adaptive Huffman Code.

5 LINEARIZATION OF DATA

An image is a function of space f(x , y) that is two-dimensional (2D). For sequential data, the coding schemes discussed in the following section are appropriate. To convert the 2D images to one-dimensional (1D) sequential data, the linearization process should be used. Local and global redundancies are represented in an image. In order to deal with the coherence and correlation of image pixels[8], local redundancies need to be more explored. The pixels in any direction may be related to each other. The schemes are sensitive to the direction of linearization of the image which is nothing but the direction of scanning the pixels of an image. Horizontal, vertical and diagonal directions of linearization can be achieved by padding row-after row, column-after-column and pixel intensity scanning in a zig-zag manner.

A. Vertical Raster   C. Down-first Zigzag   E. Up-down Snake   G. Clock-wise Spiral

B. Horizontal Raster   D. Right-first Zigzag   F. Left-right Snake   H. Anti Clock-wise Spiral
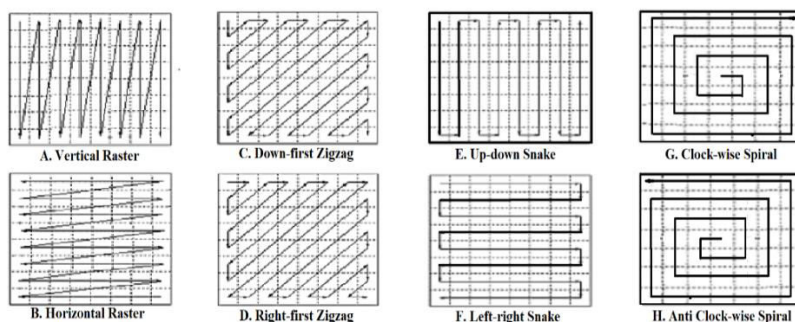
Fig. 2. Directions of Linearization

In fig. 2 Directions of Linearization are shown, where A. is Vertical Raster direction, B. is Horizontal Raster direction, C. shows the Down-first Zigzag direction, D. shows the Right-first Zigzag direction, E. represents Up-down Snake, F. shows Left-right Snakes, G. is Clockwise Spiral, and H. is Anticlock-wise Spiral. Which will be stored in a 1D vector representing image as well as suitable for below discussed coding schemes. Depending upon the nature of input image and the chosen direction of linearization, variations may be observed in incidenting data redundancies. So, choosing this direction of linearization is a crucial task before feeding it to subsequent sequential compression algorithms mentioned in the next section.

In Table 1. The effect of choosing different directions of linearization on the interpixel redundancy is visible. Here, the preloaded image in Matlab 'cameraman.tif' is read, then its 2D intensity matrix is converted to 1D vector, by using mentioned linearization methods one by one. Then the maximum, minimum RUNS in the data, and number of resultant tuples are observed in each case. It may be seen that the Horizontal linearization direction can be more suitable for this image over other methods as the Max. RUN observed is longer and the number of tuples generated are less.

Table 1. Effect of choosing different Direction of Linearization

Name of Image	Direction of Linearization	Min. RUN	Max. RUN	No. of resultant Tuples
cameraman.tif	Vertical Raster	1	13	56112
	Horizontal Raster	1	15	55387
	Down-first Zigzag	1	9	57548
	Right-first Zigzag	1	9	57550
	Up-down Snake	1	15	55385
	Left-right Snake	1	14	56110
	Clockwise Spiral	1	15	56104
	Anticlockwise Spiral	1	15	56114

The distribution of runs using the mentioned linearization directions is also shown in the Fig 3. below.
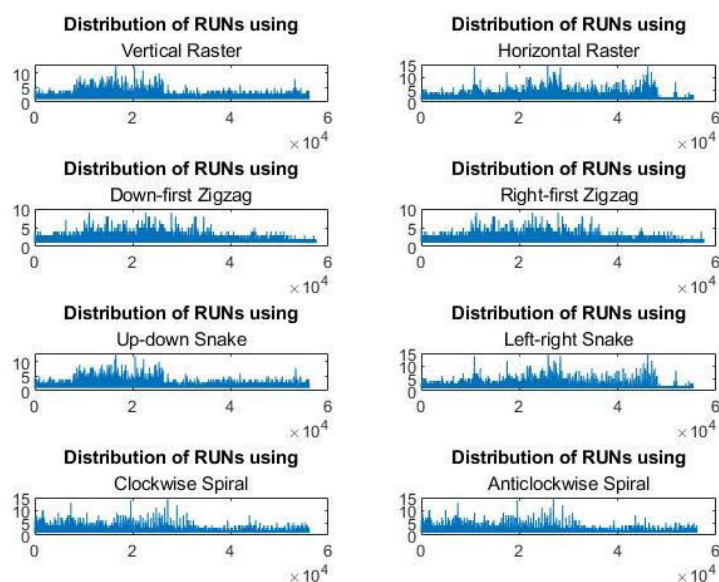
Fig 3. The distribution of RUNs using various linearization directions

6. LENGTH OF THE RUN, NUMBER OF TUPLES AND CODABLE COMPRESSION ACHIEVED:

Here inter-relation between Length of the Run and Number of Tuples generated in the compression procedures involving RLE is discussed. A situation where, when one thing increases, and another thing is supposed to decrease.

- If the length of the Run achieved is higher, then the number of resulting Tuples will be less, and

- If the length of the Run achieved is smaller, then the number of resulting Tuples will be more.

For achieving a good compression, the first situation should occur, that the maximum size Runs should be registered with smaller number of resultant Tuples. But, in this case, number of bits required to represent the Run count will grow in terms of 8-bits and the overall representation will require more data. On the other hand, if the Runs are smaller and they are representable in lesser number of bits, the number of Tuples generated will be high in number and to represent those greater number of Tuples again the data required will be more. So, to achieve good codable compression it is suggested that those parameters should be evaluated carefully. As there may not be any clear-cut range or threshold limits for length of Runs and the Tuple length. But a vague, imprecise boundary can be thought of which would separate the 'Good' length of Run and 'Average' number of Tuples from the results to achieve better codable compression. Considering this fuzzy nature of the variables it will be more significant if the methods of Fuzzy Composition are employed to form the Relation between them.

7. FUZZY COMPOSITION FOR FINDING THE RELATION BETWEEN VARIABLES:

The experimentation is carried on 100 gray scale images of 256*256 size; involving 10 images each of 10 classes like Text, Person, Flower, Animal, Bird, Object, Vegetable, Pet, Graph and Diagram.

Table 2. Result of choosing different Direction of Linearization, considering the arithmetic average

Sr. No.	Linearisation Direction	Min Run	Max Run	No. of Tuples
1	Vertical Raster	1	1780	36321
2	Horizontal Raster	1	2282	36767
3	Down-first Zigzag	1	1297	39681
4	Right-first Zigzag	1	1297	39681
5	Up-down Snake	1	1806	36251
6	Left-right Snake	1	2294	36702
7	Clockwise Spiral	1	922	36043
8	Anticlockwise Spiral	1	938	36040

The length of the Run and the number of Tuples for different (8) linearization directions are calculated. As discussed in above section the Fuzzy Composition methods are used to form the relation between them. The compositions used are Max-min, Min-max, and Max-mean. The results of applying them are as follows.

Table 3. Result of choosing different Direction of Linearization, considering Fuzzy Compositions

Sr. No.	Name of Class	Run Length			No. of Tuples			Suggested Linearization Direction
		Min-max	Max-min	Max-mean	Min-max	Max-min	Max-mean	
1	Text	1089	8260	11669	17994	5931	18222	1
2	Person	42	15	51	59515	37489	59682	2
3	Flower	1661	12	5215	57382	23755	57809	2
4	Animal	2584	14	9937	62639	12925	61170	4
5	Bird	212	11	326	50581	25577	53817	4
6	Object	4704	12	10686	56746	27120	55686	4
7	Vegetable	239	37	2780	62499	27242	57826	1
8	Pet	70	21	83	56202	43821	57572	8
9	Graph	2764	246	5665	13003	4742	17477	2
10	Diagram	1457	23	5272	54948	8186	52815	1

7. RESULTS AND DISCUSSION:

The experimentation on 100 gray level images comprising of 10 different classes is carried out. Depending upon this study the inter-relation between the maximum length of the Run and compression achieved is studied. Similarly, relation between resultant number of Tuples and compression achieved is also underlined. The fuzzy compositions have application in this type of scenarios, where the inter-relation between various experiment parameters is vague.

8. CONCLUSIONS

There is difference between the compressibility of the resultant scaler data, if different linearization methods are employed. Estimating the most suitable linearization method for a particular image in view of compression should result in higher compression ratio. The spiral linearization methods are suitable for the images having

object at the center. The raster and snake linearization methods are suitable for document images. The Zig-zag linearization is suitable for the image in which the information is scattered overspread.

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Extracting Multi-Biometric Traits (Palmprint and Palmveins) From a Single ROI

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ABSTRACT
Extracting features for biometric systems is an important phase in the biometric systems. Getting a clear biometric trait will help to extract an exact features. However, with multimodal biometric systems, the needing for extract many traits is a compulsory issue. Extrinsic and intrinsic are two types of the biometric traits existence in the human body. So, using a single region of interest ROI for extracting multi-traits can reduce the errors and time of the biometric systems scenarios. In this paper, image processing techniques are used for reduce the biometric image noise. For palmprint biometric trait, image needs an enhancement for extract the palm surface. While for palmveins, image needs to extract the hidden lines that present veins of the palm. We start with an valuable introduction, then palmprint biometric trait will extracted, finally palmveins biometric trait will extracted. For accomplishing this work, we will use a large-scale contactless palmvein dataset, which is publically available.

Keywords: Palmprint, Palmveins, Multi-traits, intrinsic, extrinsic.

1   INTRODUCTION

Palmprint is a somewhat different use of fingerprint technology which is used for biometric authentication. But the scanner size is considerably bigger, which is a crucial factor for use in desktop machines or handheld devices. Later, this problem was solved through the use of contactless devices. There are many unique features in a palmprint image that can be used for personal identification. Principal lines, wrinkles, ridges, minutiae points, singular points, and texture shown in figure (1) are regarded as useful features for palmprint representation. Various features can be extracted at different image resolutions. For features such as minutiae points, ridges, and singular points, a high-resolution image, and features like principal lines and wrinkles, can be obtained from a low-resolution palmprint image [1], [2].

Unlike normal camera image capturing, using infrared ray the veins pattern can be captured which is containing the blood with the help of components of blood, especially deoxidized hemoglobin that appears as dark lines. Therefore, with the convenience device, the pattern can be extracted properly and matched with the enrolled image in a specific scenario as per designed system. Figures (2: a, b, c, and d) shows a sample of the normal ray image, infrared ray image, the extracted veins pattern, and sensor used by Fujitsu respectively [3]. With the aims of building non-forged authentication systems, Fujitsu started to build an authentication systems based on veins print, that contributes to provide a high level of security that can be used in wide range of application, especially for access control and ATM [3].
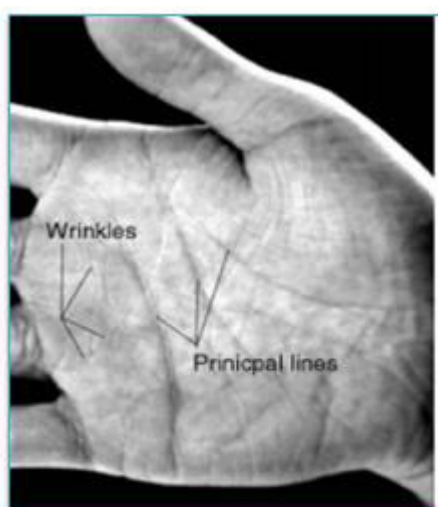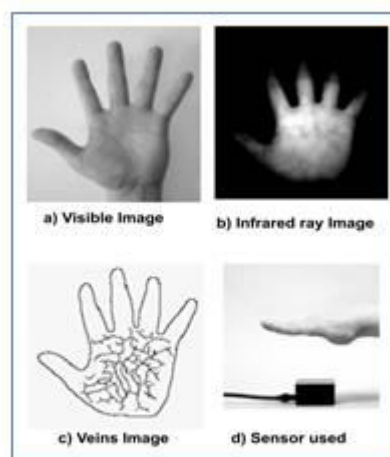

Figure 1: sample view of palmprint

Figure 2: Samples of a) normal ray image, b) infrared ray image, c)

However, this work will depends on large-scale contactless palmvein dataset, which is publically available at [4]. This dataset is consist of 12000 images collected from 300 person palms (left and right), every palm has 20 images captured in two sessions (10 per each), with gap of two months.

Above of all, we have been used these approaches for designing biometric systems, as it is published in a contactless palmprint biometric system based on CNN [5], and a contactless palm veins biometric system based on CNN [6]. Theses research works gained a high accuracy 96% and 99%, respectively.

2   EXTRACTING PALMPRINT BIOMETRIC TRAIT

Palmprint biometric is another expanding trait from fingerprint. It consist of principal lines, edges, and minutia. Palmprint features is appears on the palm surface, which is can be captured as a palm image using contactless or touch-based devices, then, these features can be extracted from the palm image [2], [7]–[9]. In this work, the palmprint images are contactless-based, which are the dataset chosen above. However, we will propose a method for extracting the palmprint biometric image from the dataset images, in this method, the surface of the palmprint image will extracted through applying series of filters that enhance an image to visualizes the palmprint biometric image features. These filters are:

i.   **Gabor filter**: is a convolutional filter representing a combination of Gaussian and sinusoidal term. Where the Gaussian component provides the weight, and the sine component provides the directionality, Gabor can be used to generate features that may be represented in texture and edges [9]–[13]. The formula of Gabor filter can be expressed as:

$$g(x, y, \lambda, \theta, \varphi, \sigma, \gamma) = e^{\left(-\frac{x'^2 + \gamma^2 y'^2}{2\sigma^2}\right)} e^{\left(i\left(2\pi\frac{x'}{\lambda} + \varphi\right)\right)} \qquad (1)$$

Where,

$$x' = x \cos\theta + y \sin\theta$$
$$y' = x \sin\theta + y \cos\theta$$

g is the Gabor filter generated, (x, y) represent the pixel, λ is the wavelength of the sine component, θ represent the orientation of the Gabor filter, φ is the phase offset, σ is the standard deviation of the Gaussian filter, and γ represent the spatial aspect ratio.

Figure Error! No text of specified style in document.1: preprocessing of the palmprint image
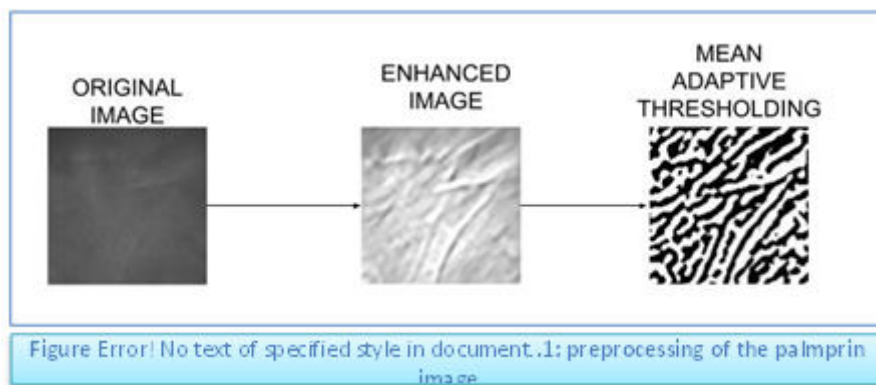
ii.   **Median Filter** : it is a nonlinear filter, considered as a useful tool used for reducing noise in an image [14]. Median can be expressed in an equation as:

$$\hat{f}(x, y) = \underset{(s,t)\in S_{xy}}{median}\{g(s, t)\} \qquad (2)$$

Where, $\boldsymbol{g}$ is an input image, $\hat{\boldsymbol{f}}$ is the filtered image, $\boldsymbol{S_{xy}}$ is an $m \times n$ subimage (region) of the input noisy image, $\boldsymbol{S}$ indicates that the subimage is centered to the coordinate $(\boldsymbol{x}, \boldsymbol{y})$ [14].

Simply, the median filtering output can be expressed as:

$$g(x, y) = med\{f(x - i, y - j), i, j \in W\} \qquad (3)$$

Where, $f(x, y)$ is the original image, and $g(x, y)$ is the output image, and W is a two-dimensional mask [15].

iii.   **Adaptive thresholding**: is the method where the threshold value is calculated for smaller regions; therefore, there will be different threshold values for different regions [16], [17]. With the aim of binarizing

images and reducing unwanted noise, we apply an Adaptive thresholding based on MEAN filtering where threshold value is the mean of neighborhood area.

3   EXTRACTING PALMVEINS BIOMETRIC TRAIT

Palmveins biometric trait is an intrinsic biometric technology, which is hidden under the skin of the palm.

Proposed Palmprint Preprocessing Algorithm:

1-   Read an image

2-   Apply Gabor filter.

3-   Smooth an image using Median filter.

4-   Segment image using an adaptive thresholding of Mean to create a binary image.

Unlike palmprint which is needs to extract the suface of the palm, palmveins needs to extract the shape inside the palm. Veins pattern appears as a dark lines hidden in the biometric image, it is captured using an infra-red ray [18]. To extract this pattern we will apply a series of filters on the image as follow:

i.   **Gaussian filter**: is a convolutional filter used to smooth the image with a default standard deviation value [19], [20]. The formula of Gaussian filter can be expressed as:

$$f(x) = a \cdot e^{\left(-\frac{(x-b)^2}{2c^2}\right)} \qquad (4)$$

f is the Gaussian filter generated, a represent the highest value in the curve, b is the center of the peak, c represent the standard deviation.

ii.   **Standard Deviation filter**: it is a useful filter used for recognizing a hidden pattern that covered with some noise, especially regarding in palm veins images [21]. Standard Deviation can be expressed in an equation as:

$$SD = \sqrt{\frac{\sum(x_i - \bar{x})^2}{r * c - 1}} \qquad (5)$$

Where, x_i is a single pixel value of an input image considered by the filter, $\bar{x}$ is the mean of pixel values considered by the filter, r is a filter rows size, and c indicates to the columns of the filter.

iii.   **Rescaling image**: is a process to normalize the image such that its values rescaled between the interval of [0,1] [22].
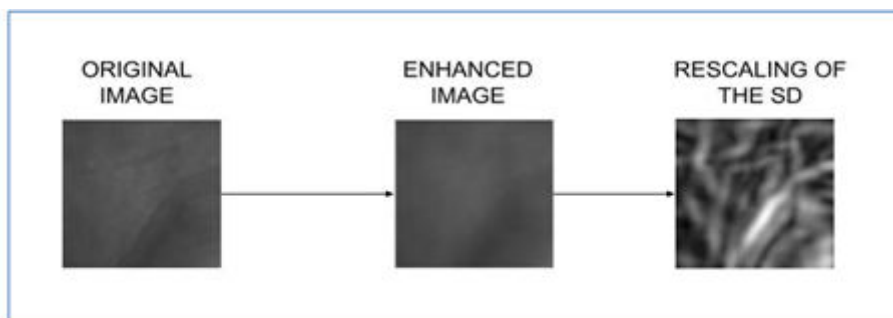

Figure Error! No text of specified style in document..1: palmveins

Proposed Palmveins Preprocessing Algorithm:

1- Read an image

2- Apply Gaussian filter with 3 kernel filter.

3- Apply Standard Deviation filter with 11 kernel filter.

4- Rescale the image and save it to the proposed new dataset.

CONCLUSION

In this paper, we proposed a new approach for extracting two biometric trais from a single ROI of the palm. These traits are palmprint biometric trait which is considered as an extrinsic biometric trait; and the second is palmveins biometric trait which is considered as an intrinsic biometric trait. The preprocessing methods and filters are described for extracting features for both palmprint and palmveins. We used a large-scale contactless palmvein dataset. For testing these approaches we have been designed biometric systems, a contactless palmprint biometric system based on CNN, and a contactless palm veins biometric system based on CNN. Theses systems gained a high accuracy 96% and 99%, respectively.

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Systematic Review of Dental Biometrics Based on Dental Radiographs

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ABSTRACT

Medical image processing is vital in several arenas of medical research and clinical observes. It greatly facilitates early detection and finding of diseases. This paper surveys a supplementary method in the area of medical image analysis for diagnosis of diseases in oral radiology using dental X rays in odontology. Dental X-ray image processing is widely used nowadays for identification of missing individuals or victims. Radiograph is more feasible and retrieved more information for feature extraction as compare to photograph.

Keywords: Dental radiograph (X-ray), dentistry, Computed Axial Tomography (CT Scan or CAT scan) Dental caries, Teeth segmentation, Gap Valley.

INTRODUCTION

In case of medical images human contribution and observation is of major importance. It's indeed a difficult task to grasp fine features in various alteration situations. The data obtained directly from X-ray acquisition device. It's going to yield a fairly poor image quality representation. Due to the role of a person's (dentist) interpretation supported his knowledge, skill and observation which could be vary from doctor to doctor., there are probabilities of error decide the correct medicinal treatment. Software developers together with area specialists have designed various standardized and scientific tools to attenuate the human fault within the case of deciding the proper treatment on the idea of visual opinion. Poor quality of dental images, the primary step is to grow the radiograph, there after segmentation is performed and followed by feature extraction which produces a part of interest which is exclusive for every individual. Feature vector thereby produced is matched with the database images. The image having minimum matching distance is taken into account to be the most effective potential match of the given query image. The primary step in human identification is dental image classification which relies on the way dental features are captured. they're classified as bitewing, periapical and panoramic dental images [5] as shown in figures Bitewing images include the features of both jaws signifying bite. While periapical images include only one jaw either upper jawbone called upper periapical image or mandible called lower periapical image. Panoramic images include features of both jaws including sinuses, nasal area, etc. However, for many dental processing bitewing images are used [6]. The dental radiograph consists of three regions namely background area (having lowest intensity), bone areas (having average intensity) and teeth areas (having highest intensity). In some cases, the intensity of bone area and teeth area are nearly same.

A dental x-ray provides valuable diagnosis information to dentists like passage way treatment, detection of caries and the other anomalies. [1] within the current years, different methods of processing on image are actively used for the finding of oral diseases in odontology. There are various diagnostic methods for odontology which include, Computed Axial Tomography (CT Scan or CAT scan), Ultrasonography (US), Panoramic Imaging, Intra Oral and additional Oral Radiography and MRI. These tomography systems are helpful in confirming the various kinds of dental disease infections. By using the radiographs of teeth, experts can find the Periodontal, Swelling, Interdental bone Loss, Extra Teeth, Impacted teeth, Cysts, Malignancies, Developmental defects, [3] Future Malocclusion

Types of Diseases

Enamel Caries:

In dental x-ray images, enamel caries may be predictable by a loss on the interproximal surfaces of the enamel. To be detectable on a radiographic image there must be a 30% to 50% change within the mineral content of the enamel lesion.

Dentinal Caries

Dentinal Caries is recognized by noting the focal loss of dentinal radiopacity. Dentin caries is also discerned inter- proximally, on the occlusal surface, buccally/lingually, or on root surfaces.

Pulpitis

Dental Caries, commonly referred to as dental caries or cavities extends below the tooth dentin and it affects the nerves or the blood vessels, the it's called the pulpitis.

The Bitewing X-ray

It highlights the crowns of the rear teeth. Dentists take one or two bite-wing X-rays on all sides of the mouth. Each X-ray shows the upper and lower molars (back teeth) and bicuspids (teeth before of the molars). These X-rays are called "bite-wings" because you bite down on a wing-shaped device that holds the film in situ while the X-ray is taken. These X-rays help dentists find decay between back teeth.

Periapical X-ray

It highlights only 1 or two teeth at a time. It shows the whole length of every tooth, from crown to root. This wont to determine teeth caries in an exceedingly particular tooth, because it allows dentist to visualise the entire tooth yet because the teeth surrounding cavities of bone.

Occlusal View

They are larger than most X-rays. They highlight tooth development and placement in children. Each X-ray shows nearly the total arch of teeth in either the upper or jaw. The film rests on the biting surface of the teeth.

Panoramic View

Panoramic X-rays shows the full teeth structure with jaws and teeth in single view. These types of X-ray are wont to detect different infections or problems present in teeth like cysts, fractures, tumors, impacted teeth and cavity etc.

Dental radiograph Dental radiograph is an intra or oral image that's taken using X-ray radiation. Dental radiograph consists of teeth using X-ray radiation. Dental radiograph consists of teeth, bones and surrounding soft tissues. There are three forms of dental radiograph that's commonly employed in dentistry that are periapical, bitewing and panoramic as shown in Fig
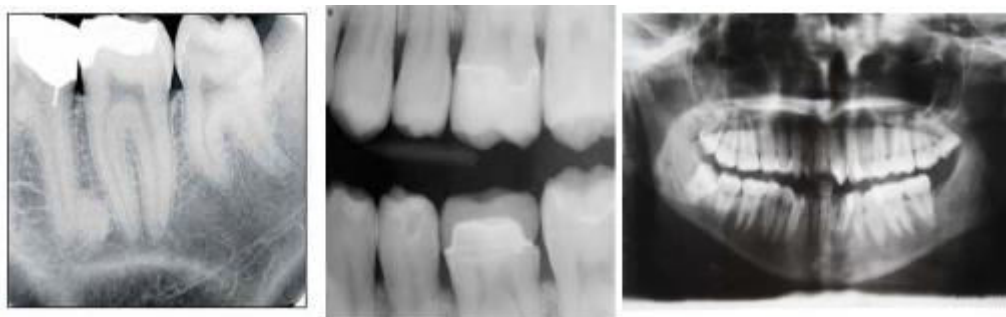
Fig(1) Periapical view   **Fig(2) Bitewing view**   **Fig(3) Panoramic view**

Literature Review:-   Various study has been done by many researcher. Many authors explored the feature extraction and matching techniques based on dental radiograph and photograph in dental biometric. It is an art and science of diagnosis and treatment of diseases and disorders of the oral cavity and its associated structures. The components of dentistry include, periodontics, oral pathology, orthodontics, oral and maxillofacial surgery, pedodontics, prosthodontics, forensic odontology, geriatric dentistry and dental implantology. Periodontics deals with diseased gums, Oral pathology concentrates in the diagnosis, Orthodontics aids in the correction of mal-aligned teeth, oral and maxillofacial surgery is concerned with major surgical procedures related to the dental and associated structures, pedodontics deals with children and prosthodontics accounts for the rehabilitation process. Forensic odontology consists of the gathering and the use of dental evidence in human identification that is primarily documenting and verification of identity. [3] For the automated identification, the dental records are usually available as radiographs .An automated dental identification system consists of two main stages: feature extraction and feature matching. A new semi-aficationutomatic method of human ident cation based on dental radiographs is proposed. This method involves three stages: radiograph segmentation, tooth feature extraction, and tooth feature matching. [4] In this paper, we proposed a teeth segmentation from dental x-ray image. The proposed method consists of three steps: tooth area identification, template matching, and teeth area segmentation. This paper presented a novel teeth detection and dental problem classification

approach using panoramic dental Radiographies. A panoramic dental radiography shows the entire mouth area where all the teeth can be seen.

In 2003, within the Journal of Elsevier, the paper entitled," Matching of dental X-ray images for human identification" has published. during this study, a brand new semi-automatic method of human identi'-cation supported dental radiographs is proposed. This method involves three stages: radiograph segmentation, tooth feature extraction, and tooth feature matching. [6]

The feature removal stage includes the radiograph segmentation and the contour extraction. contour extraction method based on edge detection. Though, the substantial noise that is usually present in radiograph images, the edge-detection-based method does not perform consistently across all the images. Sum the intensities of pixels along each row parallel to the x-axis. The gap between the upper and lower teeth will form a valley in the y-axis projection histogram, which we call the gap valley. Once we get the crown contour and the root contour, we connect them to form the contour of the whole tooth. Once the crown shape is extracted, we traverse from the two ends of the shape boundary to the root boundary. Given a query image generating several sub-images from every database image, each sub-image containing the same number of teeth as the query image. The matching distance between the query image and the open teeth is smaller than that compared to the pretender teeth.

In 2006, within the Journal of Elsevier published entitled "Caries detection and diagnosis: Novel technologies" has published. during this study, a variety of caries detection systems are covered during this review. The pattern of cavity is changing, with an increasing incidence in occlusal surfaces. This shift has rendered traditional detection systems, particularly bitewing radiographs less useful within the diagnostic protocols of clinicians. [7]   In this journal Radiographic techniques like Digital radiographs, Subtraction radiology. & Enhanced visual techniques are studied Fibre optic transillumination (FOTI and DiFOTI) Fluorescent techniques Visible light fluorescence QLF   Laser fluorescence DIAGNODent Other optical techniques. Ultrasound techniques are studied.

In 2012, within the Journal of IJSR published "A Review of Dental Biometrics from Teeth Feature Extraction and Matching Techniques " During this study, review a task of dental images in human identification and different techniques utilized in dental biometrics. We make comparative analysis of varied methods from this we conclude that almost all of the system used dental radiograph only, while some uses both dental photograph and radiograph within which dental radiograph utilize crown and root contour while dental photograph utilize shape and appearance of teeth structure.

From this study we found that. The matching stage has three sequential steps: tooth-level matching, computation of image distances, and subject identification. In this paper it uses contour and skeleton-based shape extraction as well as matching algorithm for dental images. An active contour model with selective binary and Gaussian filtering regularised level set method. It is used for contour extraction. Shape matching is done by both contour and skeleton-based approaches. Performing a work on Classification and Numbering of Dental Radiographs for an Automated Human Identification System. In this paper they use classification process which aims to classify the extracted tooth into molar or premolar using the binary support vector machine method. numbering process is executed in accordance with molar and premolar pattern. [9]

In 2017 within the journal of IEEE, paper published entitled " Automatic Image Processing Based Dental Image Analysis Using Automatic Gaussian Fitting Energy and Level Sets" During his study, author cited that,, an improved and combinational segmentation approach for tooth extraction from dental radiographs is presented. The dental periapical radiographs are generally of low contrast and poor illumination. the normal average filters may smooth the image but at the identical time it washes out the perimeters. The enhancement part is achieved using bilateral filtering to scale back the contrast variations between teeth, gums and background artifacts. this mixture of contrast enhancement and filtering approach removes the noise and other unwanted background information and at the identical time preserves the perimeters. combination of contrast enhancement and filtering approach removes the noise and other unwanted background information and at the same time preserves the edges. The segmentation using Gaussian fitting energy and independent level sets achieves the segmentation using very less number of iterations. The enhancement filters sometimes washes out the edges therefore this paper uses bilateral and box filtering approach to preserve the edges and at the same time image quality is also improved. The segmentation approach uses the combination of Gaussian distribution fitting energy in combination along with level sets. The local intensities of images are described by Gaussian distributions with different values of mean and variance to handle intensity inhomogeneity.[8]

.In 2018 within the Journal of Biomaterials and Bioengineering in Dentistry Publication Types: Research J Clin Exp Dent "Dental radiography image enhancement for treatment evaluation through digital image processing." during this paper author cited that, Base on the 2 varieties of analysis methods on dental radiography images, both MSE and PSNR statistical methods moreover as in step with expert's observation (dentist).It occurred score difference, that was supported MSE and PSNR statistical scores. Image enhancement method has been conducted in dental radiography by comparing several methods. Such as contourlet transform (CT), wavelet transform, contrast stretching (CS), and contras limited adaptive histogram equalization (CLAHE). For diminishing noise, for optimizing image contrast, and for enhancing brightness of image various methods have been used. In this paper author had evaluated by two methods. Initially it compare between original images and processed images, so that it grew the statistical score. For getting more evaluated methods ,each method was represented by coding format.[10]

In 2020 within the Journal of, IEEE paper published entitled " Classification of Dental Cavities from X-ray images using Deep CNN algorithm" In this paper Existing approach like Mask R-CNN by achieving 82% accuracy and this proposed method of Sobel is best to check other segmentation techniques like Otsu's threshold Watershed.[11] Following are the ways to construct models based on a deep CNN algorithm. The first one is image segmentation using the ROI (region of interest) selection for object detection in mask R-CNN. The second is separate segmentation approaches, comparing analyses to pick effective segmentation methods used to predict dental diseases. Watershed segmentation to distinguish the objects touching the image.

In 2020 within the Journal of , IEEE paper published entitled " Teeth Detection and Dental Problem Classification in Panoramic X-Ray Images using Deep Learning and Image Processing Techniques "In this paper we propose a deep learning solution that helps dentists make the right diagnosis using panoramic dental X rays images. Novel teeth detection and dental problem classification approach using panoramic dental radiographies. We manually annotate panoramic radiographies so as to coach the semantic segmentation CNN. [13]

LITERATURE REVIEW

Journal & Year	Findings
Anil K. Jain Hong Chen 2003 ElSEVIER [6]	A new semi-automatic method of human identification based on dental radiographs is proposed. This method involves three stages: radiograph segmentation, tooth feature extraction, and tooth feature matching.
Iain A. Pretty 1 June 2006 ElSEVIER [7]	A range of caries detection systems have been covered in this review. A summary of their performance is presented. The pattern of dental caries is changing, with an increasing incidence in occlusal surfaces.
Pulkit Pandey, Anupama Bhan, Malay Kishore Dutta Carlos M. Travieso, IEEE 2017 [8]	In this paper, an improved and combinational segmentation approach for tooth extraction from dental radiographs is presented. The dental periapical radiographs are generally of low contrast and poor illumination.
Dr. Ganesh Sable1, Dipali Rindhe2 (2012) [9] IJSR	From this, we found that radiograph is more feasible and retrieved more information for feature extraction as compare to photograph.
Hanifah Rahmi-Fajrin 1, Sartika Puspita 2, Slamet Riyadi 3, Erma Sofiani(2018) Research J Clin Exp Dent [10]	Analysis methods on dental radiography images, both MSE and PSNR statistical methods as well as according to expert's observation (dentist), it occurred score difference that was based on MSE and PSNR statistical scores.
M. Muthu Lakshmi Dr. P. Chitra 2020 IEEE [11]	The Sobel edge detection method is used to implement the classification of dental cavities by Deep CNN is achieved by high accuracy is compared to the existing approach like Mask R-CNN by achieving 82% accuracy. This proposed method of Sobel is best to compare other segmentation techniques like Otsu's threshold Watershed.

CONCLUSION:

Much of the work have been done for teeth segmentation, but very few researchers have applied and realized the methods for diagnosis purpose. Collaborative portions of X-ray selected for further processing specifically

for the purpose of diagnosis is the need of the hour as it would help both doctor and patient to understand the problem and depth of disease. Researchers up till now have been found concentrating on image enhancement or segmentation for extracting features for forensic sciences. No much research has effectively contributed for the analytic methods.

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9. Dr. Ganesh Sable1, Dipali Rindhe: A Review of Dental Biometrics from Teeth Feature Extraction and Matching Techniques IJSR 2012

10. Hanifah Rahmi-Fajrin 1, Sartika Puspita 2, Slamet Riyadi 3, Erma Sofiani Dental radiography image enhancement for treatment evaluation through digital image processing Journal section: Biomaterials and Bioengineering in Dentistry Publication Types: Research J Clin Exp Dent. 2018

11. M. Muthu Lakshmi, Dr. P. Chitra   : Classification of Dental Cavities from X-ray images using Deep CNN algorithm IEEE 2020

12. Gil Jader_, Jefferson Fontinele_, Marco Ruiz_, Kalyf Abdalla _, Matheus Pithon y, Luciano OliveiraDeep instance segmentation of teethin panoramic X-ray images

13. Mircea Paul Muresan, Andrei R_zvan Barbura, Sergiu Nedevschi: Teeth Detection and Dental Problem Classification in Panoramic X-Ray Images using Deep Learning andImageProcessing Techniques

A Comprehensive Review on Different Fusion Techniques Used in Multimodal Biometric System

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ABSTRACT
The physical or behavioral identification of any individual for authentication purpose the Biometric is widely used. There are some fusion technologies encountered to propose the system for more reliable authentication of individual, such system is called as Multimodal Biometric System, in this the integrated evidence for processing authentication using different fusion methodologies are used. Before the Multimodal biometric system, the Unimodal biometric system may not fulfill the authentication requirements. The current research expose that multimodal biometric system is more feasible in authentication of individual. The aim of this paper is to underline the importance of different fusion methodologies of biometrics in the area of security of individual identification. This paper gives possible separate make use of biometrics technologies in the area of security with the fusion of several biometric techniques.

Keywords: Biometrics · multimodal · fusion technologies · fusion levels

1   INTRODUCTION
The identification of individual (human) physiological or behavioral features such as fingerprint, voice, signature, retina, face, iris, finger vein, hand or palm and its vein pattern is measure to determine using biometric technologies. In the biometric identification there is no need to carry any document ID, but the biometric technology uses the unique physical traits to at the time identification. The "live sample" is identified by the biometric system instead of traditional PIN (Personal Identification Number), ID cards, passwords or any other document. So that's why biometric credentials cannot be predicted, lost, forgotten or easily copying. Inputting data like video, image or signal to the biometric system, after that the biometric identification system is performing diagnosing or recognition, which concerns extracting the method of interest from the input, is called as preprocessing. In the preprocessing removal of noise, apply the proper alignment to data, and data refinement. Some elements are taken out from the preprocessed data, which are then used by a classifier for biometric recognition system. The biometric recognition system is performing the identification with input data or verification with the input data concern to the same identity. Commonly, the biometric systems are unibiometric, which manipulate a single biometric signal and thus it may face problem due to missing information, poor data quality. In this way, the multiple biometric traits are in order to improve accuracy of recognition system. In some cases, a biometric signal is used side by side traditional user-validation schemes such as passwords/passcodes to verify a user's identity.

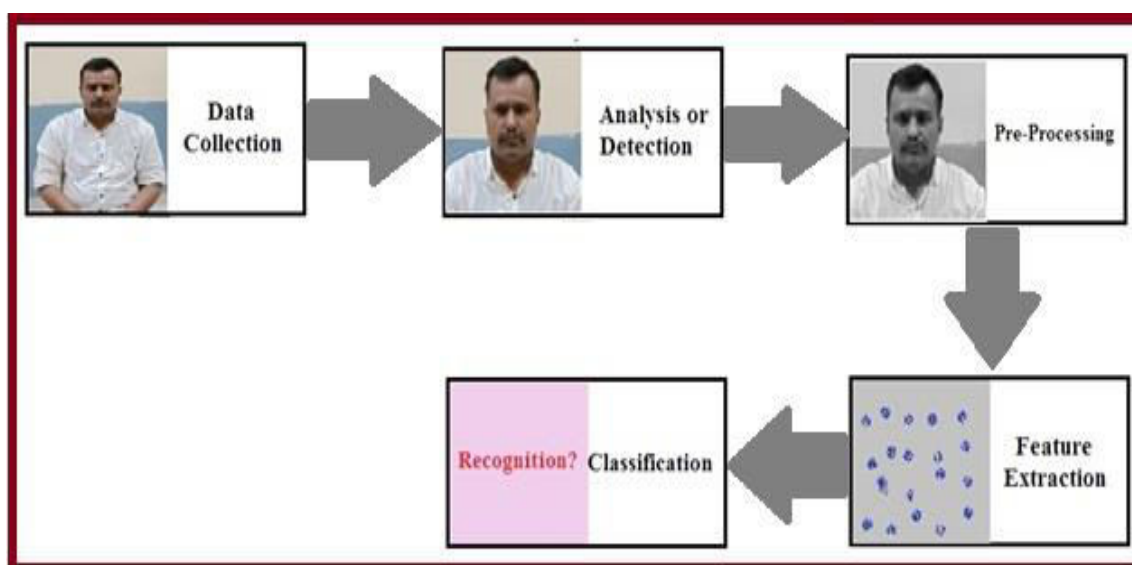For example, a dual factor authentication process is integrated in many Smartphone devices.

Fig.1. Different modules of biometric system for recognizing face.

A basic biometric recognition system is contains four components:

- The biometric data receive using different biometric sensor called as Sensor module.

- The received data from the biometric sensor is undertaking to extract feature vector called as Feature extraction module.

- The comparison of feature vectors with the template which are stored in database

- The feature vectors are compared with the template which is stored in database and then it is called as matching module.

- The claimed identity is authenticated and established the user's identity in this decision making module.

2 MULTIMODAL BIOMETRIC SYSTEM

This combines two or more unique biometric features of the individuals for authentication. The multiple biometric traits are combined together to perform authentication of individuals, this is the unique feature of multimodal biometric system. In this system the no. of samples of a single biometric trait is combined with the other biometric trait and after that it will check the combined template with the already stored database template and gives result. However, the biometric authentication system is authenticate the individuals biological features which can be either naturally understood or features retrieved or it can be learned to recognize or identify the individual [3]. How fixed a system with the large amount of fraudster to decode the ciphered biometric data flow. The multimodal biometric system is required high computational requirements and it also a robust system so that the fraudster attack is less on this system.

A recent study is performed about the fingerprint verification, the greater accuracy is achieved by taking number of fingerprint samples in the multimodal biometric system to authenticate individual's finger to improve authentication system with greater accuracy [4]. While great attention has been given to the front end processes of this biometric system mode, the backend biometric server architectural framework has received limited attention especially as it concerns emerging economies.

Thus, the next section of this research lays down a framework for proper based on the combination of multiple biometric features.

2.1 Fusion Techniques

The limitations of unimodal biometric system can overcome by multimodal biometric system to integrating information from different sources in a ideal manner. To comparing single obtained source information is common, but comparing multiple sources is more distinctive and the result in improved as well as performance is enhancing of such system and giving more reliable result in multimodal biometric.

The Fig.2 presents the different fusion techniques of multimodal biometric system using no. of sources of information. The multimodal biometric system is representing with one of the following technique:

a) **No. of Sensor i.e. Multi-sensor**

b) **No. of Algorithm of single biometric trait**

c) **No. of sample of single biometric trait**

d) **Multimodal biometric**

Multi-sensor (No. of sensor):- The same biometric sample or trait is captured by no. of different sensors and combine their information for recognition purpose. For example, a face is captured using three dimensional or spectrum camera & generated RGB data to make use of recognition module for the recognition purpose. [15]

No. of Algorithm of single biometric trait: - In the biometric system, the data is captured using biometric device with a single sensor. After that when processing the captured data it used the multiple algorithms of same data and performing recognition function. For example, when in palm recognition system it could make use of line, appearance of palm and Gabor [21], or when in a fingerprint recognition system it could make use of texture of fingerprint and minutiae [20].

In these system they are make use of different type of information from the captured data i.e. sample and use it.

No. of Samples of single biometric trait: - In this system no. of samples of single biometric trait is taken with the help of biometric system. Such type of no. of samples captured in the video recognition system, it captured continuously over a small interval of time. In the above diagram the no. of samples of same face is captured &

recognized it, so the result in no. of samples i.e. multi-sample, the recognition system they combine captured information. Therefore the system is able to perform on different samples of same modalities while need of single sensor.

Multimodal Biometric: - In this biometric system, it will captured data from multiple biometric traits to extend to recognize an object. Some of the techniques are used to merged in multimodal for recognize subject. The multimodal could make use of fingerprint, face, palm and iris techniques for recognition purpose [7].

Fig. 2. Source of information in multimodal biometric system using Fusion Techniques.

3 LITERATURE SURVEY

Multimodal techniques are used in different scenario. For example in the medical field, the regular check up of patient is often preferred primary examination. Therefore from the number of sources the information is collected and performs the overall enhancement of the accuracy of the system. The sensor level fusion and feature level fusion techniques are used to combine the actual data which is captured sensor or raw data. And score, match & decision level methods are used to combine different processed data or it obtained after applying different techniques. [3]

In the feature level fusion the redundant information can be refused, the required differentiate information which is separately retained through feature level fusion. [4]

Table 1. Literature Survey

Author	Biometric Modalities	Fusion Level	Accuracy %
G.Goswami, P. Mittal, A. Majumdar[5]	Face, Fingerprint & Iris	Feature	97%
A.K.Jain, L.Hong,Y.Kulkarni[6]	Face, Fingerprint & Speech	Feature	95%
A. A. Muthukumar et al. [9]	Fingerprint & Iris	Score	96%
S.Ben-Yacoub, .Abdeljaoued, A.Chowdhury[7][8]	Face & Voice	Simple-sum	95.6%
Sumit Shekhar, et al. [10]	Face, Iris & Fingerprint	Sparse Matrices	97.5%

4 FUSION LEVEL

Sensor Level Fusion: - In this level of fusion the data is captured by using no. of sensor or no. of samples and after that the captured data is integrated after its acquiring. The acquired data is going through to the feature extraction directly on the unprocessed data. [17]

While discussing the face recognition system this module is directly performing pixel level integration of face images which is captured using camera. For example, no. of face images can be captured using camera with the no. of face position or face variations as like face is on left angle, right angle, top angle and bottom angle etc. Then no. of sample is combined together and performing face recognition process, such technique is called as mosaicing. [18]

In this directly fusion is also performing using pixels, i.e. pixels are added in different images & create another variation. [19]

Feature Level Fusion: - The data is captured using sensor of system, and then the multiple features are extracted from the captured input data and performing feature level fusion. In this level different feature level techniques are used as like textual feature or structural feature, and by using these features they can apply on inputted data. In face recognition system, on the face images the structural feature is applied or in palm or fingerprint both structural & textual features are required. [20,21]. To combine these features, they can improve the security as well as privacy of inputted data which is captured in multiple biometrics.

A single representation of no. of sample is generated in feature level fusion after applying different feature techniques.

Score Level Fusion: - In this level of fusion the different score level algorithm is used to apply on data which are came from feature level and performing different matchers are fused together.

Also the different other fusion algorithms are used as like minimum score fusion, maximum score fusion & mean score fusion, where by using algorithm they are find these maximum, minimum & mean score of multiple samples and finally generate the final score of that sample. As well as the two author named as Ding & Ross [22] review various techniques of imputation for missing or insufficient information in the score level fusion. The score level fusion is the type of fusion which is most commonly used in different recognition system.

Match Level Fusion: - In this level of fusion the comparison is performed on the inputted data with the template which are stored in database. When we are discussing the face recognition system the comparison of face image against a gallery of images which is stored in system after that match level fusion list is matching with the generated match identity. Some of the match level fusion technique is discussed in the literature; they are highest rank method, logistic regression and borda count. In this technique multiple matchers are applied using the above match level fusion technique. [23, 24]
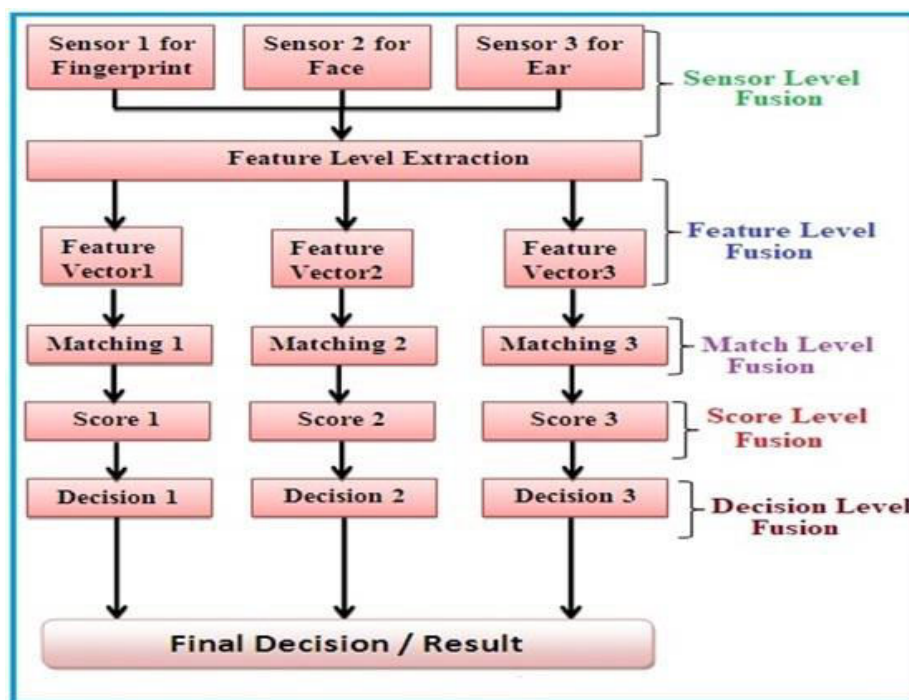

Fig.3. Biometric Fusion Levels

Decision Level Fusion: - In this level, the fusion is performed at the decision level using decision level fusion algorithm [25]. The decision level is need to take no. of matchers i.e. n no. of matchers or classifiers and

combine them based on different decision methods and finally gets the final decision. At most common fusion algorithm is applied on the decision level and performing the decision whether it is true or false on applying other scenario and obtain final decision result.

Thus the fusion in multimodal biometric system can be performed in the different level of fusion and recognition of data using pipeline and used to perform on different obtained information.

5 CONCLUSION

Multimodal biometric system is used to perform recognition of an individual, option of suitable modal and select minimum fusion level and excess in the features extracts are still some of deficiencies in the design of multimodal biometric system needs to be convey. In this paper, different fusion level techniques which are used in multimodal biometric system are discussed here. The no. of biometric modalities is used to enhance the performance, accuracy & security.

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Study of Early Detection and Classification of Diabetic Retinopathy

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ABSTRACT

Diabetic retinopathy (DR) is one of the common reasons for blindness among the working age population in world. Diabetes disease mainly caused due to the abnormality in pancreas gland. If the pancreas does not produce sufficient insulin or human body cannot process it in a proper way then human being will suffer from diabetes. Early diagnosis of DR can reduce or stop the vision loss. A lot off techniques and methods are used for the detection of the diabetic retinopathy Micro aneurysms, bleeding; exudates diagnosis is made on retinal images. Fundal camera with a back mounted digital camera gives important information on images of retina to find out the overall effect of diabetes on the eyes. For early detection of diabetic retinopathy Multilayer perception Neural Network (MLPNN) is used and sensitivity, accuracy, specificity is best among the related work.

Keywords: Diabetic Retinopathy, Retina, Exudates, Pancreas, Hemorrhage, Microaneurysms

1   INTRODUCTION

Diabetes has become one of the fast increasing health threats to the humans worldwide. The number of diabetes patients in the 20 age to 79 age group is 74.2 million in the year 2021, and will increase to 124.8 million in the year 2045 [7]. Diabetes disease mainly caused due to the abnormality in pancreas gland. . If the pancreas does not produce sufficient insulin or human body cannot process it in a proper way then human being will suffer from diabetes. As this disease progresses human circulatory system will get affected and also the retina of human eye also get affected .If diabetes persist for long time retina may get damage and also the blood vessels in retina may get damage and it results in Diabetic Retinopathy. It may cause permanent vision loss to human eyes.

The type 2 diabetes is mostly found in the persons suffering from increased resistance to insulin. The type 2 diabetes is a familiar disease, and related to limited physical activities and lifestyle. Fundus imaging play role in diabetes   monitoring. Eye fundus is sensitive to vascular diseases, fundus imaging is also considered as a candidate for non-invasive screening. Correct   findings of such type of screening depend on correct fundus image capture, and on accurate and reliable image processing algorithms for detecting the abnormalities.

Typically diabetic retinopathy begins with small changes in capillaries of retina. DR is detected by different types of lesions on retinal images such as –

1. Micro aneurysms: Small   dark red spots growing on the roots appear between capillary weakening and retina they are called micro aneurysms.

2. Hemorrhage's: Capillaries rupture and small spots appear bleeding along the nerve fibers in the membrane layers of the eye is called hemorrhage.

3. Exudates: These are cream or white colored lesions conjunctivitis which is caused   by accumulation of lipids and proteins, are indented

2.   LITERATURE AND REVIEW

Paper	Pre processing	Feature Extraction	Performance Parameters	Result
1.Automatic Diabetic Retinopathy Detection Using Digital Image Processing	CLAHE, recursive region growing algorithm (RRGA)	Image extraction	Sensitivity and accuracy	75%
2.Detection and Classification of Diabetic Retinopathy using Retinal Images	Thresholding ,Noise	Image Filtering, Histogram Equalization	Accuracy, Sensitivity, Specificity	88.46%
3.Detection of Red Lesions in Diabetic Retinopathy Affected Fundus Images	CLAHE	Geometric and Intensity Features	Sensitivity, Specificity	96.2%

4.Diabetic Retinopathy Detection through Image Mining for Type 2 Diabetes	Resize, Sharpening, Edge Detection, Thresholding	DWT and GLCM	Accuracy, Sensitivity, Specificity	97.75%
Morphology Based Exudates Detection from Color Fundus Images in Diabetic Retinopathy	Gray scale conversion , Histogram Equalization , Erosion and Dilation	Distance Transform	Accuracy	99%
Detection of Diabetic Retinopathy in Retinal Images using MLP classifier	Multilayer perception Neural Net- work (MLPNN),	mean ,contrast, correlation ,energy, homogeneity	sensitivity, accuracy, specificity	100%

2.1 Automatic Diabetic Retinopathy Detection Using Digital Image Processing [1] In this paper in preprocessing retinal color images are captured through the fundus camera and used to detect the lesions accurately. . We used the Contrast limited adaptive histogram equalization (CLAHE) technique is used for the enhancement of the image contrast, to estimate the background information of the fundus image they have used the median filtering operation with large kernel, to find out different lesion related information like hard exudates, hemorrhages etc. to find out the large exudates they have used recursive region growing algorithm (RRGA). Also they have used DIARETDB1 database which is having 89 images of the retina. This is useful to identify the hard exudates which are present in the fundus images with easy and acceptable sensitivity and accuracy.

2.2 Detection and Classification of Diabetic Retinopathy using Retinal Images [2].The paper study is to detect blood vessel, identify hemorrhages, and to differentiate normal, moderate and non-proliferative diabetic retinopathy. Density analysis and bounding box techniques are used to hemorrhages in retina. Blood vessel detection, classification, Accuracy Assessment, Hemorrhage Detection methods are used in this paper.

2.3 For the detection of red lesions in diabetic retinopathy affected fundus images [3] in this work there separate method is for automatic identification of red lesions in fundus images is used, the method uses a modified approach to match filtering to extract and detect of retinal vascularity and detection of lesions [8]. Vector Machine classifier is used and accuracy is 96.62%.

2.4 Diabetic Retinopathy Detection through Image Mining for Type 2 Diabetes [4] Hybrid System used for diabetic retinopathy detection. Color Fundus Image of retina from DIARETDB1 database is used for to find out the severity of diabetic retinopathy present in it. For preprocessing resizing, sharpening, edge detection, thresholding over the retinal images. For obtaining the wavelet features binarized image is given to DWT and also GLCM features are obtained from the image. KNN classifier is used to calculate the Euclidean distance between images to differentiate as normal or abnormal images. The overall accuracy for the proposed system is 97.75% which is quite high as compared to the existing ones. The accuracy of result obtained is 97.75%.

2.5 To find Morphology Based Exudates from Color Fundus Images in Diabetic Retinopathy [5] flow diagram of the exudates detection system is used in this paper. To enhance the contrast of color fundus images they histogram equalization used after color conversion image in gray scale. After histogram equalization threshoding is used to convert the image to binary. The accuracy of the method is 99%.

2.6 To detect diabetic retinopathy in retinal images this paper work focuses on Multilayer Perception Neural Network (MLPNN), to classify retinal images as normal and abnormal DIARETDB0 database is used. In this paper MLPNN classifier system is used to detect diabetic retinopathy by using several characteristics of retinal images like 64-point Discrete Cosine Transform (DCT) along with statistical features. To obtain appropriate output data a multilayer perceptron (MLP) is a feed forward artificial neural network model is used. The sensitivity and specificity of MLP based classifier are 100% for the DCT formed feature vector.

3. CONCLUSION:

In this study the work focuses on pre-processing, feature extraction, performance parameters criteria of the retinal images For the early detection of diabetic retinopathy various techniques is there, in this paper we have

concluded that for preprocessing Multilayer perception Neural Network (MLPNN) is superior to among the all related work mentioned here, and the sensitivity, accuracy, specificity of is Multilayer perception Neural Network (MLPNN) is 100% among the CLAHE, recursive region growing algorithm (RRGA), Resize, Sharpening, Edge Detection, thresholding and thresholding ,Noise, RGB to HIS.

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Implementation of Face Identification System in a Group Using HOGDescriptor and SVM Classifier

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ABSTRACT

Face identification is most likely the biometric technique that is utilized to distinguish individuals for the most part from their countenances. In recent years, improvement in biometric authentication method, and it's several applications like surveillance security system, developing face based attendance system, face based verification and interest in design of human computer interaction. For all these purpose, face detection and identification play crucial role and this is one of the most demanding research fields in area of pattern recognition and computer vision. In this paper, researcher have proposed an implementation of a system for group faces identification using Histogram of Oriented Gradients (HOG) feature extraction and Support Vector Machine (SVM) as a classifier. The Experimental result of proposed system shows the rate of identification up to 100% with high processing speed.

Keywords: HOG, SVM, Group Faces Identification, Face Identification.

INTRODUCTION:

In this advanced universe of science and innovation computer vision, pattern acknowledgement, fingerprinting verification, biometrics, picture handling, security and so forth., the face detection and recognition plays the most significant role [1]. Face acknowledgement is a PC innovation that decides the area and size of human face in a computerized picture, which is a key innovation in facial data preparing. It has been generally applied to pattern recognition, character confirmation, Computer vision, Mechanized video observation, electronic trade, well-being account and others. There are two regular facial recognition applications that are face recognition and face verification. Face recognition is distinguishing proof methods facial picture can be utilized to characterize an individual's personality. While the face verification, given the face picture and character estimation, then the framework must have the option to express that the estimation is valid or bogus [2].

Some face identification techniques which frequently used by researcher are Eigenface strategy is one of the by and large utilized methods for face identification. Karhunen-Loeve depends on the eigenfaces strategy in which the Principal Component Analysis (PCA) is utilized. This method is simple and effectively used for dimensionality reduction. Gabor Wavelet (GW) is called Gabor Filter (GF) 1-D is introduced by Dennis Gabor and 2-D rediscovered by Daugman. Gabor wavelet technique is such a strategy that utilizes neighborhood highlights for face identification, Multiorientational data of a face picture can be removed by utilizing the Gabor Wavelets. Features and this highlight are in neighbor areas at different scales [3]. Neural Networks (NN): The neural systems are utilized in numerous applications like pattern recognition, character identification etc. The primary goal of the neural system in the face acknowledgement is the achievability of preparing a framework to catch the mind-boggling class of face designs. To get the best execution by the neural system, it must be widely tuned number of layers, number of hubs, learning rates and so on. It is widely used in face identification. In this way, the element extraction step might be more productive than the PCA [4].

In this paper, authors proposed system using Histogram of Oriented Gradients (HOG) is one of the descriptor among numerous others. There are a couple of points of inters of HOG over different descriptors. As HOG works on neighborhood cells, it is invariant to geometric changes and photometric changes, aside from object direction [5].

Literature Survey: In face identification method, finding a face from a group photograph is a challenging task. Submitted method used Viola Jones algorithm for face detection, HAAR Wavelet and correlation coefficient recognized the face at dissimilar poses, system is more accurate with processing time is 5 seconds [6]. The system recognized face from group images using LBPH algorithm with accuracy up to 98% [7].

Submitted multiple face recognition fusion technique with 2D DWT and PCA, K- Nearest neighbor given face recognition accuracy 95.56% [8]. Used Multi PIE and Buffy data set with three different models Fisher's Linear Discriminant Analysis (FLDA), conditional probability model and joint probability model. Result shows conditional probability model performs better improvement as compare with other two models [9].

Proposed Methodology: Histogram of Oriented Gradient (HOG) is one of the elements used to recognize protests in PC vision and picture handling. A component descriptor is an agent of a picture or a picture fix that improves the picture by extricating the valuable data and tossing undesirable data. This method includes events of inclination direction in restricted parts of a picture discovery window, or district of intrigue descriptor among the all and generally utilized for object recognition. Hoard descriptor disintegrated pictures into little squared cells, process the histogram of arranged inclinations in every locale. It is the dispersion of estimations inside the picture area and needful for distinguishing proof of surface articles with various shapes [10].

CREATION OF HOG FEATURES CONSIST FOLLOWING STAGES

Stage 1: Calculation of gradient: To discover a HOG descriptor, first we have to ascertain the X and Y inclinations, at that point we can compute a histogram of slopes determined with following equations.

-1	0	1

-1
0
1

Gradient X:

Gradient Y:

f(x+1,y)-f(x-1,y)   (1)

f(x,y+1)-f(x,y-1)   (2)

Equation for Gradient Magnitude :

$M(x,y) = (gx^2 + gy^2)^{1/2}$ (3)

Equation for Gradient Orientation :

$\theta(x,y) = \tan^{-1}(gy/gx)$ (4)

Stage 2: Generation of Histogram : The second stage of calculation is making the cell histograms. Every pixel inside the cell makes a weighted choice for a direction put together histogram channel based with respect to the qualities found in the angle calculation.

Stage 3: Normalization of Block : for evacuation of commotion, a standardization should be possible in the wake of computing histogram vectors.

Support Vector Machine (SVM): It is a discriminative classifier, officially characterized by an isolating hyperplane. On the other hand, given marked preparing information, the calculation yields an ideal hyperplane

Which orders new models. For a directly divisible arrangement of 2D-focuses which have a place with one of two classes, discover an isolating straight line [11].

SVM is utilized to break down information and perceive design. They comprise a lot of administered learning models fused with learning calculations. Typically, for characterization and relapse investigation, SVM are utilized. SVM are utilized to tackle multi class issue. The point of the calculation is to discover a hyperplane between two classes. Two equal hyper planes are build on each side of the hyperplanes that different the information. As shown in fig.1 H_1 does not split the classes, H_2 does, but no more than with a little boundary H_3, divide them with the maximal boundary [12].
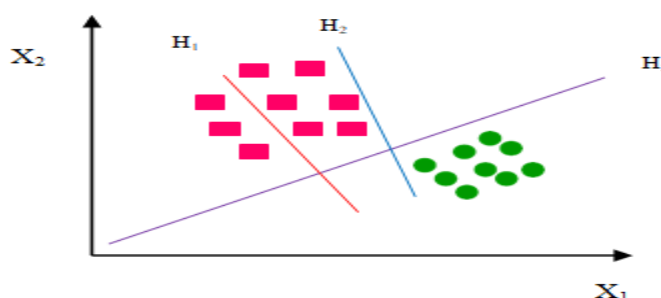
Fig. 1. Two dimensional plot for SVM

The architecture of the proposed methodology is shown in figure 2. It is constituted as input state, in which enter picture of multiple faces, face detection carried out with a robust technique viola Jones algorithm, Histogram of Oriented Gradients is a powerful feature extractor, classification purpose Support Vector Machine is good binary classifier. And the final stage is face recognition. All this algorithm is applied on IMFDB dataset in MATLAB 16.
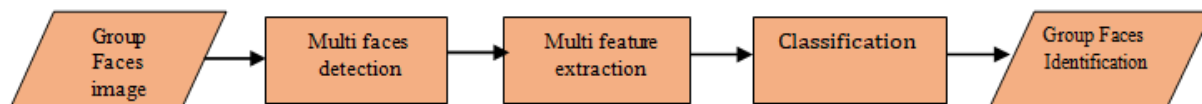
Fig. 2. Architecture of Proposed system

load trainimages;%imagesload trainlabel;%label selfeat=handles.Selfeat;

TestImages=handles.TestImages;

waitf = waitbar(0,'Extract Features...');if selfeat==1%HOG

for i=1:size(images,4) hogfeat=HOG(rgb2gray(images(:,:,:,i)));Trainfeat(i,:)=hogfeat';

waitbar(i)end

Fig. 3. MATLAB code for HOG feature extraction.

Figure 4 shows test image with HOG features, figure 5 are images calculated by X gradient, Y gradient and magnitude of Y gradient.

Fig. 4. Original image (source: Google images) with HOG feature extracted image
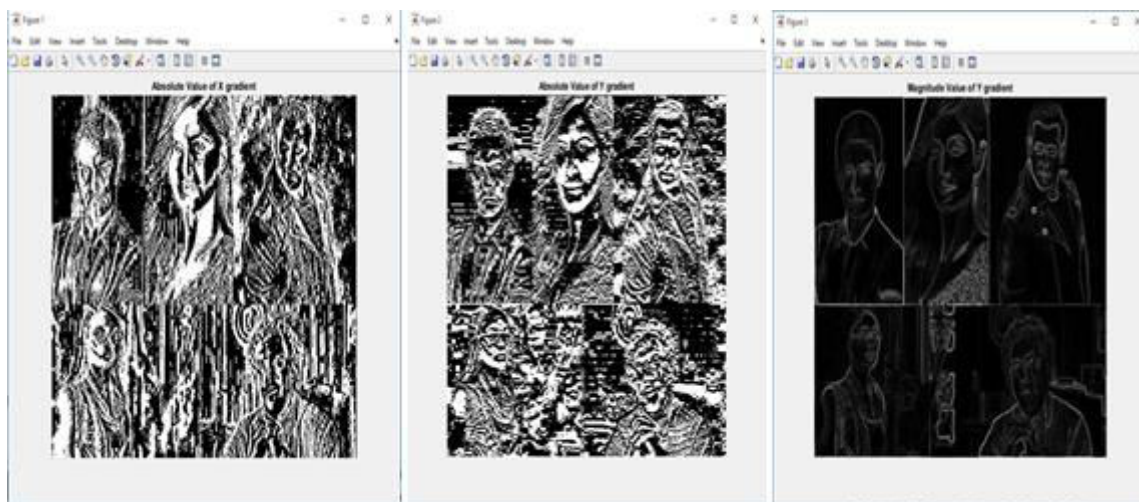
Fig. 5. X, Y gradient and magnitude of y gradient images

Figure 6 shows group faces detection and histogram of test image, output of proposed methodology is prove in figure 7 test face and it's match face.

Fig. 6. Detected group faces and it's histogram

Fig.7. Identified group faces

Dataset: Indian Movie Face Database (IMFDB) is a benchmark for face recognition algorithm in unconstrained environment. IMFDB is created by frames extracted from different Indian movies in various languages [13].

IMFDB consist of

1) 34512 facial images belongs to 100 Indian actors
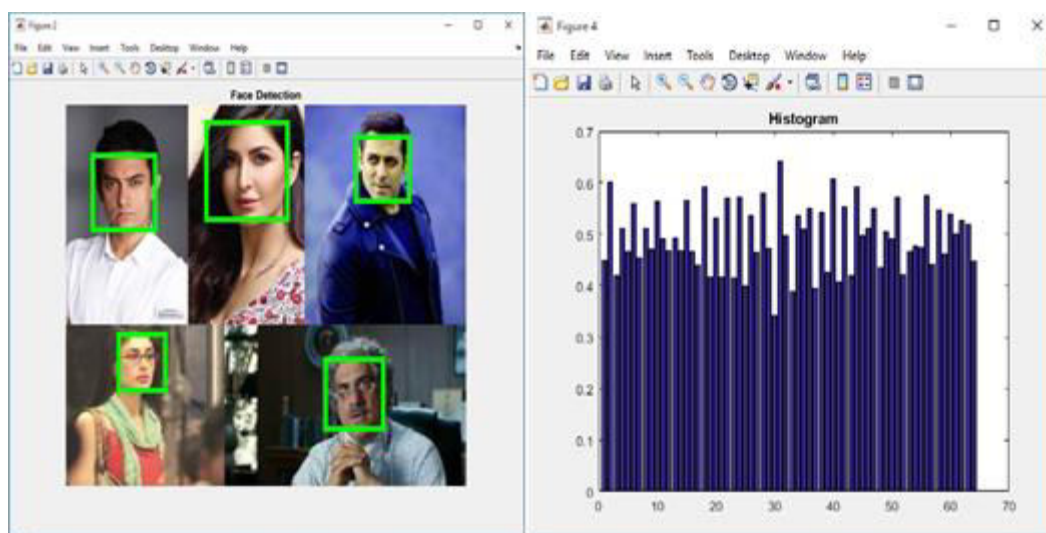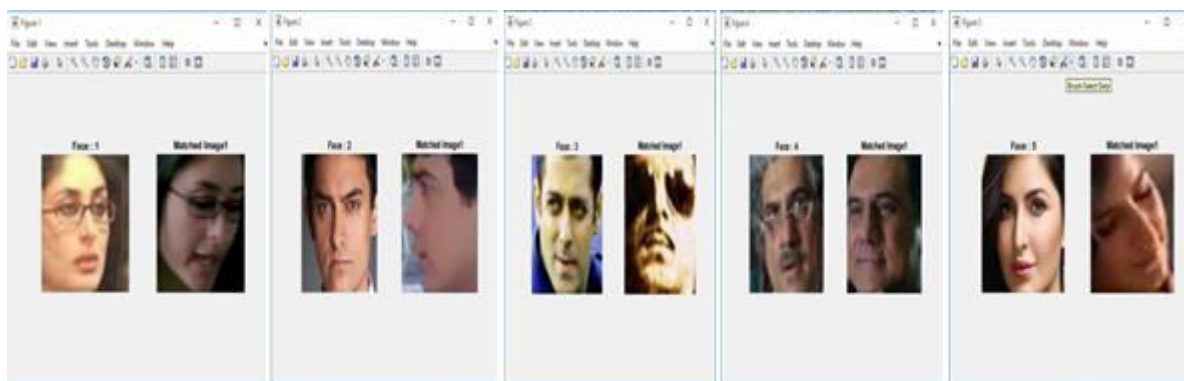
2) collected from approximately movies 103.

3) Male actors = 67

4) Female actors = 33

5) Each actor has 200 images.

Result Analysis: Implementation of proposed method shows using HOG feature extraction and SVM classifier, yield group face recognition rate up to 100% for 5 groups of faces, table 1 illustrate with time required for feature extraction and face recognition. Table 2 demonstrate measures of classifiers it includes Accuracy, Sensitivity, Specificity, False Acceptance Rate, False Rejection Rate and error rate.

**Table 1**. Detection and Identification rate for group faces

Group faces image	No. faces in image	No. of faces detected	Time taken for training (sec.)	Time required for identification	Group faces detection rate (%)	Group faces identification rate(%)
1	11	11	10.48	43.02	100	40
2	10	10	8.67	40.03	100	70

| 3 | 6 | 6 | 8.59 | 24.21 | 100 | 83.33 |
| 4 | 5 | 5 | 9.34 | 7.73 | 100 | 100 |

Table 2. Classification measures

Accuracy	Sensitivity	Specificity	False Acceptance Rate	False Rejection Rate	Error rate
94.84%	30.39%,	97.24%,	2.69%,	64.51%,	5.16%.
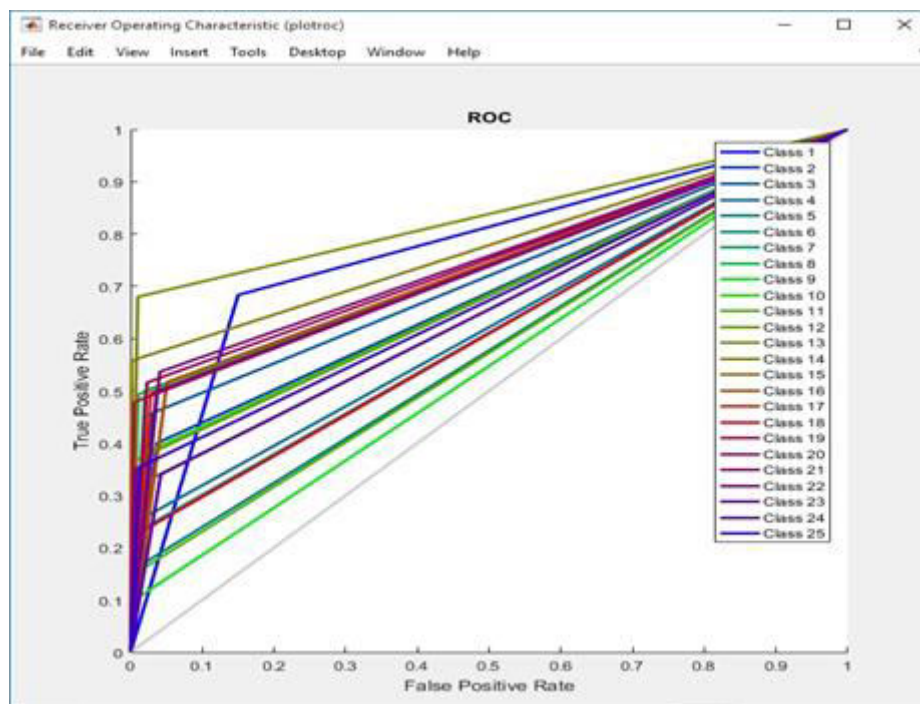
Fig. 8. Receiving Operating Characteristic curve

CONCLUSION:

The experimental result show that the Histogram of Oriented Gradients algorithm and Support Vector Machine performs better for IMFDB dataset. For every group of picture Viola Jones detect 100% faces. For group of 5 faces it gives up to 100% identification rate with less execution time. As no of face are more, rate of identification reduces and execution time increases with this dataset. SVM classifiers measures accuracy rate up to 94.84%, false acceptance rate is 2.69%, false rejection is 64.51% and error rate is 5.16%.

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Kidney Disease Prediction Using Deep ANN

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ABSTRACT.

Kidney disease is one of the critical diseases occurred due to improper functioning of one or both kidneys. if predicted at an early stage then is cured but it is very difficult to predict at an early stage. This proposed research helps to detect kidney disease at an early stage automatically with the help of the deep neural network technique and flask web app. This research gives kidney disease prediction but also gives information about how this disease occurs, what are preventive measures used if disease occurs, which treatment can be used to cure the kidney disease. This research will be beneficial to doctors and technicians to save their workload. This kidney disease prediction system gives 97.50% accu- racy.

Keywords: ANN, flask, deep learning, deep ANN.

1   INTRODUCTION

The kidney is the most important organ in the body. It has functions like removing waste from the blood, cleaning your blood, maintaining osmotic pressure by control-ling salt and water. making renin to control your blood pressure. making a chemical called erythropoietin which will be useful for red blood cells as well as making vitamin D which is useful for bone health and for others. When some waste products or some fluids are built up in the body that could not process out from the body at that time it affects our body and your kidney may get damaged. Some symptoms may arise if your kidney is damaged like swelling on the body, nausea, sleeping problem, difficulty to take a breath, weakness may arise. If we do not take care in the primary stage then kidneys get completely stop working which is called acute kidney disease or acute renal failure.

Diagnosis can be done urine test or blood test and in some cases ultrasound, a biopsy is used to detect chronic kidney disease. When the kidney does not process out waste from the body then dialysis treatment is used to remove waste substances from the blood. If the problem still persists for a longer time and the kidney does not respond well for dialysis then kidney transplant treatment is used.

Early prevention is better to get rid of this Chronic disease to prevent CKD firstly maintain the sugar level and blood pressure, weight must be controlled, eat healthy food, use less salt in food, drink plenty of water do not drink or smoke, avoid the use of pain killer tablet number of times, stress should be maintained, do exercise regu- larly, do regular checking and do a regular test like blood test and urine test to check creatinine level. [9]

The kidney has a shape like a bean. There are 2 kidneys in the human body. The kid-neys are present below the ribs cage. The kidney can filter blood up to 120 to 150 quarts to generate 1 to 2 quarts of urine. To produce urine there are a lot of steps are involved like excretion and reabsorption. This process is important to control the body's chemicals. A person can live without kidneys for up to 18 days approximately.[5]

Chronic kidney disease is also called chronic renal disease. If there is a problem in the functioning of the kidney for some months or years then that may be chronic kidney disease. Chronic kidney disease is mostly found in diabetic patient or patients who has high blood pressure. Chronic kidney disease is caused due to drinking less water, smoking, not taking a healthy diet, sleeping problems, and many more other factors [2].

Chronic kidney disease normally occurs in people whose age is above 60. The main reason behind that is decay in the kidney that minimizes the glomerular filtration rate. If this glomerular filtration rate is reduced for more than 3 months then the chronic disease has occurred. Chronic kidney disease is the 10th big reason behind the causes of death all over the world. Detecting a kidney disease at an early stage is beneficial to avoid complexity and costly treatments like kidney transplants or dialysis. [3]

If a chronic disease is not detected and treated to cure at an early stage then it shows some symptoms like blood pressure, anemia, poor nutrition, nerve damage, weak bones, less immunity. At a later stage, some harmful levels of fluids, electrolytes, and wastes can form in the blood and our body. The GFR (Glomerular Filtration Rate) is the most used method to measure kidney function levels.

The level of chronic kidney disease is manipulated from results of creatinine present in the blood, age of the person, gender of a person, and other many more factors. [4] Creatinine and Bicarbonate available in the blood are important factors to detect chronic kidney disease. [7]

The objective of this research is to detect chronic kidney disease by automated way to reduce the work of doctors and technicians it produces speedy and accurate results and also to give proper information about how kidney disease occurs, what are the symp-toms of CKD and what are the treatments available for it to give awareness about chronic kidney disease in the society.

The idea of this research came in the covid situation as the number of patients are more and less a number of doctors and trained staff are more and due to pandemic situation doctors and technician are overburdened, they have to check more patients in less time so this research gives detection of kidney disease early by providing fea-tures and got accurate results.

2 RELATED WORK

(1) In this paper, the author uses an Adaptive hybridized deep convolutional neural network method has been used. CNN is used to increase the accuracy by minimizing the feature dimensions. The author performs experimental results on the Internet of Medical things platform.

(2) The author uses machine learning methods for detecting chronic kidney disease like Ant Colony Optimization (ACO) and Support Vector Machine. The accuracy got for this research by others is 96%.

(3) The author uses a dataset from the UCI machine learning data warehouse to detect chronic kidney disease. The author uses the Apriori algorithm for the detection of chronic kidney disease. The author uses 400 instances of CKD patients with 10-fold cross-validation testing and all the results are compared with Bayes, zero R, One R, J48, etc., and accuracy got is 99%.

(4) In this study author stated that CKD disease does not show symptoms at an early stage that so it is difficult to diagnose and treat. In this research, the author uses ML techniques like decision tree, SVM, etc. is used to detect disease out of that decision tree gives 91.75% & SVM gives 96.75% accuracy.

(5) The author uses the UCI dataset for the detection of CKD. The author uses machine learning methods, out of 11 machine learning methods available extra tree classifier and random forest classifier gives the best results.

(6) In this research author uses three machine learning algorithms like support vector machine, random forest & hybrid neural network model. Author also uses an extra tree classifier. The author then uses the random forest method and he gets 100% ac- curacy means the model is overfitted. The accuracy get for SVM is 84.78% and the hybrid model is 97.82%. The hybrid model is the combination of SVM and random forest method of machine learning technique. The Hybrid model shows better perfor-mance than SVM and the random forest method.

(7) In this research paper 400 records of patients with 10 features are taken from Bade General Hospital. The author uses the DNN model to predict CKD in the patients. The proposed model gives 98% accuracy. The author also stated that creatinine and Bicar-bonate features have more impact on the CKD prediction.

(8) Author uses a neural network model and a 10-fold cross-validation method for the prediction of CKD. The author also uses machine learning techniques SVM, KNN, Decision tree, and Gradient boost to classify the CKD but according to an experiment done by the author, he concluded that a neural network with a 10-fold cross-validation method gives 98.25% accuracy.

3 METHODOLOGY

3.1 Proposed Methodology

In the existing study number of authors do study on kidney disease prediction but they all use nearly machine learning techniques to detect the disease. The drawback of ma-chine learning techniques is they are not detecting the features which are important to predict chronic kidney disease, that's why in the proposed model deep ANN technique is used from the deep learning model.

Dataset CKD used for this research is downloaded from the well-known website Kaggle. This dataset is of CSV. It contains total 25 features for predictions of chronic kidney disease. The dataset is imbalanced and some values are missing that dataset is preprocessed using preprocessing techniques.

3.2 Algorithm

In this research, the Deep ANN algorithm is used to detect chronic kidney disease. For this research 5 keras, sequential layers are added to create the sequential model out of that first layer has 512 neurons and the input dim is 23. We add input only in the first layer then we add dense layers with 256,128,64 neurons with activation function ReLU are used and in the last layer dense output layer is used with sigmoid activation function is used. to compile the model binary_crossentropy function and Adam opti- mizer is used for optimization. Chronic

Kidney disease prediction model using deep model gives Binary output in the form of 0 and 1 that is it is categorized into two classes normal patient and chronic kidney disease patient. This research uses two or more that is 5 layers are used to classify the disease so this model is of deep learning type.

3.3 Proposed Architecture

In this proposed model Keras and TensorFlow framework is used with the flask web app to detect the kidney disease prediction. The proposed model uses a deep ANN model that is a deep learning model to detect the required features automatically more we go to deep more we get the accuracy. Sometimes overfitting issues may occur with the model that can be avoided by using the dropout function.

In this model after preprocessing the dataset, the data is split into train and test the data. By applying the deep ANN model with optimizer adam and loss function bi- nary_crossentropy we can get the result. This model produces binary results in the form of '0 'and '1'. '0' means the patient is normal and '1' means the patient has chronic kidney disease. The model is saved using the model. save method and then it is deployed in the flask web app. The flask web app then checks certain features by taking input from users that values are matched with the dataset and gives a prediction whether the patient has kidney disease or not. The following figure1 shows an exact architecture of the proposed model used to detect chronic kidney disease.
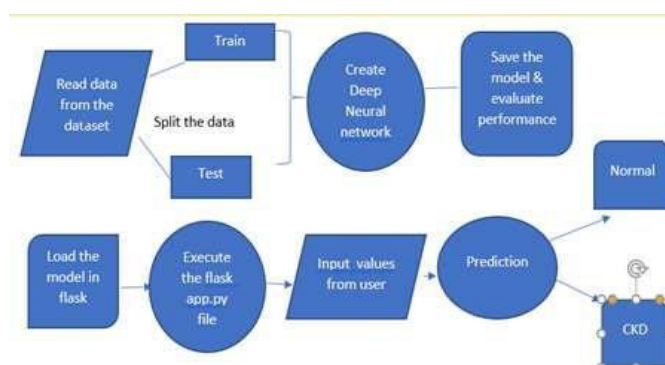
Fig. 1. Proposed architecture for detection of CKD

4 EXPERIMENTAL RESULT

Using the Deep ANN approach this research got 97% accuracy.

The following figure2 shows the Deep ANN Keras sequential model created summary used to detect chronic kidney disease. This model uses 5 layers with total trainable parameters of 184,833.

Model: "sequential_7"

Layer (type)	Output Shape	Param #
dense_46 (Dense)	(None, 512)	12288
dense_47 (Dense)	(None, 256)	131328
dense_48 (Dense)	(None, 128)	32896
dense_49 (Dense)	(None, 64)	8256
dense_50 (Dense)	(None, 1)	65

Total params: 184,833

Trainable params: 184,833

Non-trainable params: 0

Fig. 2. ANN model for detection of CKD
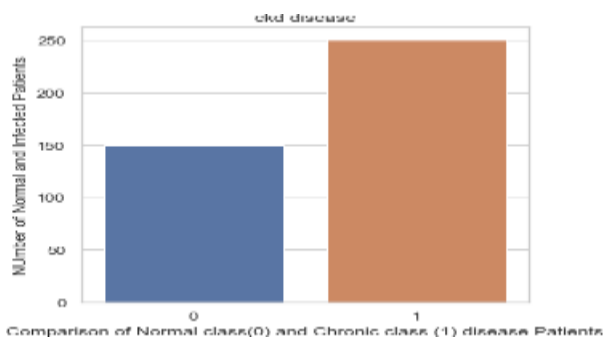
Fig. 3. Comparison of Normal and CKD Patients
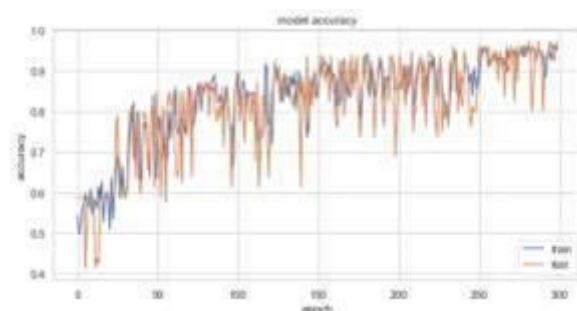
Fig. 4. Accuracy of CKD Prediction model

After evaluating the performance of the deep ANN model, we got the result like below[0.1480284184217453, 0.9750000238418579]

Fig.5 Performance evaluation of model

We got 97% accuracy of the model and the loss we got is 0.14%.
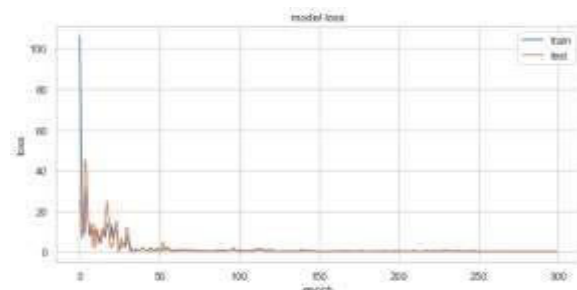
Fig. 5. Loss of CKD Prediction model

The Following figure shows the confusion matrix for chronic kidney disease detection.[[138 12]

[2 248]]

Fig. 6. Confusion Matrix

Fig. 7. Heat map for CKD disease.

5   CONCLUSION

In this research chronic kidney disease is detected automatically using a deep neural network technique This research will be useful for doctors as well as expert technicians to detect the disease at an early stage. This research saves the workload of doctors as well as experts technicians. The main purpose behind the research is not only to detect the CKD but to give awareness about the disease its symptoms and prevention tech- niques so that patients get prior knowledge about the disease and they can save their life. This result gives 97.50% accuracy.

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Covid Detection Using Deep Learning Model with Flask App

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ABSTRACT

One of the rapidly spreading and hard-to-detect viral diseases is COVID. It is at present one of the world's utmost difficult tasks. According to recent figures, the many patients detected with COVID are geometrically expanding, with above 40 crores authenticated cases; the illness is dispersal to several nations throughout the world. The incidence of COVID dispersion over the world is investigated in this study. Using real-world datasets, we describe ResNet 50 pre- model to detect COVID patients. To detect such patients, our method examines CT scan images.

Keywords: Artificial Intelligence, CT scan, ResNet50, COVID-19.

1. INTRODUCTION

COVID is a universal epidemic that originated in December 2019 by a Chinese medical doctor in Wuhan, China. There is currently a number of approved human vaccination to combat it. But no vaccine gives a guarantee to cure this disease. COVID-19 spreads more quickly. when a group of people is in close proximity as a result, travel limitations exist to keep the disease from spreading and wash your hands frequently. To avoid viral infections, it's usually a good idea to take precautions. Meanwhile, the most common infections are fever and cough symptoms. Other symptoms, such as chest pain, may appear. Uneasiness, phlegm production, and an uncomfortable throat are all symptoms. COVID may develop virus-related pneumonia, which has a 5.8% mortality percentage.

COVID has a mortality rate of 5% that of the 1918 Spanish flu epidemic. As of May 27, 2020, the overall amount of people diseased with COVID global was 5,790,103, with 357,432 fatalities and 2,497,618 retrievals informed. The majority of incidences were reported in the United States, Spain, Italy, France, Germany, mainland China, the United Kingdom, with 78,541 instances documented, which has the greatest number of informed cases of any Arab country.

Meanwhile, there have been 720 documented cases in Jordan, with 9 fatalities and 586 recoveries, respectively. In Australia, there have been 7150 documented cases, with 103 fatalities and 6579 recoveries, respectively. IT technology facilities, such as smartphone apps, have been working to decrease the hazard of contagion in mainland China since February 2020. When someone is infected with the virus, the mobile apps advise users to self-quarantine and notify the appropriate health authorities. They also keep track of sick people and the last people they spoke with [4].

The disease has grown exponentially over the world since it was originally identified, and it has now become a global problem. According to a study conducted by [7], the fatality rate of COVID-19 is 4.5 percent worldwide. Patients aged 70–79 years had an 8.0 percent mortality rate, whereas those aged 80 and up have a 14.8 percent mortality rate. Patients over the age of 50 who have chronic conditions are at the greatest danger, according to the authors, and should take extra precautions. One of the utmost serious worries posed by COVID is its quick spread, with 1.5–3.5 persons infected every time they come into touch with an infected person [30]. This means that if ten persons test positive for COVID-19, they are an extra possibility to contaminate 15–35 others. As a result, unless intervention steps are taken, COVID-19 can contaminate a huge amount of the public in a matter of days.

However, due to the comparatively small number of radiologists and the high rate of re-examinations of sick persons who want to know how their condition is progressing, they are unable to fully address the problem. To address the limitations of CT scans and X-rays while also assisting radiologists, we must increase the procedure's speed. This can be accomplished by incorporating artificial intelligence (AI) techniques into modern diagnostic systems.

One of the main objectives is to decrease the effort and time that is essential to do CT scans on positive patients of COVID, while also determining the rate of illness progression [19]. For COVID diagnosis, radiological imaging is considered a useful screening tool [10]. The radiological history of COVID-related pneumonia was found to be consistent with the scientific character of the disease by [26]. Nearly all COVID patients have shown alike characteristics on CT scans, including ground-glass opaqueness in the early stages and lung

association in the later stages. Actually, the shape and distribution of the outlying lungs can be rounded. As an alternative to time-consuming and labor-intensive traditional procedures, AI can be utilized to analyze a COVID patient in the first place. We propose using AI to predict COVID instances and diagnose COVID patients using CT Scan pictures in this research.

2   NEEDS OF FAST COVID-19 DETECTION

Across the globe, COVID-19 evolve as the biggest reason for a large number of deaths as the number reached 244K till now. This virus is highly dangerous because after entering into the respiratory system of human beings, it mainly attacks the lungs of a person and creates the type of disease which is more dangerous and severe than Pneumonia. A large amount of fluid-filled in the lungs which decreases the respiratory power of a person. At the initial stage, it is difficult to track or recognize this disease as it has normal cold fever types of symptoms. With the passage of time, we will know about more ways of diagnosing it [28]. Since many efforts have been made to create an efficient COVID-19 drug, the only effective method of protection remains social isolation and lockdown of several cities around the country. The lockdown, on the other hand, has a negative impact on the country's GDP and has a negative psychological impact on people's health and minds. COVID-19 is causing an exponential increase in the number of people who are infected all over the world. The largest afflicted countries, such as the United States, Italy, and Spain, have already exceeded China in terms of economic impact and will have a disastrous effect on the world economy. As Richard Baldwin said, this illness infects your economy and is medically dangerous [17].

Deep Learning approaches have exploded in popularity in recent years, drastically altering the landscape of numerous academic fields. Particularly in the medical field, image data sets such as retina images, chest X-rays, and brain MRI give promising findings with high accuracy percent when deep learning algorithms are used [18] [10].

3   METHODOLOGY

In the proposed model covid disease detection is done using the pre-trained ResNet 50 model. Firstly, the dataset is taken from the well-known website kaggle.com then the images are read, then images are preprocessed using resize method to change the size of the images, then images are converted into grayscale and converted the images into an array, and finally image converted into a NumPy array type. Images are preprocessed using a label encoder and one hot encoder to give labeling to the class to predict. After preprocessing images are split into train and test folders. Model is trained using ResNet model and for training purposes, images are taken as input from the train folder. After the model compilation and fitting the model, its performance is evaluated and if the performance of the model is good then it is saved using the model. Save method and then saved model is used to deploy it into the flask web app. When executing the flask web app, we take input the image from the train folder and it predicts the input image by training the image with the saved ResNet50 model and gives a prediction of whether the patient is a sufferer of covid 19 disease or not.
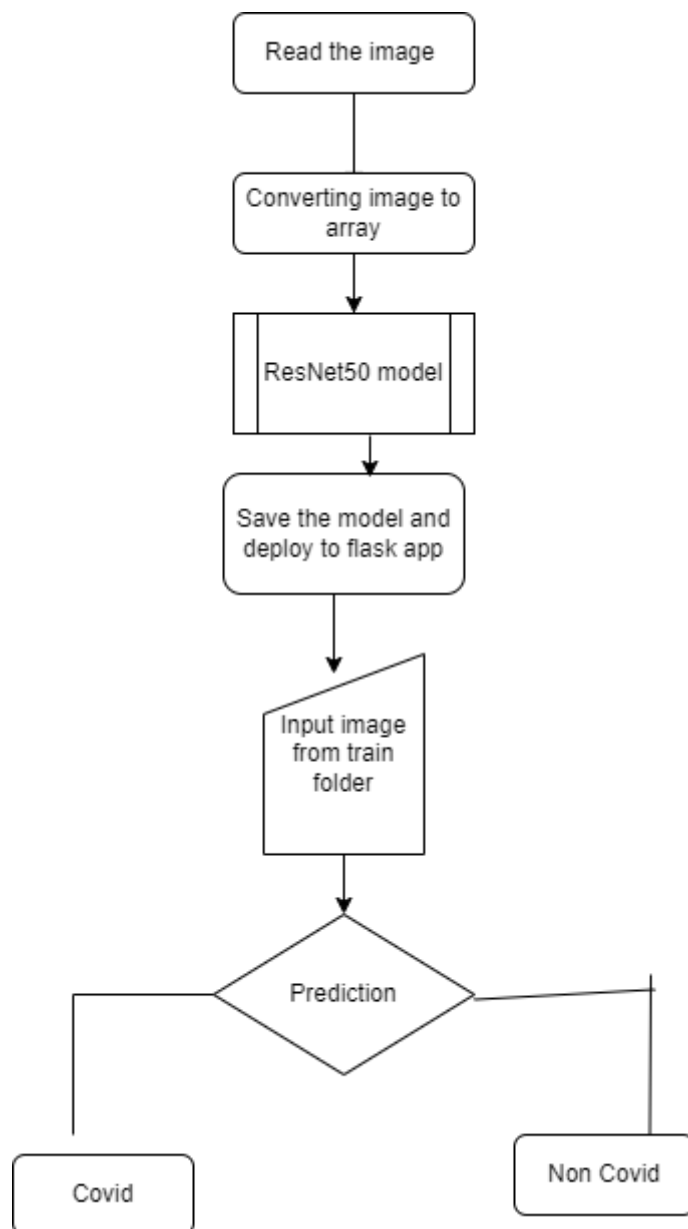
%

Fig. 1. Proposed flowchart for covid disease prediction.

4   EXPERIMENTAL RESULTS

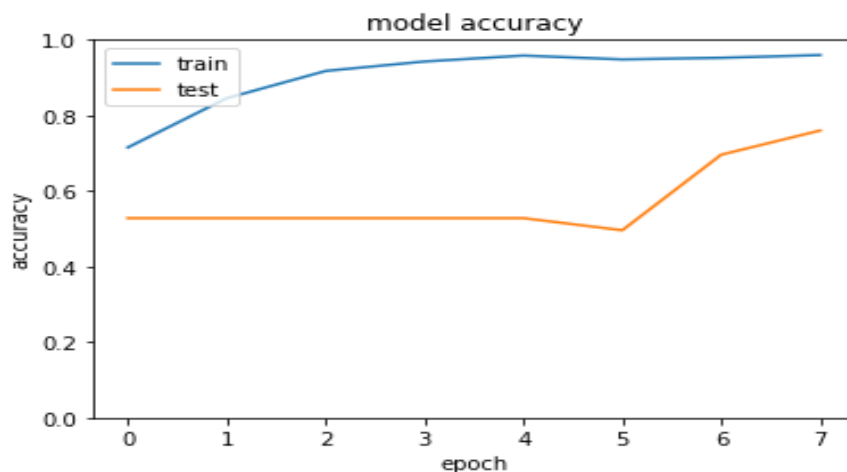The proposed model gives 95.70 % accuracy on trained data. The following figure shows the model's accuracy.

Fig. 2. Covid 19 disease detection Model accuracy

Following fig 3. shows the classification report for the covid 19 disease detection proposed model.
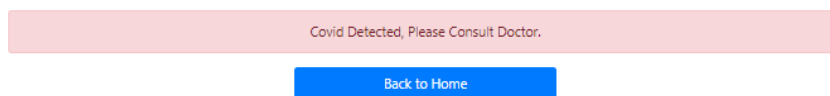
	precision	recall	f1-score	support
0	0.97	0.56	0.71	66
1	0.67	0.98	0.79	59
accuracy			0.76	125
macro avg	0.82	0.77	0.75	125
weighted avg	0.83	0.76	0.75	125

Fig. 3. Classification report for covid 19 disease detection proposed model

4.1 OUTPUT SCREENS
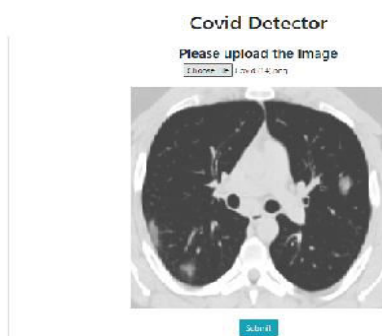
Fig. 4. Input image from train folder

Fig. 5. Output image after prediction.

5 FLASK APP IN COVID DETECTION

Infectious diseases such as Covid-19, which spreads and contaminates the air, have been a severe issue in recent years, prompting an increase in the use of facemasks. Science has proven that using AI, daily tasks may be completed more successfully and even more quickly (Artificial intelligence).

Flask App is a web application that addresses a portion of the world's current COVID -19 viral pandemic problem. It assists users, such as doctors, in examining X-ray images of their lungs. They must upload a photocopy or an image of the X-ray to the web application, and they will receive a response indicating whether the COVID-19 effect is still present in the lungs. It will also aid in predicting when a person is at risk of contracting coronavirus.

6 CONCLUSION

The speedy spread of COVID over the globe, as well as the increasing number of demises, necessitates immediate action on the part of every sector. The ability to predict probable infections in the future will be the possible authority to adequately deal with the effects.

Furthermore, consistent check-ups are mandatory to retain the path of the number of sick people, and separating sick individuals and applying medical actions are frequently necessary. Several additional aspects, such as environmental impacts and commonalities between the utmost affected places, should also be measured in order to sluggish the spread of COVID-19, and precautionary stages should be reserved.

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Sentiment Analysis of Customer Reviews Using Machine Learning Algorithms for Recommendation

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ABSTRACT

In these recent years, there is rapid growth in the usage of social networking sites by the customers and therefore increase in the amount of data generated by these platforms as well. Many applications and social platforms allow customers to express their opinion in terms of feedbacks which involve customer likings or disliking towards events, products etc. It is therefore required to design such a tool which will help people understand the current status of products and their popularity. This study focuses on design and development of a model which deals with electronic product review analysis. In this study, Amazon review datasets are used for the analysis purpose. The study focuses on data collection at real time, its visualization in terms of popular graphs as well as sentiment analysis using machine learning approach. In the proposed study, there are five supervised machine learning algorithms used for the analysis purpose along with performance measures. Based on the results given by the algorithms, comparative study is carried out so that a better gadget of a specific brand can be recommended to the customer.

Keywords: Sentiment Analysis, Machine Learning Algorithms, Recommendation, Polarity Classification

1   INTRODUCTION

In the modern digital age, social network websites are the main sources of customer data generation resulting in much valuable insights to understand customer opinions, their reviews and comments. It is therefore required to perform rigorous analysis of this data and help customer as well as business people to their decision making and/or buying strategies. Before social media, surveys and discussion forum groups were the sources to know customers buying behavior which was quite time consuming and complex task. But in recent years, the tools and technologies emerging especially in field of data mining are useful in retrieving correct information and understand customer behavior. Various aspects of social networks can be studied by designing good business model frameworks using advanced data mining tools and techniques. In the case of e commerce-based social sites, it is required to design good, user-friendly models, recommendation systems that help customers understand the current market and quality products whereas at the same time it has to help business companies to upgrade themselves as per customer requirements and improve product quality. The major aim of this study is to focus on the design and development of a model for electronic gadget recommendation based on sentiment analysis of customer reviews and comparative study of accuracy measures. Following are the objectives of this study

1. Design and development of a system for electronic product recommendation.

2. Acquisition of raw data from E-commerce social sites.

3. Conversion into standard datasets.

4. Sentiment Analysis using machine learning algorithms.

5. Data Visualization.

2   LITERATURE REVIEW

The literature shows that in the field of sentiment analysis and machine learning approaches with respect to social media and e-commerce- based applications, huge work has been carried out by researchers and studies has been performed. In the world of the Internet, the majority of people depend on social networking sites to get their valued information, analyzing the reviews from these blogs will yield a better understanding and help in their decision-making [4]. Among various techniques, sentiment analysis is very commonly used for knowing customer opinion. Sentiment analysis (SA) is an intellectual process of extricating user's feelings and emotions [4]. Machine learning strategies work by training an algorithm with a training data set before applying it to the actual data set. Machine learning techniques first trains the algorithm with some particular inputs with known outputs so that later it can work with new unknown data [4]. Authors of [5] introduce a novel approach for automatically classifying the sentiment of tweets into positive, negative and neutral sentiment. The reviews are collected using Twitter API for the language English [5]. The reviews in the form of tweets which is restricted

in character limit contain some unwanted data as well which is not useful for sentiment detection. Hence preprocessing of the reviews is required. In [5], for preprocessing purpose three different dictionaries are used. First, Stopword Dictionary which helps to find stopping word in given tweet, second is Emoticon Dictionary which handles emoticons with their respective emotional status required for polarity detection are used and third is Acronym Dictionary used to find full forms of given acronym in the tweet. Ankur Goel in [6] performs a comparative experiment on classification of tweets using Sentiment140 and SentiWordNet along with Naïve Bayes algorithm. A web product ranking system by using sentiment analysis is presented in [7]. When the user passes a query about any specific product, the system generates ranking results of that product. The data source is Amazon product review pages which is very first preprocessed to get clean text. Further sentiment analysis is performed and matching ranking results are generated. Authors of [8] proposes a technique to tune the SVM performance by using grid search method for sentiment analysis. The proposed technique makes use of information retrieval metrics like precision, recall and F measure. The datasets used for practical implementation include Twitter dataset for US Airlines, Apple, Google, Microsoft and Internet Movie Database (IMDB) and platform used is Weka. The authors in [9] state that sentiment analysis or opinion mining plays an important role while making a decision towards a particular product or a service. They have undergone experimental results which show that Naïve Bayes (NB) classifiers are highly scalable and they are very popular method used in text categorization. As per Authors of [10], handling of thousands of reviews is quite complex and time consuming so proposed a model using supervised learning method on a large-scale amazon dataset to polarize it and get satisfactory accuracy.

3   METHODOLOGY

The main objective of this study is design and development of Graphical User   Inter   face for the sentiment analysis of customer reviews available on Amazon web site   and its data visualization. The tool is designed to provide graphical user inter   face for   easy access to the menus and working with analysis of data properly. The   design and   development of the tool is carried out using five steps as mentioned   below.

The proposed system is having following steps.

- Data Acquisition

- Data Preprocessing

- Feature Extraction

- Model Construction

- Result Analysis

- **Data Acquisition**

The system uses Python as the open-source tool for designing the User Interface (UI) of our system. In this UI, there are two different tabs designed especially for Real-time Data Analysis and Historic Data Analysis. In historic data analysis we can browse in the local repository to select the required dataset whereas, in case of Real-time data analysis, we enter a Product ID of the mobile brand whose reviews are to be analyzed. The local repository contains a huge list of varied mobile brand datasets reviews. Also, by taking product ID from Amazon URL, we can handle a variety of customer review datasets for a different period. All these text reviews are then stored in CSV files for analysis purposes.

Fig. 1. Proposed *Methodology*
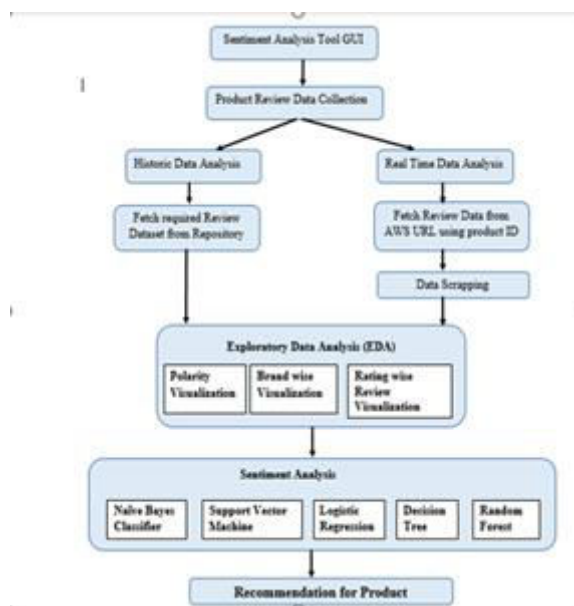
- **Data Preprocessing**

In case of text analysis of customer reviews, preprocessing is the very important and first step as the data or information present in the review is based on customer's perspective but it has to be converted to its equivalent form which can be further processed for sentiment identification. In this phase, the several techniques like POS tagging, Stemming and Stop word removal are applied to data set for noise reduction and facilitating feature extraction.

- Tokenization - is used to remove brackets, punctuations and words containing numbers and get list of words only.

- *Stop Word Removal – It removes high frequency words or articles such as a, an, the from the review text. Different methods available for stop-word elimination ultimately enhance performance of feature extraction algorithm [11].*

- Stemming and Lemmatization – The stemming process converts all the inflected words present in the text into a root form called a stem.

- Parts of Speech (POS) Tagging – POS tagging is linguistic technique used for product feature extraction as product aspects are generally nouns or noun phrases. POS tagging plays an important role in information retrieval and word sense disambiguation [11].

- *Character Case Normalization – The text may be in both the cases i. e. uppercase and lowercase.*

3.1 Feature Extraction

The overall sentiment or polarity is based on the average polarity value of all words in the review. Once the sentiment score is calculated, we apply various machine learning algorithms for model prediction like regression, Naïve Bayes, Random Forest, decision tree, maximum entropy to all datasets separately and calculate accuracy measures respectively. In case of sentiment analysis, polarity of the sentence is the most important feature required for analysis purpose. There are in general three polarity vales viz. positive, negative and neutral.

- *Feature Extraction Methods*

BOW is the Bag of Words method is considered as a representation of text. It is helpful to describe how many times a word has occurred in the given text or word. [12]. DTM means Document-term matrix or term-document matrix is a mathematical matrix is used to describe the frequency of terms in a collection of documents. Rows correspond to documents and columns correspond to terms in a document-term matrix [13]. DTM being a numerical statistic measure helps to reflect how important a word is to a document in a collection or corpus [12].

4   EXPERIMENTAL RESULTS

Machine learning algorithms like Naive Bayes (NB), support vector machines (SVM), logistic Regression, Decision Trees and random forest are used in this study. *This study uses AWS (Amazon Web Services) as a source of the dataset which contains more than 40 thousand records in the form of review text. This helps to understand the opinion of people about the latest brands which in turn helps to perform comparative analysis based on accurate results. Data visualization is an important part of this study. It helps to understand nature of review data in terms of ratings and polarity values. The histogram of ratings vs review count helps to know about how many reviews are there for each rating value in the range from 1 to 5.*

Table 1 Model performance of Logistic Regression classifier

PRODUCT_ID	Accuracy	F1 Score	Precision	Recall	AUC
B07YF5JQFB	0.862	0.878	0.878	0.878	0.86
B07N4GKMHB	0.891	0.929	0.947	0.893	0.889
B08ITMCSSH	0.875	0.923	1	0.857	0.929
B07T3PSQ3D	0.875	0.925	0.975	0.879	0.902
B07XLISDKC	0.861	0.91	0.967	0.86	0.882
B07V2LIW7K	0.845	0.899	0.966	0.826	0.884
B071K2CHSR	0.882	0.913	0.923	0.909	0.87
B00K7MK65K	0.944	0.952	1	0.909	0.955
B07H8Q1CYT	0.874	0.919	0.942	0.898	0.889
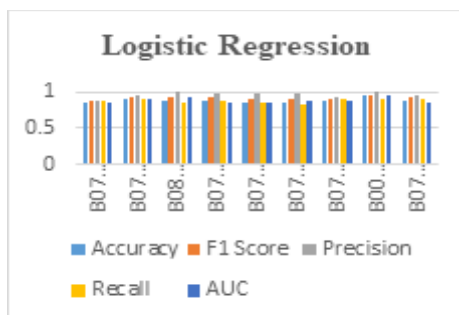
Fig.2 Performance measure comparison for Logistic Regression Classifier

The logistic regression classifier has given maximum accuracy of 95.5% for the product B00K7MK65K whereas for the BO7YF5JQFB minimum 86% is noted product among all the other datasets.

Table 2 Model performance of Naïve Bayes classifier

PRODUCT_ID	Accuracy	F1 Score	Precision	Recall	AUC
B07YF5JQFB	0.752	0.816	0.702	0.976	0.708
B07N4GKMHB	0.825	0.884	0.822	0.956	0.742
B08ITMCSSH	0.969	0.982	0.966	1	0.875
B07T3PSQ3D	0.925	0.956	0.954	0.958	0.817
B07XLISDKC	0.894	0.937	0.923	0.95	0.792
B07V2LIW7K	0.89	0.934	0.945	0.923	0.824
B071K2CHSR	0.838	0.892	0.82	0.978	0.757
B00K7MK65K	0.833	0.88	0.786	1	0.786
B07H8Q1CYT	0.899	0.939	0.905	0.976	0.795

Fig.3 Performance measure comparison for Naïve Bayes Classifier
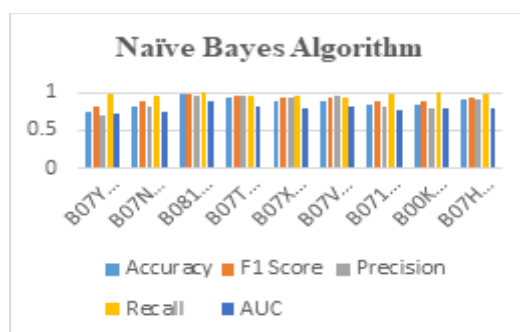
The Naïve Bayes classifier has given maximum accuracy of 87.5% for the product B081TMCS8H whereas for the BO7YF5JQFB minimum 71.8% is noted product among all the other datasets.

Table 3 Model Performance of Support Vector Machine Classifier

PRODUCT_ID	Accuracy	F1 Score	Precision	Recall	AUC
B07YF5JQFB	0.869	0.882	0.899	0.866	0.869
B07N4GKMHH	0.882	0.911	0.958	0.868	0.891
B081TMCS8H	0.781	0.887	1	0.79	0.875
B07T3PSQ5D	0.834	0.897	0.985	0.823	0.868
B07XLT5D&C	0.817	0.878	0.971	0.802	0.845
B07VZL1W7K	0.781	0.85	0.995	0.741	0.862
B071K2CH5R	0.853	0.888	0.929	0.849	0.855
B00K7MK65K	0.944	0.952	1	0.909	0.955
B07H8Q3C9T	0.862	0.91	0.949	0.874	0.843

Fig.4 Performance measure comparison for Support Vector Machine Classifier

The Support Vector Machine classifier has given maximum accuracy of 95.5% for the product B00K7MK65K whereas for the BO7H8Q3C9T minimum 84.3% is noted product among all the other datasets.

Table 4 Model Performance of Decision Tree Classifier

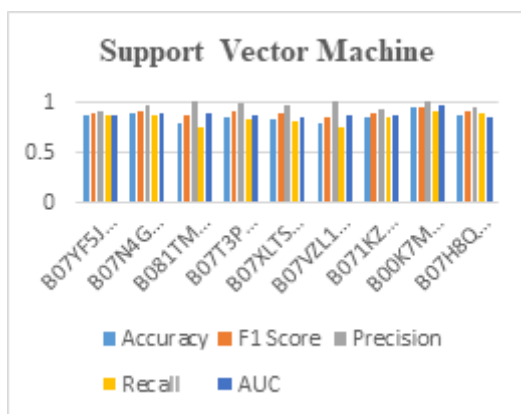| PRODUCT_ID	Accuracy	F1 Score	Precision	Recall	AUC
B07YF5JQFB	0.834	0.855	0.845	0.866	0.83
B07N4GKMHH	0.812	0.868	0.869	0.887	0.795
B081TMCS8H	0.908	0.945	0.963	0.929	0.859
B07T3PSQ5D	0.83	0.899	0.909	0.882	0.734
B07XLT5D&C	0.832	0.893	0.935	0.855	0.788
B07VZL1W7K	0.781	0.845	0.926	0.776	0.751
B071K2CH5R	0.838	0.882	0.882	0.882	0.833
B00K7MK65K	0.889	0.937	0.886	1	0.857
B07H8Q3C9T	0.786	0.86	0.904	0.819	0.738

Fig. 5 Performance measure comparison for Decision Tree Classifier

The decision tree classifier has given maximum accuracy of 85.7% for the product B00K7MK65K whereas for the BO7VZL1W7K minimum 73.1% is noted product among all the other datasets.

Table 5 Model Performance of Random Forest Classifier

PRODUCT_ID	Accuracy	F1 Score	Precision	Recall	AUC
B07YF5JQFB	0.779	0.812	0.784	0.841	0.77
B07N4GKMHB	0.825	0.884	0.822	0.956	0.742
B081TMCS8H	0.844	0.906	0.96	0.857	0.804
B07T3P5Q3D	0.858	0.915	0.957	0.877	0.802
B07XLTSDKC	0.838	0.896	0.949	0.849	0.818
B07VZL1W7K	0.865	0.914	0.974	0.861	0.872
B071KZCH5R	0.86	0.898	0.894	0.903	0.835
B00K7MK65K	0.944	0.952	1	0.908	0.955
B07HSQ3C9T	0.83	0.891	0.917	0.866	0.777

Fig. 6 Performance measure comparison for Random Forest Classifier

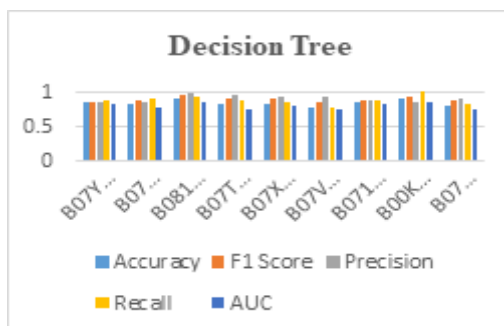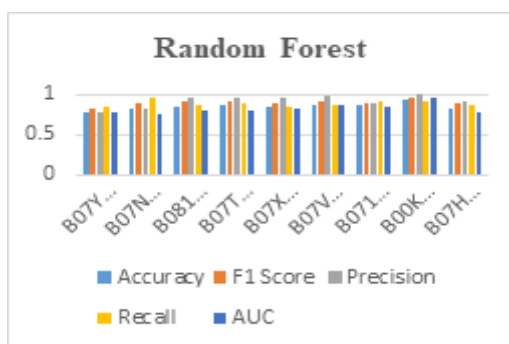The random Forest classifier has given maximum accuracy of 95.5% for the product B00K7MK65K whereas for the BO7N4GKMHB minimum 74.2% is noted product among all the other datasets.

Table 6 Brand wise review count

Sr. No.	Product ID	Total	Positive	Negative
1	Apple iphone 7	500	325	175
2	Apple iphone 8	500	300	200
3	Apple iphone XR	1500	1350	150
4	Blu Advance A4	500	360	140
5	Blu Pure View	300	210	190
6	Easyfone Prime	500	210	290
7	Samsung Galaxy J7	500	380	120
8	Samsung Galaxy S1	500	280	220
9	Samsung Galaxy J2	150	120	30
10	Samsung Galaxy S10	500	310	190
11	Samsung Galaxy Note20	2500	2100	400
12	Realme 6 Pro	100	85	15
13	Samsung Galaxy A71	100	80	20
14	Apple iphone7	100	90	10

Table 7 Result Analysis of datasets

PRODUCT_ID	Logistic Regression (%)	Naïve Bayes (%)	SVM (%)	Decision Tree (%)	Random Forest (%)
B07YF5JQFB	0.862	0.752	0.869	0.834	0.779
B07N4GKMHB	0.891	0.825	0.882	0.812	0.825
B081TMCS8H	0.875	0.969	0.781	0.906	0.844
B07T3P5Q3D	0.875	0.923	0.834	0.83	0.858
B07XLTSDKC	0.861	0.894	0.817	0.831	0.838
B07VZL1W7K	0.845	0.89	0.781	0.761	0.865
B071KZCH5R	0.882	0.838	0.853	0.838	0.86
B00K7MK65K	0.944	0.833	0.944	0.889	0.944
B07HSQ3C9T	0.874	0.899	0.862	0.786	0.83

5 CONCLUSIONS

Table 7 shows the overall result analysis of datasets for all five machine learning algorithms. The logistic regression classifier has given maximum accuracy of 94.4% for the product B00K7MK65K whereas for the BO7YF5JQFB minimum 86% is noted product among all the other datasets. The Naïve Bayes classifier has given maximum accuracy of 96.9% for the product B081TMCS8H whereas for the BO7YF5JQFB minimum 75.2% is noted product among all the other datasets. The Support Vector Machine classifier has given maximum accuracy of 94.4% for the product B00K7MK65K whereas for the B07VZL1W7K minimum 78.1% is noted product among all the other datasets. The decision tree classifier has given maximum accuracy of 90.6% for the product B081TMCS8H whereas for the BO7VZL1W7K minimum 76.1% is noted product among all the other datasets. The random Forest classifier has given maximum accuracy of 94.4% for the product B00K7MK65K whereas for the B07YF5JQFB minimum 77.9% is noted among all the other datasets.

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Breast Cancer Prediction in Mammograms with Risk Analysis Using Deep Learning Techniques: A Short Review

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ABSTRACT

Breast cancer is the leading cause of death among women. As a result, early disease detection and analysis of breast cancer risk factors reduce mortality and aids specialists in early treatment. Deep learning-based has recently made significant strides with neural networks for biomedical image interpretation to improve Computer-aided detection systems (CADs) performance. Breast cancer is a major global issue, and some techniques based on deep learning have shown promising outcomes in breast imaging. We offer a review of recent Computer-Aided depending on deep learning models which process mammograms and studies about causes of breast cancer. This survey research looked at the most commonly used mammography modalities for detecting breast cancer and classification. As well as public, most cited, and recently updated breast cancer databases for image analysis and different types of DL applications in medical image analysis, and compared the best CADs accuracy systems for detection and classification. Finally, we identify research gaps that need to be addressed in the future and propose preprocessing mammography with cause analysis as additional features to improve a new deep learning model.

Keywords: Mammograms, Breast cancer, machine learning, Cancer risks, deep learning

1   INTRODUCTION

Breast cancer spreads cells that are not favorable to the body, resulting in death. As the most frequent cancer in women and the most severe form of the illness, breast cancer is a main cause of concern. Early diagnosis and prognosis are critical to maximize long-term survival and reduce mortality rates.[1]. By 2021, the Society of Cancer in America predicts that 281,550 new detections of new cases of malignant breast cancer will be discovered in women, with 43,600 women dying as a consequence of the disease. [2]. About x-ray mammography, it is often used for breast cancer screening. When discovering an anomaly in the breast tissues during a screening mammography examination, it is common practice to recommend a diagnostic mammogram to further investigate the problematic areas detected during the screening mammogram examination. The most common early symptom of breast cancer is an unusual bulge in the armpit or breast, which doesn't disappear after a period.[3].

The current study involved the most widely used mammography datasets. CADs Models for detecting breast cancer and classification were discussed in detail with their recent results of model's accuracy depending on machine learning and deep learning methods. This category includes preprocessing, augmentation, extraction of feature and selection, and classification approaches. Our contribution is to implement a complete model of mammography and analyze the risks associated with it as a second model. The datasets are discussed in part 2, the discussion of related work is in part 3, and the discussion and conclusion are in part 4.

1.1 DATASET

Mammograms are the most common sort of specialized medical imaging in which a low-dose x-ray technology is used to see the interior of the breasts, and they are performed on women of all ages. Often referred to simply as a mammogram, a mammogram is a form of mammography that assists women to identify and diagnose breast cancer in the early stage. The use of x-rays assists clinicians in the diagnosis and treatment of medical conditions. To get photographs of the body's interior exposes you to a small quantity of ionizing radiation. The most ancient and extensively used kind of medical imaging is X-rays.[6]

The most popular mammography datasets are used to identify and classify breast cancer. The datasets are:

DDSM: Mammography screening data is accessible online through (DDSM) as an abbreviation for the Digital Database for Screening Mammography (DDSM), which they do at South Florida University[7]. Two thousand six hundred twenty digitized film mammograms are contained in 43 volumes of the DDSM. Two breast photographs are MLO views, while the other two are CC views for each case. In all mammograms, expert radiologists can distinguish between benign and malignant cancers.[8].

The CBIS-DDSM images are an improved and standardized version of (DDSM)[9], initially developed by the National Cancer Institute. A mammographer with specialized training chose and edited a small part of the data from the DDSM. It has a total of 6775 studies. The photos were decompressed and DICOM-formatted after they were captured [10].

In addition to the **MIAS Dataset**, mammogram pictures may be available at the archive of the University of Essex [11], which is a repository for these images. The database contains 322 films that have been digitized, stored on an 8mm (ExaByte) tape with a storage capacity of 2.3GB.

INbreast dataset is gathered in the S. Joao Hospital Center in Porto, Portugal [12]. There are 410 full-length digital mammograms in it. A radiologist categorized all abnormalities, including masses, using the standard breast reporting data system. [13].

All of the above datasets with the 3D mammography presently used in numerous facilities were mentioned by Al-Tam, Riyadh M.[14], aside from the more established procedures already in use (e.g., EIT and MBI). Researchers have been investigating innovative techniques, including MBI and breast-specific gamma imaging, to determine if their performance and quality may be equivalent to or superior to those currently utilized.

1.2 PERFORMANCE MEASURES

The confusion matrix is applied to evaluate the performance of classification models for a given data set. It is applicable when the test data are known for true values. It appears to be similar to the following table.

	Predicted values Positive	Predicted values Negative
Actual value Positive	TP	FP
Actual values Negative	FN	TN

Table 1: Confusion Matrix

The True Positive: Actual values were positive, and the model predicted a positive value.

The False Negative: Actual values were positive, and the model predicted a negative value.

The True Negative: Actual values were negative, and the model predicted a negative value.

The False Positive: Actual values were negative, and the model predicted a positive value.

for the others evaluating rules of effectivity such as Accuracy, Error rate, Recall, Precision, and F-Score will be listed below:

1. Accuracy is defined as the frequency with which the model predicts properly. It is determined by how many correct predictions are made compared to how many incorrect predictions are made?

$$Accuracy = \frac{TN + TP}{TN + TP + FN + FP}$$

2. Error rate: It specifies how the model makes incorrect predictions.

$$Error\ rate = \frac{FP + FN}{TP + TN + FP + FN}$$

3. Precision: How many of the positive classes predicted accurately by the model were true?

$$Precision = \frac{TP}{TP + FP}$$

4. Recall, Specificity: how model predicted correctly true positive from all true positive plus false negative.

$$Recall = \frac{TP}{TP + FN}$$

5. F-measure: The F-measure is used to compute both the precision and the recall at the same time. If the recall equals the precision, the F-score is maximized. It can be calculated using the formula below:

$$F - mease = \frac{2 * \text{recall} * \text{precision}}{\text{recall} + \text{precision}}$$

6. Area under the receiver (AUC): To evaluate a classifier's capacity to distinguish between classes, the area under the receiver (AUC) is calculated. The binary classification can be evaluated using the Receiver Operator Characteristic (ROC) curve as a metric.

1.3 Computer‑Aided Diagnosis

Over the last few decades, computer scientists have created functional computer-aided design systems (CADs) tools to aid in identifying breast cancer. These CADs systems are classified into three types based on their application tasks: segmentation, detection, and classification. However, many CAD systems, referred to as "classic CAD systems," rely heavily on manually generated features, significantly improving overall performance. Furthermore, the robustness of these systems, i.e., their performance with new data, must be enhanced[15]. Fig. 1 depicts the process of implementing CADs using machine learning.

1- Image pre-processing: This phase in image processing improves the quality of the image by suppressing undesired distortions and enhancing the image features before further processing [16].

2- Image segmentation: splitting the image into many segments to work exclusively on the segmented portions referred to as regions of interest (ROI). [17]

3- Feature extraction and selection, the goal of feature selection is to reduce model complexity, improve computing efficiency, and reduce generalization error generated by irrelevant features. Feature extraction is the process of getting information from an existing feature collection. The fundamental purpose of feature extraction is to compress data while keeping most of the important information. https://vitalflux.com/machine-learning-feature-selection-feature-extraction/

4- Classification, assigning labels or classifications to sets using classifications like SVM, KNN, Naive Bayes, DT, RF, LR, etc.
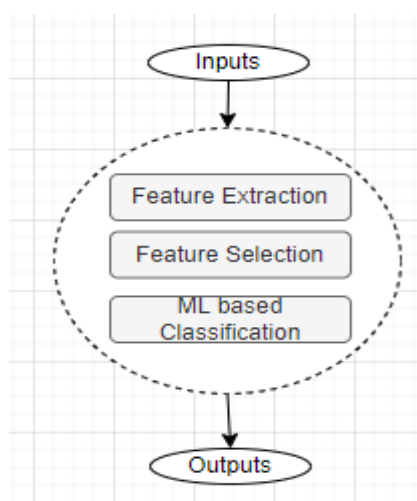

Fig .**2** ML based model

1.4 CAD Using Deep Learning for detection and diagnosis

CAD's mission is to detect and warn medical professionals of anomalous or suspicious locations in structural pictures.

CADs are typically performed as follows: A) This is how the candidates are found by using image processing. B) There are a lot of things that can be used to show how the candidate areas look, such as morphological or statistical data. And C) A support vector machine (SVM) is used to look at the features and decide if there is a chance that the disease is there, this is how it works.

The second goal of CADs is to have an opinion on the diagnosis of disease based on images. Computer-assisted diagnosis (CAD) is used to distinguish between malignant and nonmalignant lesions, and to identify specific diseases from single or multiple photographs. A common practice in the development of computer-aided design (CAD) systems is to incorporate human-designed features developed by subject matter experts. The use of deep learning approaches in CAD systems has recently been demonstrated to be effective. [18]

Also, the implementation of CADs depend on deep learning CNN, which contains three layers. The first one is the convolutional layers that perform feature extraction from images. The second one is the polling layers that reduce feature dimensions. And the third is the fully connected layer that executes the classification.

2   RELATED WORK

Based on the In-Breast database, Al-Antari, Mugahed A., et al.[19] developed a CAD system that uses the "You Look Only Once (YOLO)" for detection. "Fr-CN," a "full resolution convolutional network," was proposed by the authors for segmentation and classification, respectively. It takes only 12.23 seconds to test each image, which is significantly faster than comparable CAD models. After detecting, segmenting, and classifying masses, the model attained an accuracy of 95.64 percent with 0.94 for AUC. In [20], proposed a new CAD system that depends on an ROI-based CNN named (YOLO) as an abbreviation for You Only Look Once. Their studies detected the mass location with 99.7% accuracy. The method correctly identified between benign and malignant tumors 97% of the time.

Arefan, Dooman, et al. [21] performed a retrospective investigation, approved by the Institutional Review Board, in a group of 226 women who underwent routine breast cancer screening in the general population. A GoogLeNet-LDA model and an end-to-end deep learning model were implemented and compared in a series of experiments. Their results were between 68% to 78% at 95% the interval of confidence and the best AUC of 0.73 for model google Net.

According to Sharma et al. [22], an "end-to-end" strategy is described in which a model for categorizing images is pre-trained by fully annotated datasets that include information of ROI before being utilized to categorize local image patches. Applying a model to a set of digital mammograms from the database of CBIS-DDSM, the best results achieved an accuracy of 0.88 per image, the sensitivity was 86.1 percent, and the specificity was 80.1 percent. Using Faster R-CNN, one of the most effective frameworks for object identification, they presented a CAD system in [23], which was well-received. On mammograms, the technology detects and classifies cancers as malignant or benign without the need for human contact. The proposed approach offers a high-performance rating of classification on the publicly available database (INbreast), with an AUC of 0.95 on INbreast images.

Akselrod-Ballin, Ayelet, et al. [24]developed a model that combines machine and deep learning that was trained on linked mammograms and health records. The data, as well as other clinical data, like genetic information, age at first menstrual period, Postmenopause, and use of fertility hormones, could improve the machine and deep learning model in the future by making it even better. Machine learning technologies emphasize the need to link data from different sources to enhance breast cancer diagnosis accuracy and save experts' time on people who aren't likely to have the disease. Wang, Zhiqiong, et al. [25] extracted and clustered features using unsupervised machine learning and CNN. Second, an eight-layer CNN architecture was utilized to extract twenty detailed features, which were then coupled with the tumor's five shape characteristics, five texture characteristics, and seven density features. Finally, a classifier was given the set of fusion deep features from every mammogram to identify whether a malignant or benign breast tumor occurred. Four hundred mammograms were analyzed in this research. The optimal fine-tuning was determined using a transfer learning CNN model with 97.35 percent accuracy, AUC 0.98 on the DDSM datasets. For the INbreast database, the accuracy is 95.50 percent and 0.97 AUC, and 96.67 percent accuracy and 0.96 AUC on the BCDR database. [26]

Hamed, Ghada, et al. [27] have applied a comparative study on various publicly accessible datasets like DDSM, CBIS-DDSM. Also, conducted comparative research of different machine learning-based classification and detection methods based on multi algorithms such as Retina Net, Alex Net, YOLO, and Google Net, with YOLO and RetinaNet achieving the highest accuracy. The detection accuracy is 99.7% and 98.96%, respectively.

Devi, V. Ajantha, and Anand Nayyar.[28] conducted a study on various types of cancer and analyzed with diagnosis based on medical images (mammograms) then applied Deep learning (CNN), the dataset consists of 569 examples, 357 benign and 212 malignant, the built model was able to identify benign or malignant for the features extracted from mammograms. The overall performance was as the following accuracy result 91.6% and 91.9%, respectively. Basarslan, M. Sinan, and F. Kayaalp.[29] applied algorithms of the machine and deep learning to the Coimbra dataset from the UCI repository, which had ten quantitative attributes. For classification, the applied algorithms are RNN, RF, CNN, and SVM were used. According to their findings, RNN outperformed the others with a score of 92 %Accuracy on both datasets.

Patrício, Miguel, et al. [30] Applied algorithms of machine learning such as random forests, logistic regression, support vector machines on various clinical features, including BMI, age, Insulin, Glucose, HOMA, Leptin, MCP-1, and Adiponectin. Breast cancer presence in women was detected using SVM, ranging of sensitivity between 82 and 88 %and ranging of specificity from 85 %to 90 p%. The AUC had a 95% CI of [0.87, 0.91]. Yala, Adam, et al. [26] developed a model that depends on deep learning for risk factors and mammograms. The authors conducted three models, the first model was image-only, the second model operated on risk factors, and the third is a hybrid model that runs on both the first model and the second for the mammograms and risk factors. The data was collected from Hologic, Bedford, for 60 886 cases between 2009 and 2012. The results of AUC were 0.66, 0.69, and 0.71 for three models; the hybrid model was the best AUC with 0.71.

3 CONCLUSION

In this survey, we have listed the most popular mammography datasets used to identify and classify breast cancer. Also, developments of CADs applications used in the breast cancer diagnosis and detection on mammograms, recent results of accuracy of models of machine and deep learning. We propose a new model for breast cancer classification and detection which consists two-part: mammography-histology as a first model with improved image processing using image processing and computer vision. In addition, analysis of the risks of cancer features to each image as a second model. Then integrating both models to improve fully-model future detection of breast cancer and classification.

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A Study on Consumer Buying Behaviour towards Organic Food Products (With Reference to Tamilnadu)

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ABSTRACT

This study was motivated by the growing demand for organic food and increased health consciousness among the general public, which necessitated a more in-depth investigation of buyer behavior, product evaluation, and consumer knowledge of organic products. The majority of farms in the state of Tamilnadu, one of the most promising states for organic goods, grow conventionally without or with minimal use of composts and plant assurance chemicals. Ginger, jackfruit, fenugreek, mango, tamarind, and amla are just a few of the actual food crops grown organically in Tamilnadu and in high demand. Organic food items are also preferred by consumers, particularly in large cities. Because of the weak market connection, lack of public knowledge about organic produce, and lack of item separations between organic and inorganic items, the organic foods produced in the state were able to command a premium price. To gain a better understanding of customers' attitudes regarding organic products, this article examines buyer behavior toward them, including their willingness to pay for the item and their proclivity for various items, such as fruits, vegetables, cereals, and so on.

Keywords: Organic Food Products, Consumer, Buying Behaviour, Consumer Preference

INTRODUCTION

The demand for organic food items, as well as public knowledge of organic foods, is increasing quickly throughout the developed world. Consumers in industrialized nations, as well as in a few developing countries, have become more health concerned, and they have begun to spend their money on meals that are more environmentally friendly, healthier, and distinctive in flavor. Whatever the case, the market development in Asian nations is still in its early stages. There is little information available on the Indian organic food display and the attitudes of Indian consumers about these items. The majority of organic foods produced in our country are aimed at meeting the demand for them in the corporate sectors of the developed world. The value premium for organic products is influenced by many factors, including the increase in organic production, promotion of organic products, and consumer awareness levels. One of the most important aspects of determining the future demand for organic agriculture is to perform a study on the attitudes of customers toward organic products. To organically produced food, understanding the human perception of consumer decision-making and production is crucial from an advertising standpoint, as is understanding how organic food consumption may be increased. Apart from that, customer awareness and understanding of organically produced foods are also important factors in this regard. The current study was based on primary data acquired from Tamilnadu, which is believed to be organic as a matter of course, or that the agriculturists in this region are de facto organic producers, all things considered. The Government of India's team on organic farming, as well as a few other experts, have also identified rainfed regions and locations in the south as being more suitable for organic farming in light of the low level of information use.

In the first place, there is just a little amount of scientific data to support the claim that organic food is superior in terms of nutritional content to conventional nutrition. So far, scientific study on various organic food products has not been able to provide conclusive proof of the nutritional advantage of organic food over non-organic food. This is especially true because a large portion of scientific research is supported by grants from governments and private sector organizations. Consumers are distinct in that they have demands and wants that can be moved and grouped from one another; they also have unambiguous consumption instances and consumption leads that are distinct from one another. As a result, both the Food and Drug Administration and the United States Department of Agriculture explicitly state that non-organic food is just as nutritious as organic food. Organic milk and organic tomatoes, for example, are superior to non-organic kinds in several research investigations. In addition, research is ongoing into a variety of other types of organic foods that may provide additional health advantages when compared to their non-organic counterparts.

The marketer meets these requirements and wants through the provision of products and administration services. It is critical for a company's survival, competitiveness, and development that the marketer identifies these requirements and wants, and that the marketer provides product offers that are more effective and efficient than those of rivals. For a company to be successful, it must have a comprehensive but careful understanding of

its customers and their consumption habits. Consumer behavior consists of a muddled mental process as well as a physical enhancement (buy choice). People engage in consumer lead while surveying, securing, using, or engineering items and businesses. Consumer lead is a decision-making process and physical improvement that people. As an example of consumer behavior, consider the phrase "The transfer of power that takes place during a usage operation, both inside the customer's self and within his or her environment. Learning, Influence, and Behavior are three components of this collaboration; it begins with pre-purchase development and continues through post-purchase understanding; it includes the phases of evaluating, purchasing, using, and discarding products and ventures; and it includes the phases of evaluating, purchasing, using, and discarding products and ventures ". A consumer can be either a person or a business/modern/authoritative consumer, depending on their situation. Clarification of the factors that influence customers' purchasing decisions and use patterns; clarification of the methods by which purchasers make purchasing decisions. Organic food goods are accessible on the market, including organic fruits and vegetables, grains, pulses, and cereals, cooking oil, coffee and tea, spices, and poha and wheat.

Organic food items are purchased for a variety of reasons.

1. Organic produce has fewer pesticides than conventional produce. Chemicals such as fungicides, herbicides, and insecticides are frequently used in traditional agriculture, and residues from these chemicals remain on (and in) the food we consume.

2. Organic nutrition is generally fresher than conventional nutrition since it does not include preservatives that allow it to remain longer. Organic delivery is frequently (but not always, so check where it is coming from) produced on smaller farms close to where it is marketed (but not always).

3. Organic farming is better for the environment than conventional farming. Organic farming practices reduce pollution, preserve water, reduce soil erosion, increase soil fertility, and need less energy than conventional farming practices. Cultivating without the use of pesticides is also beneficial for nearby birds and animals, as well as for the people who live near farmlands.

4. Animals that are reared organically do not get anti-microbials, growth hormones, or are fed leftovers from other animals. In addition, feeding livestock creature byproducts increases the risk of bovine spongiform encephalopathy (BSE), and the use of anti-infection medications can result in the development of bacteria that are resistant to illness and disease. Animals reared organically are allowed greater freedom to roam about and access the outdoors, which helps to keep them healthy and prevent the disease from developing.

5. The advantages of wildlife: Wild animals provide a vital food supply for billions of people all over the world, providing them with protein and minerals in plenty. According to the United Nations Food and Agriculture Organization (FAO), 34 million people rely on fishing for a living, which provides protein to more than 3 billion people.

6. Farmers are given a lot of help: Organic agriculture minimizes nonrenewable energy use by reducing the demand for agrochemicals (these require high quantities of fossil fuel to be produced). Organic agriculture, by its capacity to trap carbon in the soil, helps to the mitigation of the greenhouse effect and the reduction of global warming.

7. There are health advantages: Organic products reduce public health risks to farmworkers, their families, and consumers by reducing their exposure to toxic and persistent chemicals on the farm and in food, as well as the soil in which they work and play, the air they breathe, and the water they drink. Organic products are also environmentally friendly. Pesticides have a particularly harmful effect on children. As a result, introducing organic food and fibre goods into the marketplace provides parents with the choice of purchasing products that have not been created with these poisons.

8. Environmental and health advantages, as well as excellent flavor: On the whole, organic farming is more environmentally friendly since it discourages the use of harsh chemicals and, as a result, helps to preserve the natural environment. In fact, according to research studies, organic farming has the potential to save around 500 million pounds of pesticides and chemicals from entering the environment each year.

REVIEW OF LITERATURE

Rathna, G. A., & Sumathy, D.(2022). Consumers approach the market using many fundamental decision-making strategies. The Consumer Styles Inventory may be used to evaluate these diverse modes of decision-making (CSI). The researchers determine if a customer intends to purchase organic food using Sproles and Kendall's (1986) approach. This decision-making technique applies to a wide variety of commodities and

scenarios (Walsh, Hennig-Thurau, Wayne-Mitchell, &Wiedmann, 2001a), and researchers may use it to forecast customers' intentions about organic foods. Sproles and Kendall's eight characteristics may apply to a current style, such as customer decision-making style. This section has identified existing gaps in the organic food literature and practice as a critical step in determining the current study's worthiness. It stressed that the pertinent concerns have not been well investigated. Additional models have been presented and integrated into the current model in this model. Additionally, four variables influence a consumer's inclination to purchase organic food: environmental awareness, health concerns, longevity, and nutritional value. According to the sampling strategy, the study participants were picked from customers in the Coimbatore district who frequent certain establishments. Coimbatore is predominantly an agrarian area, and the ordinary man's interest in organic food items is well-established.

Kataria, Y. S., et.al. (2019). Their study examines that to explores the customer decision-making process for organic food goods in India by experimentally expanding the theory of planned behavior. 188 individuals from the Delhi NCT region were surveyed by the researchers. This study analyzed data using Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Partial Least Squares Regression, respectively, utilizing SPSS, Jamovi, and Smart PLS.2. The model described in this article exhibited a moderate coefficient of determination, a high predictive significance, and high goodness of fit index. This article has both practical and theoretical implications since it enables researchers to extend and modify the Theory of Planned Behavior in the context of organic food consumption by Indian consumers. This document educates marketers on the critical impact accessibility plays in determining attitudes toward buy behavior and, subsequently, actual purchase behavior. Additionally, the study examined the influence of age and income on real purchasing behavior.

Mrs. K. Renuga Devi, Dr. M.Ramya (2018). The rising demand for organic foods and rising health awareness among consumers motivated the researcher to perform a more in-depth study of buyer behavior, appraisal, and consumer awareness of organic products. Tamilnadu is a potential state for organic products; most farms in the state-run traditionally, without or with limited usage of composts and pesticides. Mango, tamarind, and amla are among the most sought-after organic food crops in Tamilnadu. Also, customers desire to buy organic food, especially in cities. In any case, due to poor market integration, lack of public awareness of organic foods, and lack of item differentiation between organic and inorganic foods, state-produced organic goods obtained a pricing advantage (premium price). The current article explores buyer behavior toward organic products, including willingness to pay and preference for specific items, such as fruits, vegetables, and cereals.

Krishnakumare, B., & Niranjan, S. (2017), The study examined consumers' purchasing habits for organic food items using data obtained from 240 respondents. Consumers of organic and non-organic food are segmented by gender, family income, education, and job position. Psychological variables including attitude, perception, belief and intention have demonstrated good benefits for Tirupur's organic food consumers. Consumers include a variety of meals in their shopping carts, ranging from healthy to indulgent, pricey to affordable, and traditional to foods with added health advantages. People who believe that health and wellness foods provide more than just nutrients include them in their diets. Researchers have long sought to understand people's dietary preferences, as well as their views about health and wellness foods.

Harmon Ramananda Singh (2002) studied the market for durable and non-durable products. Consumers are aware of brands. Public and personal data sources are crucial. Consumers are influenced by product benefits and promotion. Most customers are brand loyal. Consumers have complicated buying habits.

Many definitions of organic food place a strong emphasis on the "natural philosophy," which is a combination of technological advancements, manufacturing methods, and conceptual underpinnings (e.g., Bourn and Prescott, 2002; FAO, 1999; Klosky and Tourte, 1998; Goldman and Hylton, 1972). When it comes to natural products, the restricted use of unnatural synthetic concoctions is stressed by certain definitions, such as "biological" or "common production frameworks" (e.g. Klosky and Tourte, 1998). (e.g. FAO, 1999). Examples are Torjusen, Nyberg, and Wandel, 1999. Although most natural foods are purchased at supermarkets, Cottigham (2012) reports a rise in direct natural food sales in the last two years. It is higher than the average development; 16.2 cents per penny versus 10. Even though growth has slowed in the last two years, merchants still account for 80% of natural food sales and are the primary source for customers. Stores in developed nations sell and stock a range of natural foods, however, this tendency isn't as strong elsewhere. Organic food is separated from non-organic food by production and processing methods rather than by observable or tested features (Lohr, 2001). However, many people are ignorant of the distinctions between organic and conventional procedures. The table below shows the main differences between the two cultivation methods.

STATEMENT OF THE PROBLEM

Organic foods frequently include more beneficial elements, such as antioxidants, than their conventionally grown counterparts, and individuals with sensitivities to foods, chemicals, or preservatives sometimes notice that their symptoms subside or disappear when they consume only organic sustenance. Organic food is highly popular, and everyone should consider the benefits. The widespread public perception that organic food is healthier than conventional food is fairly strong, which is the fundamental cause for its demand growth over the previous 5-6 years. Organic Fact is a staunch supporter of organic nutrition This article will define organic nutrition, how it benefits consumers, their purchase behavior toward it, and the standards for the same. This is to demonstrate that organic nutrition is beneficial to one's health.

OBJECTIVES OF THE STUDY

1. To study consumers' buying behavior towards organic food products.

2. To analyze the customer preferences for a variety of organic foods.

RESEARCH METHODOLOGY

The research mainly covers Tamilnadu. This research included both primary and secondary data. A structured questionnaire was utilized to collect primary data from 200 respondents from Coimbatore, Chennai, Madurai, and Tirunelveli in Tamilnadu. The quiz is intended for organic food customers to learn their purchase habits. Published books, journals, periodicals, and websites provide secondary data. Simple statistical procedures like percentage analysis and Mann Whitney U test were employed to analyze the data.

HYPOTHESIS

The following are the five theories that were developed:

H 1: Food quality (FQ) does not affect the propensity to purchase organic foods.

H2: The perception that organic food items help local farmers (SLF) does not affect the desire to purchase organic food.

H3: Convenience of purchase and price (CP) does not have an impact on the purchase intention for organic products.

H4: Attitude toward Environmental Friendly concerns (AEF) has no substantial influence on the desire to purchase organic food.

H5: Attitude (AT) toward organic food products does not impact the purchase intention of consumers toward organic food goods.

DATA RESULTS AND INTERPRETATION

Table.1: Demographic Profile of the Respondents

Factor	Particulars	Respondents	Percentage
Age	Below 20	20	10
	20 – 30	75	37.5
	30 – 40	60	30
	Above 40	45	22.5
Gender	Male	65	32.5
	Female	135	67.5
	TOTAL	200	100
Marital status	Single	60	30
	Married	140	70
Education	School	54	27
	UG	65	32.5
	PG	52	26
	Others	29	14.5
Occupation	Govt employee	35	17.5
	Private employee	42	21
	House maker	93	46.5
	Student	30	15

	Below 10000	32	16
Income per month	10000-20000	97	48.5
	Above 20000	71	35.5
	TOTAL	**200**	**100**

**Source: Primary data

According to the data in the preceding table, 75 respondents are between the ages of 20 and 30. Approximately 67.5 percent of those who answered the survey questions identified themselves as female. When we look at the marital status of the respondents, we find that 140 of them are in the category of married. In terms of education, 32.5 percent of respondents have completed an undergraduate degree, 27 percent have completed a secondary education degree, 26 percent have completed a postgraduate degree, and 14.5 percent have completed any other type of degree. The housemaker group accounts for 46.5 percent of all occupations, whereas the private employee category accounts for 21 percent. Approximately 48.5 percent of those who answered the survey fall within the 10K-20K income bracket.

Table 2 : Type of organic food product prefer by Consumer's

Factor	Options Food Items	Respondents	Percentage
1	Fruits & Vegetables	60	30
2	Pulses & cereals	20	10
3	Coffee & Tea	18	9
4	Grains	21	10.5
5	Spices	23	11.5
6	Cooking oil	45	22.5
7	Poha & wheat	10	5
8	Others	3	1.5
	Total	**200**	**100**

**Source: Primary data

According to the data in the table above, organic fruits and vegetables are preferred by the vast majority of customers. Then there's the preference for organic cooking oil, which accounts for 22.5 % of customers. Spices, grains, pulses, and cereals are the top three choices for consumers, with 11.5 percent, 10.5 %, and 10 %, respectively.

RELIABILITY TEST:

It is using Cronbach's alpha as a measure of internal consistency (Husic-Mehmedovic, M., et al. 2017), researchers were able to determine whether or not the construct had an alpha value greater than 0.7. (Cronbach, L. J. 1951). In the following table, you can see the results of the reliability test performed on the data set.

Table 3: Data Reliability Statistics

Variable (Key Determinant)	No. of Questions	Cronbach's Alpha
Attitude towards Product Food Quality (FQ)	4	0.847
Attitude towards Support to local farmers (SLF)	6	0.884
Attitude towards Convenience and Price (CP)	6	0.849
Attitude toward Environmental Friendly (AEF)	4	0.657
Purchase Intention (PI)	13	0.827

**Source: Primary data

Obvious in this regard is that Table 3 shows the alpha scores of all five variables, with the results indicating that almost all of these variables were significantly higher than the cut-off limit of 0.7, with only the variable "Attitude toward Environmental Friendly (AEF)" having a value slightly lower than the 0.7 level threshold (the actual Cronbach Alpha score being: 0.657). As a consequence of these findings, it was concluded that the testing instrument developed for this study was trustworthy and that it could be delivered conveniently to the study population. Furthermore, Factor analysis of 0.775 indicates that this outcome is acceptable in this situation.

Table 3: Correlation between study variables

	FQ	SLF	CP	AEF	PI
Correlations					
FQ	1	.			
	.088**	1			
SLF					
	.157**	.170**	1		
CP					
	.123**	.236**	.352**	1	
AEF					
PI	.204**	.171**	.049	-0.024	1
**Correlation is significant at the 0.01 level (1-tailed)					

Source: Primary data

It is correlated with the presence and direction of the association between two variables (Pallant, J. Pearson's correlation coefficient) (2001). At the 0.01 level of correlation, the bulk of the independent variables are significantly linked with customer purchase intentions, and all of the variables have a substantial inter-relationship with one another. In this study, the factors of AEF were shown to have a significant negative link with purchase intention (PI), whereas the variables of FQ, CP, and SLF were found to have an extremely favorable relationship with PI.

Table 4: Predictor between the variables

Predictors	R	R Square	Adjusted R Square	Std. The error in the Estimate
Model Summary				
Independent Variables	.271a	.073	.070	1.02091
Attitude (AT)	.956	.914	.914	.31125

As shown by the data in Table 4, the value of the R squares has an average variation of 7.3 percent in terms of customer purchasing intentions. The predictor variables FQ, SLF, CP, and AEF may all be used to explain this phenomenon. However, although the levels of variance are less than 10%, the data demonstrate that the factors provide significant contributions to our knowledge of their separate influences on customer purchase intention. When examining the respondents' attitudes toward organically produced food goods, we can see from the value of R squared (Table 3) that the predictor variable of consumer Attitude can explain 91.4 percent of the variation in the Purchase Intention (PI), which is the outcome variable (AT). This finding demonstrated that when consumers have a positive opinion of a product, they are more likely to make a buy.

Table 5: ANOVA – Predictors (AEF, CP, SLF, and FQ) with the Dependent Variable – PI

Predictors	Sum of Squares	df	Mean Square	F Score	Sig.
Regression	82.060	4	20.515	19.68	.000a
Residual	1037	995	1.042		
Total	1119	999			

a.Predictors: (Constant), FQ, SLF, CP, AEF

b.Dependent Variable: Purchase Intention (PI)

An Anova test was then performed to confirm the validity of these Predictor variables (see Table 4). The results of the Anova test revealed that the level of significance was less than 0.5, indicating that the Predictor models were viable for the intended test. Using the F-test to compare the findings of these Predictor variables against the Purchase Intention variables (AEF, CP, SLF, PQ, and AT), it was discovered that the F-test was statistically significant (F=19.68, p0.05), indicating that the corresponding Predictor was valid.

A linear regression analysis was conducted against the consumers' attitude toward organically produced food products to determine whether or not this hypothesis was correct. The predictor of the Attitude and the Purchase Intention (Predictor – AT; Dependent Variable – PI) was used to test this hypothesis (AT). In this case, the squared value of R revealed that AT accounted for 91.4 percent of the variation in PI (see Table 3). With an F value of 10554.238 and a p-value of 0.05, the results of the ANOVA test were found to be statistically significant. These findings revealed that the attitude predictor had been significantly validated.

Table: 6: Coefficients – Predictors (FQ, SLF, CP, and AE) and Purchase Intention (PI) Coefficients a

Predictors	Non-standardized Coefficients		Standardized Coefficients		
	β	Std. Error	β	t	Sig.
(Constant)	1.970	.230		8.559	.000
FQ	.219	.034	.197	6.345	.000
SLF	.258	.047	.173	5.481	.000
CP	.027	.038	.023	.712	.476
AEF	-0.103	.035	-0.098	-2.930	.003
PI	0.937	0.009	0.956	102.734	.000

From the results of the test, it can be inferred that three of the predictors had a statistically significant impact on the dependent variable (consumer purchase intention), and these were: Environmentally friendly (p=.003), supporting local farmers (p=0.000); and food quality (p = 0.000). Furthermore, environmentally friendly predicts a negative buy intention with a coefficient of -.103 and a p-value of 0.003, demonstrating that this predictor has an inverse influence on the purchasing intentions of customers (PI). This is particularly significant because earlier research has demonstrated that AEF has a direct link with PI. Furthermore, it was discovered that CP had no impact on PI, which is consistent with the findings of many prior investigations. It was determined how much each of the predictor factors contributed to the final result by utilizing Standardized Coefficients. In this test, a higher result suggests that a unit change in these independent variables has a greater influence on the dependent variable. These results indicate that the predictor Attitude (with a p-value of.956 and a d = 0.000) makes a substantial contribution to the dependent variable of the respondent's purchase intention for organically produced items, as shown in Table 6.

CONCLUSION

To understand organically produced foods purchasing behavior, the major goal of this study was to identify four essential characteristics influencing the purchasing behavior of organically produced foods from existing research, intending to understand the relational relevance between these key determinants and those consumers from Chennai, India, to understand organically produced foods purchasing behavior. The researchers revealed that three criteria significantly influenced customers' propensity to purchase organic foods: the quality of the food, the assistance provided to local farmers, and the treatment of animals. However, the well-being of the animals played a significant factor in deciding this case as well. This most likely means that customer buying intentions will decline shortly. As a result of this research, management and academics now have a far more solid foundation upon which to construct strategies to ensure that customers' purchasing intentions for organically produced items are thoroughly understood. Consumer attitudes toward organically produced food are positively related to consumer purchase intentions, according to the findings of the survey. However, determinants such as supporting local farmers did not have a statistically significant impact on consumer purchase intentions for organically produced food among those who took part in the study. In contrast to prior investigations, the findings of this study are incongruent with one another. Consumers in Chennai are not worried about the welfare of the animals in their hands, even though India is well-known for its tolerance and sympathy for non-human animals. If you are concerned about the welfare of animals, purchasing organic food is not a strong incentive to make the switch. As long as organically produced goods are easily available, Indian buyers have demonstrated a clear preference for customers who are not bothered with pricing when it comes to convenience and price. This decision has had a significant negative impact on the Indian residents of these areas, who earn an average of $60 per month. Increased government support, subsidies, and investments in food-supply chains, among other things, are required under India's food-supply chain policy. As well as the establishment of a domestic organic food-purchasing program, an awareness campaign to improve the general public's understanding of the health and social benefits connected with eating more organically grown food sources is highly needed.

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Transport and Communication System of Dimoria Development Block and its Impact on Agricultural Marketing

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ABSTRACT

Transport and communication plays pivotal role in upliftment of Agricultural Marketing system. It is the medium through which directly as well as indirectly agricultural product finally goes to the consumer.

Keywords- Transport and communication, Agricultural marketing, Agricultural product and Consumers.

INTRODUCTION

Transport plays one of the most important roles in the economic development of an area. It helps in production, in getting good market facilities for produced goods, for easy movement of buyers and sellers and in developing a bridge between more and less developed areas. Communication is also very important like transport for the growth of an area. Effective means of communication system is extremely necessary for sending and receiving any kind of information.

MATERIALS AND METHODS
MATERIALS

Dimoria Development Block, situated in the South-Eastern region of Kamrup (M) district of Assam has been selected for the research work. It is located in the south bank of river Brahmaputra between 26°N to 26°14´N line of latitudes and 91°51´E to 92°10´E line of longitudes. Agricultural marketing of the entire block has been studied on the basis of secondary data. The average annual temperature of the area is 36°C for summer and 20°C for winter. The average annual rainfall of the area is 200 cm.

METHODS

Focus Group (FG) has made of farmers for collecting various information regarding Transport and Communication of the study area. They said about the prevailing scenario, problem and prospects of Transport and communication of the study area.

RESULTS AND DISCUSSION

National Highway 37 passes through the Dimoria Development Block. It covers 53 km length in this area. This road joins Khanapara situated in the western end to Jagiroad situated in the eastern end. Both metalled and un-metalled road network is present in the region. 50% road of the region is not developed satisfactorily. Out of all the roads, 11.1% is national highway, 8.9% is state highway. These roads are used for marketing of paddy. Food Corporation of India and local rice mills get the produced good from the field using these roads. Vegetables, fruits, grams, etc. are also marketed using national highway, state highway and village roads. These goods are transported to local markets, Guwahati, Jagiroad and to the airport for national and international deals. Paddy produced here are exported to Meghalaya through national highway and from Meghalaya to Bangladesh. Although some village roads are deteriorating, but transportation facility is a little better than many other areas of Assam. Government should focus on these road networks and develop them satisfactorily for better transport and communication purpose. Producers and sellers employ cart, truck, mini truck, tractor which has carrying facility, motor vans, auto, cart, etc. for carrying the farm produced to markets, cold storage and airport. The North-Eastern Frontier Railway (broad gauge rail line) also passes through Guwahati via Chandrapur. There are four stations situated in this block: Digaru, Tetelia, Khetri and Borahu. Railway is the most important transport facility for the local people especially tribal community. They carry the vegetables, broom, fruits, etc. to various market centres of Guwahati like Bamunimaidam, Beltola, Noonmati, Fancy bazar, Paltan bazar, etc. They use daily trains like Guwahati-Maibargaon (Kolongpar) passenger and Guwahati- Silghat DEMU, etc. These people travel from this region to Guwahati on adaily basis. They go to the market at morning and return to their homes in the evening train. Train journey is not easy for them with lots of mass because these trains stop in the stations for a limited period of time and are loaded with passengers as well. But railway is providing them a broad market with cheap transportation cost. Number of trains must be increased for these people. One narrow gauge railway line is under process and this line will connect the Teteliya station of Dimoria with Meghalaya. Recently, railway stations of the region for example Khetri, Teteliya, etc. are developing in a rapid pace. Stations have become much bigger than the previous ones, footbridges have been constructed and railway lines have been

developed. These will definitely help the locals in obtaining the broader markets at cheap transportation cost. Communication facility is moderate in the region. Some remote areas are still suffering from bad mobile network coverage. Less promotional and advertising is another difficulty of the region. Television and radio network is quite good. Producers do not get the maximum profit due to the promotional problems. Communication facility needs reform.

So overall transport and communication facility is a little bit improved than average. But it definitely needs reform.

Fig: Major routes of transportation in Dimoria Development Block
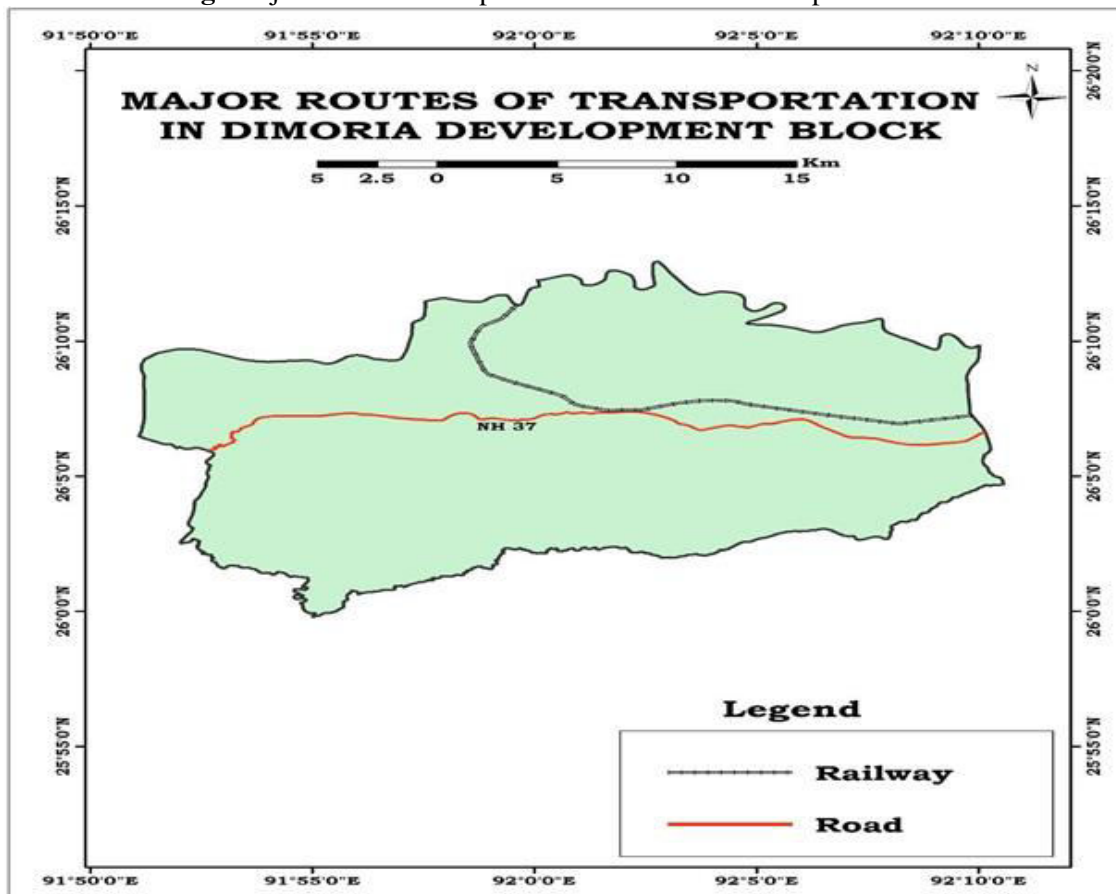
CONCLUSION

Agricultural marketing is entirely dependent upon satisfactory transport and communication facility. Cheap and standard quality of carriage is needed for better agricultural marketing. As we all know agricultural products are generally perishable and bulky in nature. That kind of goods need a market or a storage facility as soon as it is harvested. For those activities cheap and good transport system plays the most important role. It helps to get a good market to the farmers and helps them in getting the return of his hard work. Agricultural products are transported from one rich agricultural region to poor. For that a very well-developed transport system is needed. Again, for getting a good market, a good communication system is also needed. Information about the produced goods, advertisement, promotion, etc. are distributed through communication system from one area to other. Proper communication system helps in getting government aids, consumers of national and international markets and prize for the hard work of the producers. Without market, the surplus agricultural produced will not have any value. So, a good transport and communication facility has immense importance.

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Status of Socio-Economic Conditions, Demographical Structure and Pattern of Land Utilisation in a Floodplain Block of Kamrup Metropolitan District of Assam: A Case Study on Dimoria Development Block, Assam

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ABSTRACT
Socio-Economic status and Demographical structure are the key indicators of prevailing the level of development of a region. Measuring indexes of socio-economic status are education, occupation and income. Demographic structure includes population under various age groups. Again, the pattern of Land-Utilisation of a region also plays a significant role in overall development of a region.

Keywords: Socio-Economic, Demographical structure, Land-Utilization, Development, Region

1. INTRODUCTION

Socioeconomic status (SES) is defined as a measure of one's combined economic and social status (House 2002; Galobardes et al. 2006). Same in the case with the Demographical structure, which implies age-sex composition, population under various age groups etc. A region's development is considered on the basis of it's prevailing socio-economic and demographic character. A region where socio-economic factors like education, income level and occupation are high as well as demographic conditions like population under working group is high and dependent group is low that region is considered as developed region and vice versa in case of less developed regions. Again, the Pattern of Land Use and Land Cover of an area also plays an important role in progress of a region. So, it is very important to know the existing and trend of Socio-Economic status, Demographical structure as well as Land Use and Land Cover scenario of a particular region for monitoring, assessing and give necessary suggestion for further betterment.

3.MATERIALS AND METHODS

3.1 MATERIALS

Dimoria Development Block is situated in the South-Eastern part of Kamrup (M) district of Assam. The block is situated about 35 km to the east of Guwahati which is the largest city of the entire North-Eastern India. Dimoria Development Block is bounded by Jagiroad (Morigaon district) on the east, Guwahati city on the west, Meghalaya plateau on the south and Kapili River, Chandrapur circle and Morigaon district on the north.

3.2 METHODS

Whole analysis and monitoring process has been done with both primary and secondary data source of study area, for primary survey 33% of the random sampling household survey has conducted and for secondary data sets of different census year from the census of India website has used. For Land Use and Land Cover monitoring a detailed land-use land cover map has been prepared.

4. RESULTS AND DISCUSSION

Dimoria Development Block falls under Tribal Development Block (36 total in the entire Assam) which have a population of 1,37,839, according to census of India, 2011. Out of the total population male dominates the area with 50.5% (69,843) while female population constitute 49.50% (67,996). Tribal population of the Block constitute 14.38% while non-tribal population is 85.61%. The block has 144 villages, 25,807 household and 12 Gaon Panchayat viz. Digaru, Hahara, Baruabari, Barkhat, Dhoupguri, Khetri, Maloibari, Kamarkuchi, Topatoli, Tetelia, Nartap and Sonapur.

Fig. 4.1: Gaon Panchayat in Dimoria Development Block
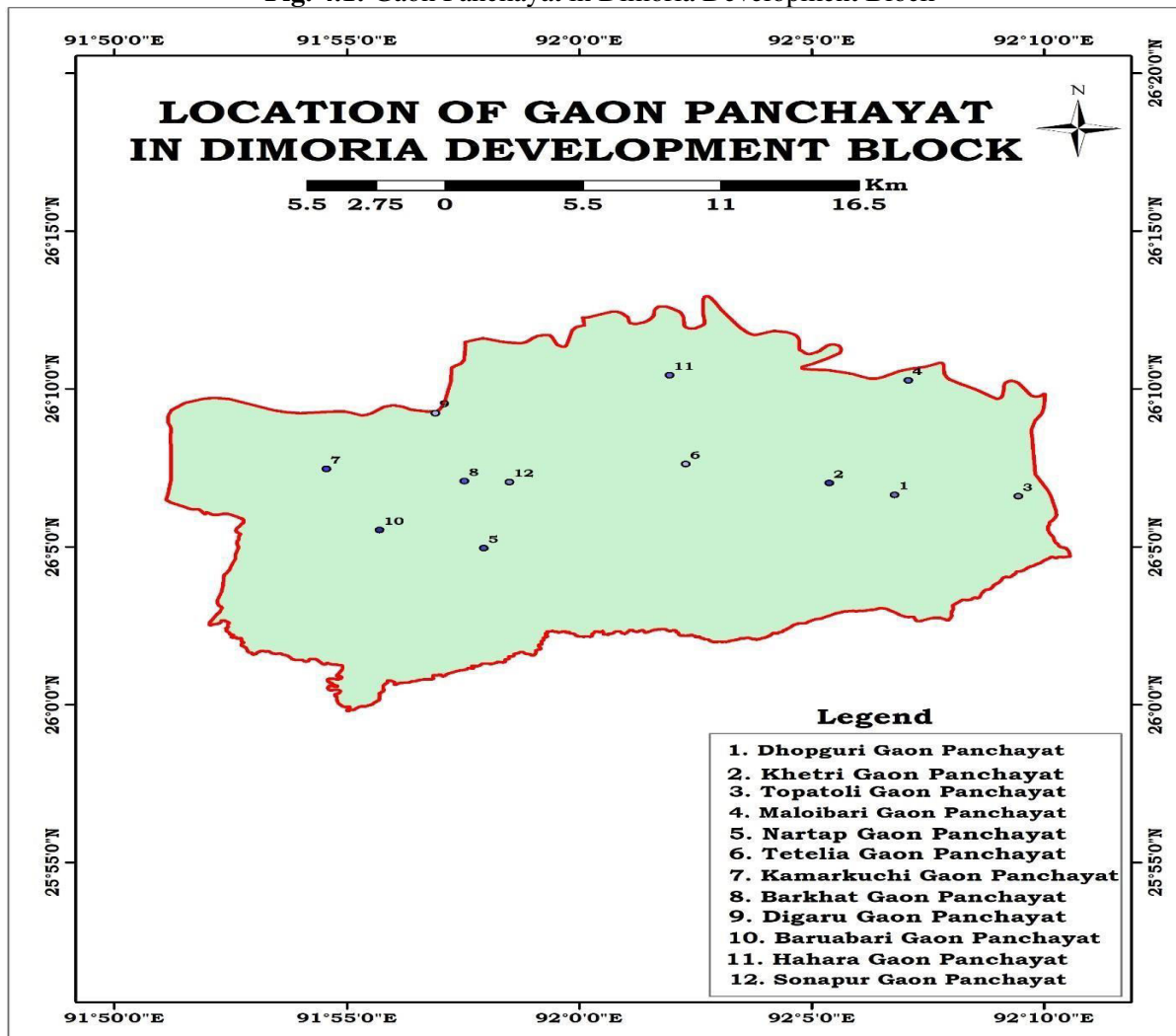
GROWTH AND DISTRIBUTION

According to 2011 census, the total population of Dimoria Development Block is 137,839 where male dominates the scenario with 50.5% (69,843) and female is 49.50% (67,996).

Table 4.1: Decadal growth of population in Dimoria Development Block from 1971-2011

YEAR	POPULATION
1971	68,157
1991	91,375
2001	1,19,548
2011	1,43,371

Plain areas of the block are densely populated while hill areas are sparsely populated. The Kamarkuchi Gram Panchayat holds the highest population while the Digaru Gram Panchayat has the lowest population, 19,557 persons and 12,205 persons respectively. Although, Nartap is the largest Gaon Panchayat in terms of area but due to the reason of hilly terrains, it carries lower population.

DENSITY:

Population density of Dimoria Gaon Panchayat is quite high. It is 548 persons according to 2011 census while the density of Assam is 398 persons per sq. km.

SOCIAL GROUPS:

There are four main social groups at Dimoria Development Block. They are as follows:

General: 33.84% OBC: 36.33%

ST: 14.38%

SC: 15.44%

RELIGIOUS COMPOSITION:
When we talk about religious composition of Dimoria Development block, Hinduism dominates the scenario (90% approx.), which is followed by Islam (5.99%), Christian (3.64%) and others (0.38%).

LITERACY:
Literacy rate of Dimoria Development Block is 67.21%, according to 2011 census where with 72.02% again male dominates the scenario, female literacy rate is 61.79%.

Total male literate persons 46,405, Total female literate persons 38,235.

Gender-wise Labour Force Participation:
Gender-wise labour force participation refers to number of male and female workers engaged in different economic activities. According to the census report of India (2011), there are 33,344 male workers and 11,625 female workers.

ECONOMIC ACTIVITY

Table 4.2: People engaged in different economic activities

Economic activity	% Of Total population
Primary economic activity	70%
Secondary economic activity	7%
Tertiary economic activity	21%
Others economic activity	2%

Source: Dimoria Development Block

Annual Income of the Surveyed House-holds
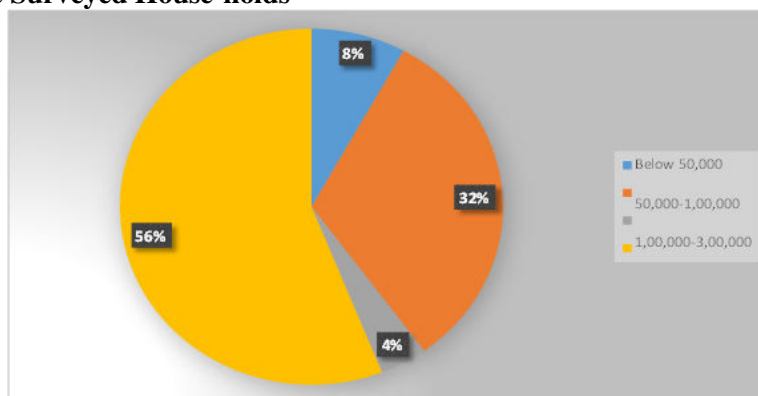
Fig 4.2 Annual income of the surveyed population

The above figure shows the annual income of the respondent families. 56% people have income above ₹3 lacs. 32% of people are in ₹50,000-₹1,00,000 category. 8% people are below 50,000 and 4% people are under ₹1,00,000- ₹3,00,000 category.

Source of Income
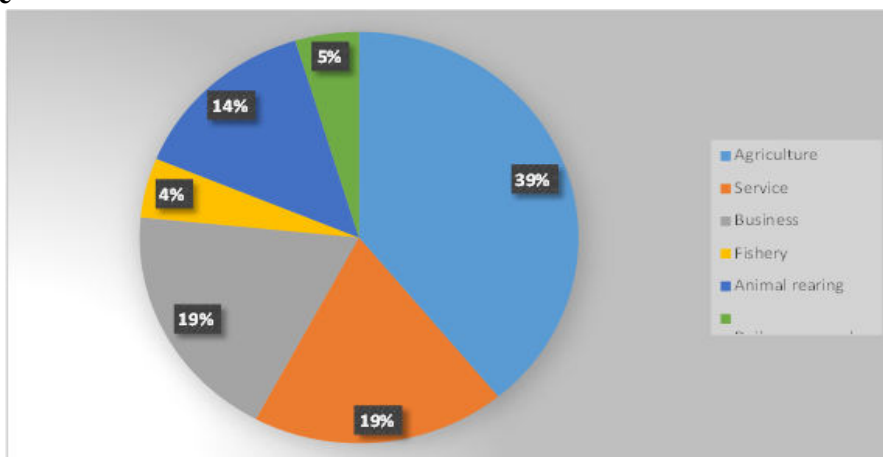
Fig. 7.3: Source of income

The above figure shows that source of income of the 39% of the people comes from agriculture. Business and service sector with 19% secure the second position as income generating activity. 14% comes from animal rearing and 5% and 4/5 from daily wage labour and fishery respectively. Many respondent families have multiple sources of income.

LAND HOLDINGS

The highest number of respondents holds land size between 2 bighas to 5 bighas which is 56%. 36% of the respondents occupy land more than 5 bighas and 8% of people hold land less than 2 bighas.

Pattern of Land Utilisation
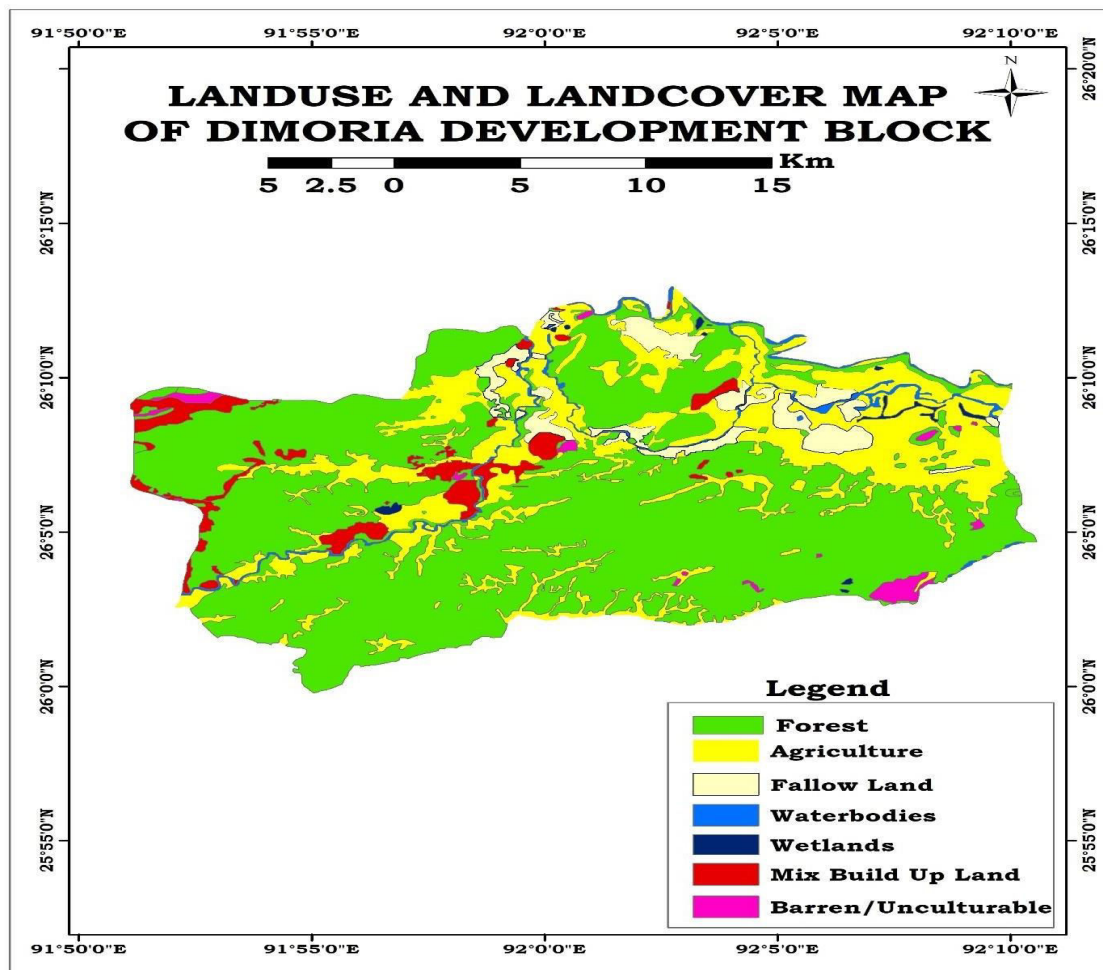
Fig. 4.2: Landuse and Landcover map of Dimoria Development Block

Dimoria Development Block, where agriculture is the main economic activity and various kinds of crops are cultivated comprises the following crops with the areas they are occupying with respect to the total geographical area of the region: Kharif crops (70.6 sq. km. and 22.8% of total geographical area), double crops (66.4 sq. km. and 21.4% of total geographical area). The dominant crop of the region is paddy with 70% of the total cultivated land. (Devee. D, 2019).

Apart from agricultural land utilisation, percentage land use and land cover of Dimoria Development Block are as follows:

Table 4.3: Landuse and Landcover in Dimoria Development Block

Agricultural land	40.70%
Barren/Uncultivated	7.07%
Fallow land	6.65%
Forest	22.12%
Mix build up land	13.27%
Water bodies	5.30%
Wetlands	4.86%

Source: Bhuban.nrsc.gov.in

CONCLUSION

From the above analysis it can be concluded that Socio-Economic Conditions specially in case of literacy is not so satisfactory in the block. Literacy rate of male and female are 72.02% and 61.79% respectively. And 70% of the population are engaged in Agricultural sector, 21% are in tertiary sector and rest are in secondary and quaternary sector. The number of male and female labour force in the block constitutes 33,344 and 11,625 respectively. And in Land-Use and Land Cover map it is clearly visible that majority portion of the are covered by Agricultural land and followed by others. As Socio-Economic, Demographic as well as Land Use of an area plays significant role in uplifting a region so it is very important to look after in these aspects.

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A Study Based on Joint Threshold Key Generation with Hardware ID Verifcation to Enhance Data Security

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ABSTRACT

Data mining is a field of computer science in which it has a computational process of discovering patterns in large data sets. The maintenance of confidential data is very important. There are several approaches which enables the secured services that are based on the technique encryption. But when considered to a Relational Database, the security is not much considered. A trusted hardware based relational database with full data confidentiality is to be implemented which ensures data security and assures the request processed by correct data administrators only. A Joint Threshold Integration Model(JTIM) is also implemented for obtaining threshold based request acceptability. A survey based on trusted Database that provides security to Relational DB is discussed in this paper and the security problems in the Database architectures are identified.

Keywords-Data Mining, Encryption, Security, Database, administrator, relational database.

I. INTRODUCTION

The benefits of outsourcing the data and protection of the data is a great challenge. In a relational DB, the security of the data is not much concentrated. There are many chances by which the data can be hacked by insider or an third party. The privacy and confidentiality of maintaining the data are to be noted well. In the existing researches, the privacy access and searches are encrypted in the relational DB. But there are arbitrary functions which allow the computations of decrypting the input data easily. Thus it leads to lack of data Security. The main objective of the proposed work is to provide a trusted h/w (Bluetooth ID) which is generally based on the relational DB which ensures full data confidentiality and data security. The Joint Threshold Integration Model (JTIM) is implemented for obtaining the request from the admin. By implementing JTIM the server verifies the Username, password, w-ordinated bit key and Bluetooth ID of the admin and only if it is matched the data is provided. The co-ordinated bit key changes for every next upcoming request. So the method of hacking the data is reduced completely.

II. LITERATURE SURVEY

G.Aggarwal et.al, has presented paper on "Two Can Keep a Secret: A Distributed Architecture for Secure Database Service". The recent trends towards database outsourcing are clearly explained. The laws governing the data privacy is clearly given to enhance the interest in enabling the secure DB Services. The existing system of the paper deals with the external DB Service. The data which is to be stored in external DB is first encrypted in the client side. This method enables the secure DB service. It decomposes the data from which they are optimized and then are executed in the distributed system. The attribute values are hidden to maintain privacy. But the disadvantage is that the viability of the architecture must be checked. Special techniques for optimization are not given. This must be enhanced in the future.

Alexander Iliev et.al, has presented the paper "Protecting Client Privacy with Trusted Computing at the server ".The paper discuss about the trusted computing architecture. The existing system shows the way of having a physically protected component in an external organization. The main aim of the paper is to design and prototype TC at the server which is to enhance the client privacy. Considering the privacy problems, the public key Infrastructure (PKI) is designed which provides Secured TC. The Square root algorithm is introduced which randomly permutes the contents of the record. This algorithm has the ability to retrieve I rewards at one time. The prototype design consists of three coprocessors which is used to handle retrievals. The method of enhancing the performance in the DB is given but the secure hardware has limitations. The system memory is low which is to be enhanced in the future.

BishwaranjanBhattacharjee et.al, has presented a paper on"Using Secure Coprocessors for Privacy Preserving Collaborative Data Mining and Analysis ". The paper discuss about the facts of using secure processors for traditional use. The secure coprocessor system eliminates the Physical Security measures. This is due to the hardware miniaturization which are very powerful. This paper brings out a solution for preserving the privacy in data sharing and mining by using cryptographically secure processors. But it has resource limited co-processors.

The data which is transmitted through coprocessors is encrypted and is protected from eavesdroppers. Even when the data is decrypted at the trusted environment the data is secure. Further the process of joining, mining and analysing the data is done with the help of seared co-processor.These secure processors are more powerful and also provide better hardware miniaturization. The future work is to provide multiple secure processors with high speed and privacy.

Mustafa canim et.al, had presented a paper known as "Building Disclosure Risk Aware Query Optimizer for Relational Databases" which gives detailed information about the methods of building encryption techniques concerned to various organizations. The paper gives the solution which us quite effective in preventing data leakage from stolen storage devices. The cryptographic keys are used to decrypt the sensitive information. The disclosure risk is minimized by using encrypted data in relational DBMS. To reduce the effect of various attacks on sensitive data, the Transparent Data Encryption (TDE) method is used. TDE provides encryption applications. The cryptographickey known as database master key (DMK) guarantees the secrecy of the data. All the DMK'S are protected by the Service Master Key (SMK). But this model does not prevent data disclosure if the attacker attacks the main memory itself. The future enhancement is to provide query optimization techniques which will provide protection to sensitive data at lower cost. Future a framework must be done which prevents the attacker from modifying the contents of main memory.

Yao chen et.al, has presented a paper"To Cloud or Not to Cloud? Musings on Costs and Viability" which helps us to know the way in which cloud computing is used in different types of application and to know the method of saving the cost. The paper mainly focuses on two scenarios. The first scenario is "unified client". It gives the result that applications are accessible by a single user. The savings of cost is in a high rate. The next scenario is "multi-client" There are many parties handling the same applications. The network integration must be fairly good for the multi-client scenario to work properly. In both the scenarios the computing is embedded. So they are very cheap and provides high speed communication infrastructure at different levels which is applied in global information exchange and interaction of cloud mitigation viability is clearly explained. The unified client applications hasachieved the cost savings at sufficient level at the client cloudnetwork distances. In the third-party client the feasibility equation changes dramatically. This is due to dominating cost of networking. The future enhancement is to increase the availability and the global distribution of the data.

Rosario Gennaro et.al, has presented a paper "Non-Interactive Verifiable Computing : Outsourcing Computation to Untrusted Workers" which introduces and formalizes the verifiable computation. A function F is chosen on various dynamically chosen input of one to more workers. The primary constraint is the verification of the function should be done at lower cost and with less computational effort. The existing problem is the dishonest client. Generally the end users modify the software of the client which generally gives low performance of the actual work. This is generally done to increase the website ranking. To avoid this problem, the proposed work is done which uses the method of redundancy .The same work software is sent to various clients and the consistency is checked. This reduces the wasting of resources. This work is done by allotting the cloud resources. The work is based on crucial format which provides software computation. And also one-time verifiable computation. The benefit of using this method is provides input and output privacy to the client. The future work of this scheme is to provide increased efficiency and also a scheme which avoids and tolerates malformed resources.

Valentina Ciriani et.al, has presented a paper "Combining Fragmentation and Encryption to Protect Privacy in Data Storage" which reveals the result of encryption and fragmentation. The impact of privacy requirements is the need to develop reliable solutions for protecting sensitive solutions. Protection is more important because the stored data is processed and communicated by all third parties. This paper provides a solution to enforce the privacy for data collection. It combines two techniques namely data fragmentation and encryption. This produces a lower cost in the architecture. Encryption is applied when privacy is explicitly demanded. The fragmentation is used to break the entire data set for making storage easily.The resulting fragments storage is done in same server or different servers. Unauthorized users will not know the data storage server as well as the encryption key which holds the sensitive data. There are certain technical limitations in which regulations are not put into enforcement and also the information which are stored in fragments have the chances of changing over time.

Ernesto Damiani et.al, has presented a paper on "Balancing Confidentiality and Efficiency in Untrusted Relational DBMSs "which gives the scope and characteristics of computing environment. The research proposes the one client server interaction which is introduced by shifting away from the traditional method. The primary importance of this method is to provide protection and secrecy of the information which is accessible

by the client. Generally we know that open networks which are operated by the online querying are difficult to maintain. The data encryption is very much supported and when assumed as trust in the server the decryption of the query execution takes place. The encryption provides a way to provide data access by unauthorised users, intruders breaking into the network and any other unauthorised action.The robust single server solution is the method followed which is based on the indexing of information in the encrypted database. There is great efficiency in the protection and the execution of information. The efficiency and confidentiality of the information is balanced by indexing the encrypted data. The indexing is based on two techniques namely direct encryption and hashing. The indexing of information is enhanced to provide efficient execution of information of the interval based queries. The B+ tree hashing structure is used to execute the interval based queries. The inference attacks are not much concentrated which should be enhanced in the future.

Einar Mykletun et.al, has presented a paper "Aggregation Queries in the Database-As-a-Service Model" which gives the proposal method of protecting the data from untrusted server. The Database-as-a-service (DAS) model is proposed to protect the database contents at the server. The data confidentiality is maintained only when the data is outsourced to the client in the encrypted form. The main focus is that the client must be able to access the data in the encrypted form. The technique includes the execution of the SQL range queries over the encrypted data and attributes. The homomorphic encryption function is proposed in the context of DAS model. The homomorphicencryption function mainly focuses on the aggregation queries over tuples in the DAS model.This technique is very simple and reduces the computational overhead on the aggregation queries which are associated between the server and the client. This method is insecure during the cipher text attacks under query which is to be enhanced in the future.

Tingjian et.al, has discussed a paper on "Fast, Secure Encryption for Indexing in a Column-Oriented DBMS ".The paper discuss about the research work on focussing the various form of encryption. The two main goals for performing encryption in the Database system is security and fast performance. The well-suited method for preserving the data in Database is order preserving encryption technique. The security in the Database is achieved by access control and data encryption. The technique known as efficient light weight database encryption scheme(called FCE) is proposed in which the comparison are done with partial decryption.Any block cipher is used to encrypt a few bytes in each page of the database.The FCE enables the efficient and sufficient comparison which results in the efficient indexing on the cipher text. The main goal achieved is that the untrusted server cannot learn any access details of the plain text but thee equality search can be performed.The encryption of the sensitive data in DBMS which is more crucial and misused by intruders is avoided by this method.

VigneshGanapathy et.al, has proposed a paper as "Distributing Data for Secure Database Services". The paper focuses on the method of preserving the sensitive data.It is based on the method in which the client stores the data the data with the third party service.Various approaches have been analysed based on the data encryption causing a large overhead in query processing.Clients possessing the sensitive information do not generally compromise with the security issues. To capture the privacy of the Database, the privacy constraints are given by the client for sensitive database. A distributed architecture method is proposed which provides a solution and data is stored in multiple sites. The distributed architecture provides privacy and fault tolerance for the clients processing the sensitive information. Separate algorithms are used for distributing the data and partitioning the query data is given such that highly sensitive information are easily protected. The decomposition method is used to partition every sensitive data and then the encryption of the data to protect the sensitive information is enhanced in this method.

BijitHore et.al, has discussed a paper on "A Privacy-Preserving Index for Range Queries".The emerging data management has brought out the potential to transform the IT operations of the corporations. It results in the organisations to easily share their data for various purposes. The Database-as-a-Service(DAS) is a outsource data management in which data is stored at the service provider. The proposed work defines a security perimeter around the data owner. The data which is stored within the perimeter is trusted and the data outside the perimeter is untrusted one. The data within the security parameter is decrypted and the query predicates are evaluated. The proposed work focuses on the range queries and bucketization based approach to support the DAS model. The set of buckets is partitioned in the attribute domain. The main goal is to characterize and avoidance of the privacy threats to support range queries. The privacy and the performance for securing the data is achieved by the technique "data bucketization". The controlled diffusion algorithm is used to achieve the bucketization to the desired level. The syntactic and real datasets effectiveness is measured in this method.

V.Indhumathi et.al, has presented a paper on " On Demand Security for Personal Health Record in Cloud Computing" .It shows the method of storing the method in third party ie, cloud server.The major problems existing are fine grained access, cryptographic access control, method of measuring the key management. This problems leads to the insecurity of the Personal Health Records(PHR) of the patients.The scheme known as Multi Authority Attribute based mostly cryptography(MAABE). The patient privacy is enriched at a great level. The key complexity and the in secureness of the PHR is maintained in a clear way. It generates a great way of security to the personal health records.

R. Sharmila et.al, has presented a paper on "A Survey on Privacy Preserving Homomorphic Collaborative Data Publishing". The paper focuses on the method for providing guidance and support to the design process which are needed. Problems which occur in privacy preservation and the security issues which are to be fulfilled are discussed in the paper very clearly. The privacy preservation for single and two party protocol are clearly explained. Privacy constraints for multiple checks reduces the worst case time complexity.The public audit process is also implemented to improve the efficiency of security. The performance and the extensive security is greatly enhanced in this method.

A.V.K Shanthi has discussed a paper on "Privacy Preserving Homomorphic in Collaborative Data Publishing". It deals with the security issues for protecting the database from the third parties, social actors, stakeholders. Systamatic tools and methodologies are introduced to protect the sensitive information in the databases. The original data is converted to an anonymous form to preserve the privacy. The original data is splited into multiple batches with the HLA Base Authentication algorithm. The encryption of the data is done with the DES encryption algorithm which provides the appropriate public and private key components. This increases the trustworthiness between the user and service providers. This gives a secured transaction n a reduced time and size.

A.V.K Shanthi et.al, has presented a paper on "A survey on Deduplicaion and Various Attacks in Cloud". It specifies to make the storage utilization more efficient by the method of eliminating repeated files. Data is encrypted before it is outsourced to the cloud. This enhances the confidentiality of the data in a great way. The duplication of the data is done by providing a ownership protocol which contains the user's personal data. This protocol does not take any various potential attacks in the clouds. The problems in security problems are reduced by various algorithms and the Deduplication method enhances the efficiency of the sensitive data that is outsourced in the cloud.

A.V.K Shanthi et.al, has presented a paper on "A Survey on fine-Grained Access in Cloud Computing". This paper deals with storing the Personal Health Records(PHR) in a secured way. The medical information is stored in the cloud. The access to the data is cryptographically enforced with efficient user revocation. The PHR service is outsourced by the third-party service poviders.The malicious activities are easily found out. The fine-grained data access control methods are done with semi-trusted servers. The data is encrypted before it is outsourced to the cloud.The Attribute Based Broadcast Encryption Algorithm(ABBE) handles the user revocation and satisfies the disjunctive property.

III. CONCLUSION

Various methods have been proposed to provide security to the confidential data stored by the clients. This study gives the clear idea of providing security to the Database. The security is enhanced in a great way for the databases. When considering the relational databases the security is not much enhanced. Taking this into account, we propose a novel approach by introducing a hardware ID and encrypting the information of the administrators accessing the relational databases. A trusted hardware is to be implemented which provides the limited privileges even to the administrators to enhance the security to the Relational Databases.

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Effect of Urban Air Pollution on the Lichen Pyxine Cocoes NYL. in Mysore City

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ABSTRACT
In the present study, the lichen Pyxine cocoes were collected from different places of Mysore city, Mahadevapura and studied their effect of urban air pollutants on the morphology, anatomy and chlorophyll pigments were examined. Morphological study was carried out by observing the thallus using a stereomicroscope. The changes like discolouration of thallus, deposition of soot, dust and other particles were observed in the thallus and photographs were taken. Significant differences were between the thallus of different areas were observed from the thallus which were collected from the traffic area and industrial area when compared to the thallus of residential area and control area. Free hand sections were also taken to study the differences in the internal structure of the lichen thallus. The transverse sections showed no significant variation in the thickness of the algal layers, cortex, and hyphal layers. The photographs of the sections were taken at 10x and 40x magnifications. In the thallus which was collected from Mahadevapura showed clear algal cells (40x), in any plants if pollution is more, then the effects can be made out clearly by estimating the amount of chlorophyll pigments, because the pollutants affects primarily on chlorophyll pigments. It is the cheap and best method which is done all over the world to study the effects of urban air pollutants like SO_2 and NO_2 on plants along with other parameters. Hence, in the present study chlorophyll pigment estimation was done, The result which was drawn clearly suggests that there is a slight influence of air pollutants like SO_2 and NO_2 on the chlorophyll pigment death, because least chlorophyll amount was recorded in the thalli which were collected from traffic area i.e., Metropole Circle followed by industrial area and residential area. Highest amount of chlorophyll was recorded in the thalli collected from the control area.

Keywords: Biomonitoring, Ambient air quality, chlorophyll amount

1. INTRODUCTION
Lichens are the types of plants which are made up of two different organisms, they are algae and fungi. They are slow growing plants hence they are used widely as pollution indicators. Air pollution is one of the most dangerous and common kind of environmental pollution that is reported in most industrial towns and metropolitans cities of India and abroad (Verma and Agarwal, 2009). Environmental pollution can be defined as "any undesirable change in the physical, chemical and biological characteristics of any component of the environment which can cause harmful effects on various forms of life or property" (Kaushik and Kaushik, 2006). Sulphur dioxide (SO_2), Nitrous Oxide (NO_2), Carbon dioxide (CO_2) and Carbon monoxide (CO) are the major air pollutants present in the air, which are emitted by industries and vehicles. The sulphur compounds are hazardous to health. Sulphur dioxide attacks the lungs and other parts of respiratory system in man, although the various sulphur dioxides are corrosive to other organs of the human body. The SO_2 and Hydrogen sulphide (H_2S) damage many plants in the form of necrotic lesions on the leaves (Arora, 2004).

Plant injury is common near large cities, industrial area, traffic area etc. Urban air pollutants affect plants by entering through stomata, destroys chlorophyll and effect photosynthesis. Pollutants also erode waxy coating of the leaves called cuticle. Cuticle prevents excessive transpiration, damage from pests and diseases, drought and frost. Damage to leaf causes necrosis, chlorosis or epinasty and abscission. Particulates deposited on the leaves can form encrustations and plug the stomata. The damage can result in the death of the plant (Kaushik and Kaushik, 2006). In the urban environment not only avenue trees, shrubs and herbs even some of the epiphytic lichens are also exposed and affected by urban air pollutants.

The Mysore has a rapid development in urban area in demography, migration, transportation, or industrial sector. The Mysore is the second metropolitan city in Karnataka in which it has 10,48,510 of population as per 2011 census and 43 villages will be amalgamated to corporation. The traffic congestion contributes greater to deteriorating environment in urban communities. In the last few years, about 70% of ambient - air quality degradation in Mysore is affected by transportation activities. Based on the statistics of department of regional transport offices (RTO) in Mysore (2011) the increasing of motor vehicle in Mysore has gone to 4, 38,003 (31st

March 2011) till this year. While transportation activities could effect on positive impact like the increasing economic activity, or negative impact on increasing of street capacity could effect in decreasing ambient air quality and also decreasing on public health quality (Harish, 2012).

The Karnataka State Pollution Control Board (KSPCB, Mysore) conducts the monitoring of ambient air in city every month for 24 hours twice a week. There are two conventional ambient air quality monitoring centers in Mysore - one located at Krishna Raja (K.R) Circle and the other at Metagalli, and Nanjanagud an industrial area. The K.R. Circle unit measures the pollution level caused by vehicular traffic while Metagalli unit measures residential pollution and the Kallahalli near Nanjanagud (next to M/s Jublient Organosys.) measure the pollution of Industrial region (Harish, 2012).

Lichens are non-vascular plants, which are made up of two different living organisms i.e. algae (phycobionts) and fungi (mycobionts). Lichens are extremely slow growing organisms, many increasing in size no more than one cm per year. Lichens are distributed all over the world. Lichens which colonize on rocks are called as saxicolous, on the barks of tree trunks as corticolous and those growing on soil are called as terricolous lichens (Mehrotra and Aneja, 2008). Lichens grow on a wide range of substrates, both on natural and man-made, and obtain their required nutrients and water directly from the atmosphere. This uptake of nutrients from the atmosphere means lichens are good indicators of environmental disturbance as they bio-accumulate airborne pollutants (Meijer and Dorihoe, 2006).

In the last few decades usage of lichens in urban areas as an indicator of air quality has been increased tremendously (Rani et al, 2013, Bajpai et al, 2011and Rout et al, 2010). The ability of lichens to accumulate levels of elements in the excess of physiological requirements in the close correlation with atmospheric elemental levels has led to their wide application as practical biomonitors of atmospheric contamination (Hussan. et al, 2013). Biomonitoring techniques help us to assess the effects of pollution and other environmental changes on the biotic components of ecosystems. In general, a biomonitor is an organism that provides quantitative information on the quality of the environment, while bioindicator is an organism that indicates the presence of pollutants by qualitative responses changing physiologically or chemically (Conti and Cecchetti, 2001). The lichens and trees can form networks of plant bioindicators of air pollution, the use appears to be simple, flexible, and economical and efficient to build good to map the pollution. The identification of pollution within the sensitive organisms can also detect the degradation of air quality before it severely affects the biota or humans (Maatoung et al, 2012).

One of the most important uses of lichens is that they are important reliable indicators and useful biological measuring devices of atmospheric pollution, because of their physiological sensitivity. A numbers of parameters are used to estimate the effect of air pollution on lichens (Das et al, 2013). Chlorophyll content and chlorophyll degradation are the parameters which are commonly used to assess the impact of air pollution on lichens (Rout et al, 2010). The most obvious sign of pollution damage to lichens is caused by decomposition of chlorophyll (Danesh. et al, 2013).The algae in lichen are particularly sensitive to pollutants such as SO_2 which disturbs membrane leading to chlorophyll breakdown (Garty, 1993). Pollutants like SO_2 and NO_x affects the growth of lichens and its colony. Sometimes the lichens which are sensitive to pollution will die or they shifts there colony. This shows the presence of air pollutants in the air (Gupta and Singh, 2011). Lichens are the most sensitive organisms known to SO_2 and, therefore, lichens can be used to monitor air quality (Niewiadomska, 1998 and Tiwary, 2008). Fruticose lichens are known to be the most sensitive to air pollution, followed by foliose and crustose lichens (Hazarika et al, 2011, Begum and Harikrishna, 2010). Among all the lichen species used in India, Pyxine cocoes is found to be more toxitolerant and suitable for biomonitoring studies (Shukla and Upreti, 2007, 2008; Bajpai et al, 2010; Danesh et al, 2013).

In the present study, the one of the most commonly growing lichen Pyxine cocoes Nyl. was used to study the effects of air pollutants on the morphology, anatomy and chlorophyll pigmentation at different traffic intersections and control area. Hence this investigation was planned to conduct with these objectives, 1. To compare the morphological changes in the lichen thallus   growing at selected studies areas with respect to the lichen thallus growing at control area. 2. To compare the anatomical differences in the lichen thallus growing at study areas and compared with the lichens growing at control area. 3. To compare the chlorophyll a, chlorophyll b and total chlorophyll content in the lichen thallus growing at study areas and compared with the lichens growing at control area.

2. MATERIALS AND METHODS:
Botanical name: Pyxine cocoes. Nyl
Family: Physciaceae

The genus Pyxine was established by Elias Fries in 1825 with Lecidea sorediata Ach. as its type species. By 1885 Nylander had recognized four species in the genus Pyxine. It is a foliose lichen with black apothecia, usually without algae in the margin; spores thick walled, brown and two celled. The thallus is normally composed of neatly radiating sub dichotomous to linear lobes, although irregular substrates and age disturb this pattern. They are commonly more or less flat.

Thallus foliose, appressed, corticated on both surfaces, heteromerous, photobiont a green alga, apothecia laminal with or without a thalline margin, Sorolia laminal, linear or conflict, medulla white, spores 16-20 × 6-8 µm; distributed in subtropical regions of India (Awasthi, 1988). To evaluate the effect of air pollutants on lichen present on different trees at three different areas of Mysore city and control area.

Mysore city is the second cleanest city in India after Chandigarh. Though Bangalore is the capital city of Karnataka, Mysore is known as cultural capital of Karnataka, because of its calm and clean environment. But in recent days due increased industrialization and urbanization the city is becoming polluted day by day. In the present study, the effect of urban air pollutants on the lichen was studied in three different locations of the city and results were compared with the control area chosen. The selected areas were Metropole circle or General. K.M. Kaariyappa circle selected as heavy traffic area, Saraswathipuram as residential area and Metagalli as industrial area. Mahadevapura, a village which is 29 kms away from the Mysore city was chosen as a control area (Fig. 1).

The lichen samples were removed carefully using the knife and scalpel. In Metropole circle the sample was collected which were growing on Delonix regia trees, which are located along the road sides of JLB Road. In Mahadevapura village, Saraswathipuram and Metagalli area the samples were collected which were growing on Pongamia pinnata and Cocos nucifera trees (Fig. 2). In Metagalli the samples were collected near a rubber factory and a bag manufacturing factory. The collected samples were cleaned by using forceps and needle and preserved in a polythene bag.

The thallus was observed under a stereomicroscope and the differences were noted down between the lichen grown at polluted area and controlled area (Fig. 3). The free hand sectioning was done, mounted on the clean slides and observed under the light microscope to study the differences in the thallus growing at polluted areas and control area The lichen sample was collected and the chlorophyll pigment analysis was carried out by following the Arnon (1949) method.

3. RESULTS
MORPHOLOGICAL STUDY
In the present study the morphology of Pyxine cocoes Nyl. was observed under stereomicroscope. The morphological differences or changes were observed and compared with the thallus which was collected from four different areas. The lichen thallus which was collected from the avenue trees of Metropole circle and industrial area showed some differences when compared to the thallus collected from residential area and control area. The health of the thallus was affected by the urban air pollutants emitted by the vehicles. The thallus showed reduced apothecia number. The thallus colour was decreased or the thallus discolouration was seen. When it was observed under the stereomicroscope the dust particles and soot deposition was clearly noted (Fig. 3).

The morphological result of the thallus collected from industrial area was also similar to that of the thallus collected from commercial area, but the thallus discolouration was not more and it is also not so disturbed when compared to the thallus collected from commercial area. The thallus which is collected from residential area and control area was almost similar in appearance with normal branching and also good number of apothecium was noticed. No discolouration was observed but only few debris and deposition of sand particles were seen. But cleaner thallus was the thallus collected from control area. This result was due to the less vehicular emission. Overall the health of the thallus was good when compared to the thallus collected from commercial area and industrial area (Fig. 3).

Free hand sections of the thalli were taken transversely. The sections were compared to make out the anatomical differences in the thallus collected from four different areas (Fig. 4 & 5). No big differences in the thickness of the thalli were noticed, but the algal cells can be clearly seen in the T. S. of thallus of control area at 40x (Fig. 5b). The thickness of the algal layer was good in all the thallus collected (Table 4).

The chlorophyll pigments were estimated by following Arnon (1949) method. The chlorophyll a, chlorophyll b and total chlorophyll contents were recorded highest in control area, followed by residential area, industrial area and commercial area (Table 3 & Fig. 6).

4. DISCUSSION

All the study areas which were selected in and around Mysore city have the concentrations of air pollutants within the permissible limits as standardized by KSPCB, Mysore. But in comparison the concentrations of the air pollutants was more at K. R. Circle when compared to Metagalli (Table 1 & 2).

Bad air quality in an area can negatively impact on lichen morphology (Wakefield and Bhattacharjee, 2011). The morphological features and differences in the thallus of Pyxine cocoes did not reveal any efficient results regarding the pollution and urban air pollutants. The morphology of the Pyxine cocoes showed little deposition of soot and dust in thallus which is collected from Metropole circle and Industrial area when compared to residential area and control area. The thallus which was collected from residential area and control area was good, with no such depositions. Morphological variables did not present a clear pattern in response to assumed pollution level differences among the sites (Wakefield and Bhattacharjee, 2011). Similar studies and results were noticed by Wakefield and Bhattacharjee, 2011 and Estrabou et al., 2004.

The anatomical study did not show any significant differences in the thickness of algal and fungal zone. The anatomical study by Estrabou et al., (2004) observed thicker cortex in urban area in Physcia endochrysea and Ramalina celastri. They also noticed more thickness in the algal layer in rural area and fewer in the polluted area. Increase in the algal density was seen in Canomaculina pilosa species. Physcia endochrysea showed little changes and Physcia undulata showed reduction in algal quantity. Wakefield and Bhattacharjee (2011) noticed thicker algal layer and cortical layers in different sites. Hence they were not able obtain a clear results in Physcia sorediosa, Parmotrema perforatum and Ramalina stenospora.

The amount of chlorophyll in the lichen thalli is often related to the levels of environmental stress (Wakefield and Bhattacharjee, 2011). The status of chlorophyll primarily indicates that the lichen pigment concentration is highly affected by air pollutants. The concentration of chlorophyll and pollutant concentration indicate that the lower concentration of chlorophyll was mainly due to pollution stress (Das et al, 2011). In this study the chlorophyll a, b and total chlorophyll content was recorded highest in control area, followed by residential area, and the reduced amount of chlorophyll was observed in traffic area and industrial area, because of the deposition of soot and dust particles (Table 3 & Fig. 6). Presence of dust will also influence the chlorophyll degradation (Das et al, 2011). It suggests that the concentration of chlorophyll was affected by the traffic level (Sujetoviene and Sliumpaite, 2013). The increase in the pollution results in the decrease in the chlorophyll (Rani et al, 2013). The variations in response could be directly attributed to the emissions from the industries and vehicular population at the study areas (Danesh et al, 2013).

Distinct variations in chlorophyll contents of Pyxine cocoes were also observed by Das et al., 2011, Rout et al.,2010, Danesh et al., 2013 and Rani et al., 2013. The chlorophyll pigment analysis was also carried out in different species of lichens like Ramalina duriaei (Kardish et al., 1987, Garty et al., 1993. etc.), Pyrenula introducta, Leptogium denticulatum, Acanthothecis species (Rout et al., 2010), Physcia species, Xanthoria parietina (Hussan et al., 2013) etc.

5. CONCLUSION

The present study provides the information about the effects of air pollutants on the lichen Pyxine cocoes, in selected areas of Mysore city. The morphological study and anatomical study shows that it is not much affected by the air pollutants but little decrease in the amount of chlorophyll pigment was noticed. Too much variation in the results is not seen because of less pollution level in the city when compared to other cities in India. The significant changes in any pollution related studies using lichens can be viewed in future days, because Mysore city is expanding due to increased urbanization and industrialization.

Further studies can be done by transplanting the lichen for longer duration from unpolluted or less polluted areas to traffic areas and industrial areas. By lichen transplantation method best results can be achieved. Pyxine cocoes has an efficient accumulation potential of various pollutants; therefore it can be used as a model lichen species for pollution monitoring in urban and industrial area. Mapping the distribution of lichens, heavy metal analysis using lichens growing near the polluted areas as well as by transplanting them, pollution status as well as the effects of air pollutants on the lichens can be studied. Fumigation studies can also be carried out in controlled conditions to study the effect of particular pollutants on the lichen morphology, anatomy, and physiology and biochemical reactions.

The pollution level will increase if proper attention was not given towards the urban development planning. To overcome the effects of air pollution we have to use the resources judiciously and more importance has to be given towards planting the trees in the city. Environment protecting programmes like Vanamahotsav,

Afforestation, Eco-forestry and Social forestry etc. have to be increased and also by educating the society, environment is protected and also pollution can be minimized. Environmental protection and ensuring healthy environment is an integrated effort which needs to be enforced, implemented and realized for future generations.

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Table 1: Ambient air quality monitoring data for the months of January, February and March of 2014 at K. R. Circle.

Sl. No.	Month (2013)	SO_2 (μg/m^3)	NO_2 (μg/m^3)	PM 10 (μg/m^3)
1.	January	11.3	22.8	59
2.	February	12.0	23.0	68
3.	March	12.0	21.2	48
	Average	**11.76**	**22.33**	**58.33**

Table 2: Ambient air quality monitoring data for the months of January, February and March of 2014 at K. S. P. C. B, Metagalli.

Sl. No.	Month (2013)	SO_2 (μg/m^3)	NO_2 (μg/m^3)	PM 10 (μg/m^3)
1.	January	11.2	22.9	59
2.	February	10.9	22.4	71
3.	March	12.3	23.6	52
	Average	**11.46**	**22.96**	**60.66**

Table 3: Thickness of algal layer of Pyxine cocoes.

Sl. No.	Study areas	Thickness of Algal layer (μm).
1	Metropole circle	45
2	Metagalli	51
3	Saraswathipuram	66
4	Mahadevapura	66

Table 4: Chlorophyll pigment profile of Pyxine cocoes selected from different areas

SSl. No.	Areas selected	Remarks	Chl. a	Chl. b	T. Chl.
11	Metropole circle	Traffic area/ Commercial area	0.703	0.985	1.813
22	Metagalli	Industrial area	0.700	1.255	2.126
33	Saraswathipuram	Residential area	0.962	1.290	2.419

| 44 | Mahadevapura | Village, Control area | 1.105 | 1.843 | 3.173 |

Chl. a = chlorohyll a

Chl. b = chlorophyll b

T. Chl. = total chlorophyll content

Figure 6: Chlorophyll a, Chlorophyll b and Total chlorophyll of Pyxine cocoes recorded in study areas

Where, MC: Metropole circle (Traffic area), MG: Metagalli (Industrial area)
SW: Sarswathipuram (Residential area), MH: Mahadevapura (Control area)
Chl. a: Chlorophyll a, Chl. b: Chlorophyll b and T. Chl.: Total chlorophyll

Information Seeking Habits among the Engineering College Students in Cauvery Delta Region

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ABSTRACT
Libraries are the reservoirs of knowledge. The success of library depends on the resources and retrieval the collection should meet the requirements of the user. Libraries provide right information at the correct time to the users. Reading triggers the imagination of the person and adds new sight to eyes and new wisdom to mind and also loads the mind with new software. The individual who reads well has a means for widening mental horizons and for multiplying opportunities of success. For evaluating the study well structured questionnaire was distributed among the students. The data were collected from the 100respondends. The findings of the study show that overflowing of information, low internet speed, and lack of support from library staff are the problems faced by the faculty members while seeking information. People have been reading since ages and thus words of knowledge have been passed on through generations and the reading habit influences the promotion of one's personal development in particular and social progress in general. Regular and systematic reading sharpens the intellect, refines the emotions, elevates tastes and provides perspectives for one's living and thereby prepares a person for an effective participation in the social, religious, cultural and political life. But today, in an age when browsing the net, playing with funky handsets and passing non – stop SMS seem to be the order of the day. The internet boom, interactive medium of images, TV and the silver screen filling the minds of the modern youth, taking majority of their free time we have to think seriously how the growing generations will find time to read. While technology is taking control steadily over individual lives, the reading habit is first vanishing into thin air. This dissertation is to examine the e- reading habits of the Engineering College Students.

INTRODUCTION
Information Access Pattern refers to "any activity of an individual that is undertaken to identify a message that satisfies a perceived need". Manda defined information Access Pattern as "a manner in which a user conducts himself in relation to a given information environment. It is, therefore, regarded as essentially, a process of interaction between the user and the rest of the information system". Information Seeking behaviour is the 'human behaviour dealing with generation, communication and use of information and other activities concerned with information such as information-seeking and information retrieval' (Ingwesen and Järvelin 2005). It encompasses information-seeking as well as the totality of other unintentional or passive behavior (e.g., glimpses, encounters) and avoidance of information (Case, 2007; Wilson, 2000). The study viewed information behavior as any activities that teachers engage in relation to information including awareness of information needs, their active information-seeking, use of information in creation and presentation, communication, preferences and use of information sources.

PURPOSE OF THIS STUDY
This study is to measure the success and failure of the reading habits and the variety of interests of the Students in their fields such as general and subject oriented and also it will be a guide for the librarian, System administrators to procure the required documents so as to the result brought out.

The purpose of this study is how often and how much time is spent and what the students read online. The specific objective of reading habits is to study thoroughly the reading habits of the Engineering College students.

This study has been conducted for the following purposes.
- How much time is spent in reading
- Sources for reading
- Which e – resources students read mostly.

SCOPE OF THE STUDY
The scope of the present study is limited geographically to the students of the Engineering College students. The population taken for the study belongs to students from the Engineering College students in Delta region.

OBJECTIVES

The specific objectives of the study are given below:

1. To identify different types of reading patterns of Engineering College students.

2. To identify the level of literacy in using of Computer and Internet.

3. To identify the effect of subject background on the reading habits of Engineering College students.

5 The purpose and frequency of reading by the Engineering College students.

6 To find out the problems faced by the students while reading e – documents.

7 To find out the impact of e – reading habits of the students of Engineering College students on their studies.

METHODOLOGY

The data for the study was collected well organized questionnaires were distributed to the students of selected Engineering College students.. To collect the data from respondents a self designed pre-tested questionnaire and personal interview method will be used. The questionnaire will be tested on 30 respondents and then will be redesigned if needed, to meet the objectives of the study. Statistical scales can be used to design the questionnaire. Questionnaires were distributed to 125 students. The researcher received from 108 filled questionnaires. 8 are not properly filling or in completed. Therefore the present study consisted of hundred respondents as sample.

Data analysis and interpretation

Data analysis is considered to be an important step and the heart of the research work. After the collection of data with the help of well structured questionnaires, the next logical step is to analyses and interprets data with a view to arriving at empirical solution to the problem. Each question is analyzed by using MS – EXCEL software. In this chapter, the research has arranged the primary data gathered through questionnaire in the form of tables and simple charts.

PURPOSE OF USING COMPUTERS

Table-2 Purpose of using Computers

Purpose of using computers	Number of respondents	%0f respondents
Exam purpose	50	50
Class Notes	25	25
Project work	15	15
Seminar work	10	10
Total	100	100

MAJOR PROBLEMS IN ONLINE READING

Table-1 Major Problems in Online Reading

Major problems in online reading	Number of respondents	% of Respondents
Slow working of internet	68	68
Network problem	25	25
Power failure	7	7
Total	100	100

The above table the revels that major problems online readings are, 68% respondents to face lack of internet speed, 25% respondents said network problem is a major issue and 5% respondents said power failure is a major problem.

SUGGESTIONS

• Purchase progressively new systems for access the e-resources

• Institution master ought to extend the speed of the web.

• Purchase progressively number of new form of e-journals and e-books.

• Frequently power failure is one of the main problems so the Engineering College students take necessary steps adequate and continuous power supply.

• Purchase and provide new furniture for suffering back and neck pain respondents.

CONCLUSION

Libraries are the reservoirs of knowledge. The success of each library depends on the resources and retrieval systems. The collection should meet the requirements of the user. The advent of computers and information technology has revolutionized the field of library and information services and has brought considerable changes in the information-seeking behaviour of users. Consequently, librarians must be aware of how faculty seeks information. The main role of the librarian is to be familiar with the information requirements of the users. Libraries must understand information-seeking behavior of users to re-engineer their services and provide information efficiently.

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Inlfluence of Leadership Style on Employee Motvation

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ABSTRACT

Leaders with drive, leadership motivation, honesty and integrity, as well as self-confidence, cognitive capacity, and knowledge of corporate leaders, are recognised as those who do the right things, and the art of leading is referred to as leadership. In the current globalized era, the role of leaders is felt in each and every corner of the world. Effective accomplishment of task, is possible only in the presence of a leader. Thus, leadership styles have turned out to be inevitable. The main idea behind the study is to analyse the type of leaders existing in the field of study. Moreover, it also focuses on the expectations from one's leader. This study attempts to analyse the preferred leadership style among the employees of the chosen automobile firms in Chennai and analyse the gap existing between what exists and what is preferred by the employees. As expected, the preferred style of leadership expected from a leader is people-oriented leadership style. Irrespective of the department, designation, age and qualification it has been found that all categories prefer only people-oriented leadership style as compared to task- oriented leadership style,

Keywords: Leader, Leadership styles, people-oriented leadership, task-oriented leadership

INTRODUCTION

Effective and dynamic leadership is critical to an organization's success. Understanding the notion of leadership is really crucial. Let us define a leader before moving on to the notion of leadership. A leader, according to Cook, Hunsaker, and Coffey, is someone who establishes a vision and goals, then motivates people to willingly commit to those goals. Leaders and non-leaders share a few key characteristics. Leaders with drive, leadership motivation, honesty and integrity, as well as self-confidence, cognitive capacity, and knowledge of corporate leaders, are recognised as those who do the right things, and the art of leading is referred to as leadership.

As seen by those they work with and through, a leader's style is the regular behaviour patterns they utilise when working with and through others. People develop these patterns when they learn to react in the same way under comparable circumstances. They form routines, which make their acts fairly predictable to others who deal with them. Many factors influence leadership, including coworkers, followers, situational variables and job needs, supervisors, and the external environment.

SIGNIFICANCE OF THE STUDY

In the current globalized era, the role of leaders is felt in each and every corner of the world. Effective accomplishment of task, is possible only in the presence of a leader. Leadership behaviour is emphasized to a large extent. Thus, leadership styles have turned out to be inevitable. The main idea behind the study is to analyse the type of leaders existing in the field of study. Moreover, it also focuses on the expectations from one's leader.

STATEMENT OF THE PROBLEM

The success of an organisation is influenced by leadership styles. Leaders must conduct in such a way that they can only accomplish success in the duties they are tasked with in order to gain the members' influence. As a result, the goal of this research is to identify the many leadership styles that exist inside an organisation. Apart from the above, this research aims to explore the most favoured style of leadership and also the expected leadership styles from their superiors. The above two objectives help in evolve the differences prevailing in the practise and preferred leadership style.

OBJECTIVES OF THE STUDY

This study attempts to analyse the preferred leadership style among the employees of the chosen automobile firms in Chennai and analyse the gap existing between what exists and what is preferred by the employees.

REVIEW OF LITERATURE

Numerous studies have been undertaken throughout the years with the goal of examining how leaders act. Bennis (1999) defines true leadership which has been proved with positive outcomes such as skills with respect to communication which could really inspire and delegate, decision-making judgement, the capacity to foster talent, the ability to coach, hiring, firing, budgeting, and performing performance reviews. This list is not complete, but it does highlight two characteristics of leadership that are both required for effective leadership to occur: task behaviours and relationship behaviours. According to Northouse (2012), how these two traits are

displayed determines the degree to which a leader is effective. Situations vary, but each requires a combination of task and relational actions.

Task-related behaviours guarantee that people, equipment, and other resources are used efficiently to achieve goals. Planning, organising, clarifying roles and objectives, monitoring activities, and resolving dispute are all part of meeting these specific objectives. Yukl (2012) offers a variety of research papers for each component behaviour, demonstrating that demonstrating each behaviour may improve leadership effectiveness.

Curral (2009) conducted a study which has attempted to know the influence of task-oriented vs. relationship-oriented leadership on the creation of group performance. The results have shown that the leadership style has an influence on the group related behaviour and performance.

RESEARCH METHODDODLOGY

Descriptive research design has been found to be relevant for this study. The research tool used was a structured questionnaire was prepared for collecting primary data. Data collection was carried out in automobile firms operating in Chennai. Data collected through Questionnaire was administered in SPSS (Statistical Package for Social Sciences.) by which data was tabulated. Later data was interpreted to emerge with findings.

DATA ANALYSIS

Table 1 : Variables influencing style of leadership

Variables	Leadership Styles		Total
	People Oriented	Task Oriented	
Cooperation	38 (63)	22 (37)	60 (100)
Interaction Facilitation	22 (37)	38 (63)	60 (100)
Goal Achievement	32 (53)	28 (47)	60 (100)
Performance	41 (68)	19 (32)	60 (100)
Sharing of Responsibility	44 (73)	16 (27)	60 (100)

Note : Figures in Parenthesis denotes Percentage

It is evident from the above that the that in case of people-oriented style of leadership the most important variable is Sharing of responsibility (73%) which is followed by cooperation among the leader and the led (63%). Least influencing variable of people-oriented style of leadership is found to be interaction facilitation (37%). In case of task-oriented style of leadership the most important variable is interaction facilitation (63%) which is followed by goal achievement (47%). Least influencing variable of task-oriented style of leadership is found to be responsibility sharing (27%).

Table 2 : Chi Square Test for association between department and preference for leadership style to be adopted by the leaders

Department	Leadership Styles		Total	Chi Square Value	P Value
	People-Oriented Leadership	Task-Oriented Leadership			
Production	23 (85)	4 (15)	27 (100)		
Administration	15 (75)	5 (25)	20 (100)	1.955	<0.001**
Service	9 (69)	4 (31)	13 (100)		
Total	47 (78)	13 (22)	60 (100)		

Note : Figures in Parenthesis denotes Percentage

It is evident from the above that there exists an association between department of employees and their preference for a particular leadership style to be adopted by their leader. Majority of the employees irrespective

of their department to which they are attached prefer their leader to exhibit people-oriented leadership style rather than exhibiting task-oriented leadership style. However, on further analysis it can be seen that this preference is higher among employees working with production department as compared to the other two departments.

Table 3 : Chi Square Test for association between designation and preference for leadership style to be adopted by the leaders

| Designation | Leadership Styles | | Total | Chi Square Value | P Value |
	People-Oriented Leadership	Task-Oriented Leadership			
Operator	18 (82)	4 (18)	22 (100)		
Supervisor	24 (63)	14 (37)	38 (100)	3.016	<0.001**
Total	42 (70)	18 (30)	60 (100)		

Note : Figures in Parenthesis denotes Percentage

It is obvious from the above that there is association between designation of employees and their preference for a particular leadership style to be adopted by their leader. Majority of the employees irrespective of their designation prefer their leader to exhibit people-oriented leadership style rather than exhibiting task-oriented leadership style. However, on further analysis it can be seen that this preference is higher among operators as compared to supervisors.

Table 4 : Chi Square Test for association between age and preference for leadership style to be adopted by the leaders

| Age | Leadership Styles | | Total | Chi Square Value | P Value |
	People-Oriented Leadership	Task-Oriented Leadership			
< 30 years	25 (64)	14 (36)	39 (100)		
>30 years	19 (91)	2 (9)	21 (100)	7.322	<0.001**
Total	44 (73)	16 (27)	60 (100)		

Note : Figures in Parenthesis denotes Percentage

It is obvious from the above that there exists an association between age of employees and their preference for a particular leadership style to be adopted by their leader. Majority of the employees irrespective of their age prefer their leader to exhibit people-oriented leadership style rather than exhibiting task-oriented leadership style. However, on further analysis it can be seen that this preference is higher among employees who are above 30 years of age.

Table 5 : Chi Square Test for association between educational qualification and preference for leadership style to be adopted by the leaders

| Educational Qualification | Leadership Styles | | Total | Chi Square Value | P Value |
	People-Oriented Leadership	Task-Oriented Leadership			
Diploma	20 (83)	4 (17)	24 (100)		
Graduation	7 (47)	8 (53)	15 (100)	1.955	<0.001**
Professional (Production)	17 (81)	4 (19)	21 (100)		
Total	44 (73)	16 (27)	60 (100)		

Note : Figures in Parenthesis denotes Percentage

It can be seen from the above that there is association between educational qualification of employees and their preference for a particular leadership style to be adopted by their leader. Majority of the employees irrespective of their age prefer their leader to exhibit people-oriented leadership style rather than exhibiting task-oriented leadership style. However, on further analysis it can be seen that this preference is higher among employees who are either diploma holders or graduates as compared to those who possess professional qualification.

Table 6 : Level of consistency between preferred leadership style and existing leadership styles

Personal Details		Leadership Styles		Preferred Styles	
		People Oriented	Task Oriented	People Oriented	Task Oriented
Department	Production	15 (56)	12 (44)	22 (82)	5 (18)
	Administration	10 (50)	10 (50)	14 (70)	6 (30)
	Service	8 (62)	5 (38)	8 (62)	5 (38)
Designation	Operator	9 (41)	13 (59)	19 (86)	3 (14)
	Supervisor	24 (63)	14 (37)	25 (66)	13 (34)
Age	Below 30 years	25 (64)	14 (36)	25 (64)	14 (36)
	Above 30 years	8 (38)	13 (62)	19 (91)	2 (9)
Qualification	Diploma	11 (46)	13 (54)	20 (83)	4 (17)
	Graduation	13 (87)	2 (13)	7 (47)	8 (53)
	Professional	9 (42)	12 (57)	17 (81)	4 (19)

Note : Figures in Parenthesis denotes Percentage

The above table analyses the consistency maintained in the leadership styles. Consistency here refers to the balance maintained in the type of leadership style one follows and the one they prefer from their leaders. It is obvious from the above table that irrespective of the demographic variable the most preferred style of leadership is people-oriented style.

FINDINGS AND CONCLUSION

As expected, the preferred style of leadership expected from a leader is people-oriented leadership style. Irrespective of the department, designation, age and qualification it has been found that all categories prefer only people-oriented leadership style as compared to task- oriented leadership style. The true reasons of the consistency factor disparity can be investigated. The information on preferred leadership styles might be valuable in determining how satisfied employees are with the organization's leadership patterns. As a result, it can be argued that the research assisted in determining that leadership conduct is distinct. The bulk of the responders are employee-focused leaders who provide collaboration to members at all levels, while the rest are task-oriented leaders. Similarly, the majority of them highly prefer to work under a leader who priorities the needs of his or her employees. They have the impression that their bosses are looking after them.

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Online Customer Experiences and its Impact on E-Loyalty in Clothing E-Retail

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ABSTRACT
Purpose – The purpose of this study is to explore the underlying factors influencing experience of online shoppers and further leads to formation of satisfaction and repeat purchase intension in the apparel segment of Indian e retail.

Design/methodology- The study is based on a systematic and thorough review of literature of 42 full length peer-reviewed articles to identify the relevant literature from 2010 to 2019. Based on Sample and preliminary analysis and Content analysis

Findings–Three Dimension / Drivers identified as Product related drivers, Website related drivers and Psychological driver's .These dimensions impact e loyalty either directly through e-satisfaction.

Practical implications – The finding of the study would help e- retailer in optimizing their strategies to provide smooth customer experience to shop online.

Originality/value – Customer experience has taken prime focus as it is essential for e retail success. Through this study we have tried to reconstruction and consolidated the factors and dimension that have capacity of influencing online shopper's experience.

Keywords: Customer experience, Customer journey, online shopping, Digital market, Customer Satisfaction

1. INTRODUCTION

The e-commerce has transformed the business in India. Indian market is continuously growing and becoming a competitive market. India presents a unique and powerful growth story (PWC India Report 2019). The adoption of Digital is being seen as a stimulant for overall economic growth. India illustrates a special and bright growth backed with favourable demographics and policy reforms (PWC India Report 2019).

Shares of Various Segments in E-commerce Retail by Value

- Electronics — 48%
- Apparels — 29%
- Home and Furnishing — 9%
- Baby, Beauty and Personal Care — 8%
- Books — 3%
- Others — 3%
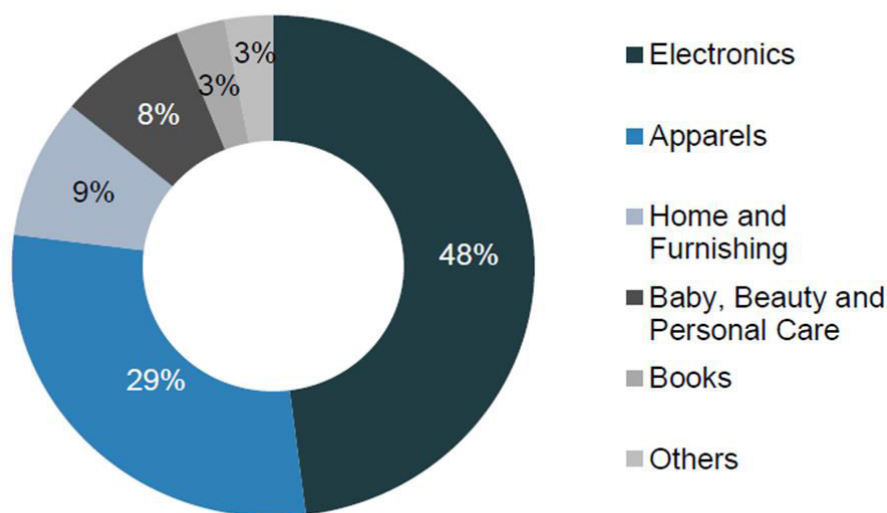
Source: Media sources, BCG –The $250 billion Digital Volcano, BCG –Digital Consumer Spending in India, Kalaari Capital -Imagining Trillion Dollar Digital India, Feb'2019

According to a study by PWC, 2019, the E-commerce showcase is relied upon to reach US$ 200 billion by 2026. Incredible growth of online retailing is posing a lucrative opportunity in Indian Market. Hence in this study we have attempted to explore the underlying factors influencing experience of online shoppers and further leads to formation of satisfaction and repeat purchase intension in the apparel segment of Indian e retail.

The exponential growth of the industry has opened opportunities for many retailers such as Amazon, Myntra, Snapdeal, Flipkart, etc. and, hence, resulting in a competitive and dispersed market place. This congestion is creating fragmented brand share for e retailers. Digital space is redefining how value is generated and conveyed (Evans and Cothrel, 2014), i.e. web store gives space to customers to choose the most competitive offer by vesting on different websites. Making a tough state of affairs for on-line marketers; they have to battle not entirely with offline sellers but also with on-line sellers.

The retailers want to retain their existing customers and encourage the new ones to explore the virtual potentials (Tiago et al., 2015). Studies also demonstrated that unfavourable shopping interactions contribute to negative results (T Sai Vijay., 2019, Afshar, 2015).

Verhoef et al., 2009 highlighted customer relation as critical factor for market results and success. Palmer, 2010 also established and validated interactivity with customers has positive impact on customer satisfaction and loyalty. Several studies have examined the conceptualization of customer dimensions (Alexander Bleier et al., 2018, Klaus, 2013) .T Sai Vijay. et al, 2019 highlighted the combined impact of online shopping principles (internal influencers) and network atmospheres (external influencers) on e-loyalty of shoppers.

Studies has focused primarily on analyzing support behaviour, establishing typologies of shopper and building consumer interactions with few online design elements (Compeau et al . 2016, Alexander et al . , 2019). There is however a scarcity of studies validating the effect of customer experience dimensions and its impact on such as consumer satisfaction and loyalty (T Sai Vijay. et al 2019; Alexander Bleier et al., 2018; Martin et al., 2015) resulting research gap.

Through extensive literature review we have tried to explore the underlying factors influencing experience of online shoppers and further leads to formation of satisfaction and repeat purchase intension in the apparel segment of Indian e retail.

2. LITERATURE REVIEW
2.1 CUSTOMER EXPERIENCE
Customer experience concept is not new in the market but its taking prime importance as customers are taking charge of their shopping attribute. Holbrook and Hirschman (1982) coined "consumption experiences" aimed at fulfilling dreams, feelings and fun, including the experiential view of consumption and it became a distinguished thought.

Studies have simplified the customer experience theory, citing it as "comprehensive in nature and involves the customer's psychological feature, affective, emotional, Social and physical responses to the retailer".

2.2. E – SATISFACTION & E- LOYALTY
In terms of customer's psychological feature, online customers progressively seek experiential value (Rose et al., 2012). Constant flow of information and more choices have enabled customers, resulting become less forgiving of unreliable or poor offerings and have no hesitation in switching to other service providers and platforms. Thus consumers have become critical in the matrix of retail performance (Kahn, 2018).

Several attempts have been made to develop the definition of substantial Customer (Verhoef et al., 2009; Rose et al., 2011; Klaus, 2013; Rajbir Singh Sethi et al., 2018) to improve comprehension and applicability.

(Alexander et. al, 2019; Kahn, 2018) describes the emotions essential for creation of the customer experience. Rose et al. (2012) proposes one dimension of online customer experiences i.e website attributes. Martin et al., 2015 identified Elements proficient of affecting the online shoppers experience comprising - website design, Perceive ease of use, customization, Social presence, website information

Klaus (2013) identified the component of functionality and its elements are ease of use, two way interaction, and product information. (Akinbode et al., 2019) defined psychological dimension and its vital components - trust, Price competitiveness. T Sai Vijay et al., 2019 highlighted it as "a psychological state, exhibited as a personal response to the e-retailer's website".

Akinbode et al., 2018; Akinbode et al., 2019 have empirically established that these elements: website improvement, e-retailer preferences, customer satisfaction and attitudes toward an online retailer and shoppers purchasing intention are vital for customer experience.

Studies have emphasised and empirically validated elements of online shoppers experience critical in creation of customer satisfaction and loyalty. (Akinbode et al., 2019, Martin et al., 2015; Rose et al., 2012, Klaus, 2013; Palmer, 2010)

Therefore incorporating multiple customer experience dimension under one umbrella to have holistic view requires further exploration (Alexander et. al, 2019).

3. THEORETICAL FOUNDATION AND RESEARCH QUESTIONS

Existing literature on online customer experiences include various methods and structures.

Some studies have employed TAM, Technology acceptance model (Davis, 1986) to study and validate Internet atmospheric indications and their outcomes. Yoo and Donthu, 2001 and Loiacono et al., 2007 have used SITEQUAL scale and WebQual respectively to study emotional reactions of users on their online buying intentions

Recently, based on the TAM and SOR framework (T Sai Vijay et al., 2019, ,Wann-Yih Wu et al. 2017, Anusha Sreeram et al.,201) have studied theoretical models based on the TAM Further to analyze the effect of Internet atmospheric indications on the emotional reactions of users to their online buying intentions have consider SOR framework.

According to TAM model (Davis, 1986) the attitude of the Individual for adaptation of new technology is determined by primly two factors: Perceived Usefulness and Perceived ease of use. The SOR Framework coined by Mehrabian and Russell, 1974 states that Stimulus (s) exists in shopping atmosphere and influence consumers (O) resulting purchase intention as response (R).

In this research we have tried to synthesized concepts to have holistic list of variable comprising and affecting customer shopping behaviour in online retail market. We have considered SOR and SERVQUAL framework for variable identification and build model.

Lecinski, 2011 highlighted a concept "Google's zero moments of truth model "elucidate the revised decision-making process of the online customer. Online shopper's decision to shop is very much influenced by stimuli present on online platform like updated information and social presence. They are no more guided by sequential shopping. Also studies have highlighted (Alexander et. al, 2019; Verhoefet al., 2009) customer experience is holistic in nature.

Hence concluding to have holistic online customer experience the concept of three stimuli (Drivers) of online customer experience is proposed–

- Product related drivers,
- Website related drivers &
- Psychological drivers

Where Stimulus is (Product related drivers, Website related drivers, & Psychological drivers), Organism is Satisfaction and Response is Loyalty

Based on the E-S-QUAL framework developed by Parasuraman et al. this study intends to identify the variables. As dimensions of ESQUAL includes all phases of customer interaction with web store.

4. OBJECTIVES OF THE STUDY

1. To understand online customer experience in context of India

2. To identify the determinants of Online customer experience

3. To examine the effect of these determinants on online customer experience.

5. SIGNIFICANCE OF THE STUDY

The country has seen an exponential growth of the e-commerce market in the last five years.

Researches oriented towards Indian consumers' experience and its outcomes are limited Akinbode et al., 2019. The concepts were borrowed from developed markets framework. Such extensive studies are required in Indian e retail market.

Indian e commerce market is fuelling towards trillion dollar economy in near future. Indian e commerce market has become an opportunity for retailers to cash upon .As a result it's becoming competitive market. To sustain and survive the online retailers are deep discounting themselves. All these factors are creating volatile situation in Indian e commerce market making e loyalty a distant picture (Shah, 2012)

According to Hoffman & Novak, 1996, the best way to retain the customers & to exploit the forthcoming opportunities it is vital to enhance customer experience. Thus this study would help e retailers, markets to understand elements of online store environment capable of influencing customer satisfaction and loyalty to sustain and nurture profit.

In India's unpredictable shopping environment, this research would provide insights into developing strategies to enhance customer experience resulting loyalty.

6. METHODOLOGY

We have done a systematic and exhaustive analysis of Customer experiences literature spanning from 2010 to 2019. The relevant literature was defined, explained, analyzed to have an improve acquaintance of a phenomenon in a clear and organized way.

Yingxia Cao et al.,2018, Steel and Ko¨nig (2006) argued that integrating various speculations into a thorough model might be useful in having holistic picture as: (a) Difficult to clarify entire arrangement on premise of a single theory; (b) sensible circumstances; (c) conceivable move toward issues in a more compelling and precise way. The highlights of study can provide comprenhsive and holistic arrangements. So we have synthesised from different theories to identify variables.

7. DISCUSSION AND FINDINGS

Online web environment provides a platform to have two way communication, versatility to exhibit product choices and the abundance of consumer behaviour. Contributing richness in customers shopping behaviour. Leading to emerging research, focusing on the value of online customer experiences.

Through exhaustive literature review, mentioned below table describes current trends and approach on Online Customer experience being adopted. Also helps in identifying potential dimensions underlying the customer experience.

Year	Contribution
Yr.2019-Yr.2018	• Social interaction, Product assortment, timely delivery of product, Product economic value & online reviews key characteristics for online shoppers. • Convenience, affordability, personalized attention and gratification unique online consequences • Broad categories of OSE identified: some have highlighted Product related drivers and website related drivers, whereas few researcher have identified psychological factors have significant impact on loyalty • Studies have also suggested e-commerce firms to focus on website quality, immersive experience, information support and social presence while designing and integrating their social platforms
Yr 2017.	• Perceived usefulness, credibility of the website, Entertainment as key variables capable to outline customer's satisfaction and loyalty behaviour. • Situational variables (attractive alternatives and investment) that affect customer's evaluations in making decisions to remain loyal. • Customer service & privacy taking prime importance in formation of customer's satisfaction.
Yr .2016	• Price offerings, perceived benefits, perceived risks & Website quality found to be the essential factor. • Trust and online shopping experience come out as the significant factors in the decision making process • Series of specific functional and experiential TCCE touch points identified.
Yr.2014-Yr.2015	• Four dimensions identified as critical factors Website design, Ease of use, trustworthiness, and customer service. • Perceived usefulness and trust features come out as the significant factors in the decision

Year	Contribution
	making process
Yr.2010-Yr.2013	• Studies emphasized on Switching costs and its association with customer loyalty.
	• Web design & ease of use categorized under service quality and have positive impact on customer satisfaction
	• Customer experience interactive elements (physical moments, emotional involvement moments).
	• functionality OCE dimension and the psychological dimension

Studies have highlighted (Alexander et. al, 2019; Verhoefet al., 2009) customer experience is holistic in nature and there is revision in decision-making process of the online customer. They are no more guided by sequential shopping according to Google's zero moments of truth model. Therefore incorporating multiple customer experience dimension under one umbrella to have holistic view requires further exploration (Alexander et. al, 2019).

This study adapts, extends the three dimensions namely:" Product, Website and psychological dimension. Twelve new online customer experiences elements identified under these three dimensions are Informativness, Product Assortment, Pricing, Trust, Social Presence, Ease of Use, Perceived usefulness, Quality, Layout, Convenience, Financial Security, and Entertainment. It highlights that these three dimensions have significant impact on customer satisfaction and loyalty in Indian e retail sector. (Alexander et. al, 2019; Kahn 2018; Martin et al., 2015).

Through exhaustive literature review we have identified list of variables that impact "Online customer experience" that would further lead to satisfaction and develop customer loyalty. There is need to create lasting satisfaction of customers and establishes the validity of the platform for relationship.

Hence, to have holistic online customer experience the concept, need to identify drivers to incorporate all elements under related categories. And study all drivers together and their interrelationships.

8.LIMITATIONS AND SUGGESTIONS FOR FUTURE
In this research we have considered e retail sector. Future studies can be done by considering other e commerce sectors. This study is review study which can further be validated and tested for further generalization and consistency .Future studies can be done on studying the effect of moderators like age, income, gender across different market of India. Since customer experience is key to success so studies highlighting and updating variables capable of influencing customer experience would be of supreme importance.

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Extract of *Ipomea Nil* Ameliorates Hyperglycemia, Oxidative Stress and Improves β-Cell Function in Streptozotocin Induced Diabetic Rats

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ABSTRACT

Ethnopharmacological relevance: The art of ayurveda and traditional healing system in India have reflected the ethnomedicinal importance of the plant Ipomea nil reflecting its vast usage in the ayurvedic preparation as well as management of diabetes by traditional practitioners.

Aim of the study: This study aims to ascertain the anti-diabetic potential of Ipomea nil hydroalcoholic extract on Streptozotocin induced diabetic rat model.

Material and method: Diabetes was induced in wistar rats by Streptozotocin (STZ) and thereafter diabetics rats were treated by two different doses of hydroalcoholic extract of Ipomea nil (200 and 400 mg/kg body weight) respectively with glibenclamide as positive control. Biochemical parameters such as blood glucose, liver profile, lipid profile, renal profile, glucose-6-phosphatase, fructose1,6-bi phosphatase and serum insulin level. Further more histology of pancreas was carried out to evaluate cell structures. Moreover immunohistochemistry was performed on pancreas and heart tissues to determine pancreatic insulin, TNF-alpha and cardiac Bcl-2 protein expression in all the experimental groups.

Results: Toxicitiy studies exhibited non-toxic nature of both the doses of Ipomea nil. Further studies on diabetic rats exhibited anti hyperglycemic activity of upregulating serum insulin levels. Similarly the extract ameliorated oxidative stress which were evidenced by downregulating the TBAR levels and augmenting the SOD, GSH and Catalase levels of antioxidant enzymes. Furthermore histopathological analysis demonstrated recovery in structural degeneration of beta cell mass of pancreatic tissues with increase in liver protective enzymes of diabetic rats. Interestingly the protective effect of the extract was further evidenced by upregulation of insulin and cardiac Bcl-2 expression.

Conclusion: The overall study has demonstrated the potential of hydro alcoholic extract of Ipomea nil in the management of diabetes with its related complications. But need further investigation on its major constituents with depth mechanistic studies at specific molecular level.

Keywords: Ipomea nil, hydroalcoholic extracts antidiabetic, anti oxidant, insulin, TNF-α, Bcl-2

1. INTRODUCTION

Diabetes being a evergreen research topic for upcoming researchers due to its unbated rise in number of the patients suffering from this metabolic syndrome. At present it is one of the alarming threats which is globally rising due to its term effects such as retinopathy, neuropathy, cardiac failure and atherosclerotic vascular diseases. The most famous concept of impairment in carbohydrate, lipid and protein metabolism with its abnormality in insulin signaling gives abnormal rise to hyperglycemia. It is even associated with oxidative stress which is responsible for upregulating the formation of reactive oxygen species (ROS) responsible for reduction in the anti-oxidant levels.

Herbal medicinal plants proves to be beneficial and have started to withdraw more attention in past few years for the control of diabetes owing to their minimum side effects when compared to the synthetic pharmaceutical drugs available in market along with their cost factor. These traditionally important plant species are known to exert anti diabetic effect by decreasing blood glucose levels and oxidative stress and upregulating the pancreatic expressions of insulin and glucose transporter proteins. [1-4] The presence of various phytoconstituents such as glycosides, alkaloids, terpenoids, flavonoids, carotenoids etc accounts for the anti-diabetic properties of the plants. As the search for more effective and less expensive anti diabetic agent is ongoing, there is a renewed research interest on traditionally used anti diabetic drugs. One such plant is Ipomea nil which is also commonly known as morning glory belonging to family Convolvulaceae.

Ipomoea nil commonly understood as species of Ipomoea morning glory known by several common names. The flowers open in the morning and closes by afternoon. This plant is abundantly found in forest region of Chittoor district of Andhra Pradesh. Various works are reported with this medicinal plant such as anti-microbial,

dyslipidemia, anti-diabetic anti-oxidants activities[5-9]. Although various interesting pharmacological aspects have been identified in previous studies to reflect its anti-oxidant, anti-inflammatory and anti-microbial properties of different parts of this plant, recent studies demonstrate anti hyperglycemic potential of this plant. However, lack of scientific report on anti-diabetic mechanism attempts to initiate this study to understand the mechanism involved in anti-hyperglycemic activity of this plant needs to be studied in a STZ induced rat model.

2. MATERIAL AND METHODS

Plant material: Ipomea nil belonging to family Convolvulaceae was collected from the forest of Chittoor district, Andhra Pradesh and then authenticated by Dr. K. Madhava Chetty, Assistant Professor from department of Botany, Sri Venkateswara University, Tirupati with Voucher number 1005.

Animals: Male wistar rats (150-300gm) were used in this study. Rats were procured from licensed breeders of Hyderabad. Animals were housed in polypropylene cages and kept at normal light and humidity controlled conditions. Maintenance of 12h light/dark cycle at room temperature (25 ± 2°C) with humidity level of 35 % and provided with normal rat pellet diet with distilled water throughout the study period.

Experimental groups: All the experimental animals were acclimatized in institutional animal house and then base line estimation was carried out. Experiments were performed after receiving CPCSEA approval (IAEC/ANCP/2017-18/1) in accordance with the animal experimentation guidelines issued by CPCSEA. Then they were divided into 5 groups with each consisting of six animals as follows.

Group I: Control which served for baseline values for all parameters.

Group II: STZ (45 mg/kg) injection dissolved in 0.1M Citrate buffer solution

Group III: STZ injection followed by Glibenclamide (2.5mg/kg) orally for 28 days

Group IV : STZ injection followed by administration of hydro alcoholic extract of Ipomea nil 200 mg/kg body weight for 28 days.

Group V : STZ injection followed by administration of hydro alcoholic extract of Ipomea nil 400 mg/kg body weight for 28 days.

Induction of Diabetes: Rats were categorized into two division: diabetic and non- glibenclamide treatment diabetic. Diabetes was induced by a single ip injection of streptozotocin (STZ) dissolved in 0.1 M citrate buffer solution (pH 4.5) at a dose of 45 mg/kg body weight.[10] The rats in control group did not receive any STZ injection. Presence of diabetes was confirmed by measuring the increased levels of FBG, 72h post STZ injection. The blood was collected via pricking the tail vein. The characteristics symptoms of diabetes were also identified in diabetic rats which include hyperphagia, polydipsia and diuresis.

Estimation of body weight, Blood glucose level determinations: Body weights on starting day and end day of all experimental animals were measured thoroughly. The serum glucose levels were measured on day 0, 7th, 14th, 21st and 28th with the help of a digital glucometer (Accu-chek). Blood was initially collected by pricking the tail vein. At the end of the experimental procedure, the rats were sacrificed. Heart was punctured and then blood samples were collected. After collection the samples were centrifuged at 4 degree centigrade for duration of 15 minutes at 800g and the separated serum was processed for biochemical estimations.

Estimation of Insulin level: Serum insulin levels were measured by using enzyme linked immunosorbent assay (ELISA) kit (EIA-2048, 96 wells DRG instruments) according to manufacturers guidelines.

Estimation of Lipid profile levels: Serum lipid profile which includes Total cholesterol (TC) and triglyceride (TG) were determined by using diagnostic kits and values were estimated by using an automated analyzer. Serum level of LDL cholesterol, VLDL cholesterol and HDL were also estimated using same methods.

Estimation of Liver enzyme levels: Liver function test includes serum glutamic oxaloacetic transaminase (SGOT) and Serum Glutamic Pyruvic Transaminase (SGPT) and alkaline phosphatase were determined by using diagnostic kits and values were estimated by using an automated analyzer. Serum level of total protein and total bilirubin were also estimated using same methods. Estimation of glucose-6-phosphatase and fructose-1,6-biphosphatase were also estimated using same procedure.

Estimation of renal profile: Serum creatinine (SC) and serum urea (SU) were determined by using diagnostic kits and values were estimated by using an automated analyzer.

Determining anti-oxidative enzyme levels in the pancreatic homogenates: 10% pancreatic homogenate was prepared in phosphate buffer (0.1M, Ph 7.4) by using a glass tefflon homogenizer. The sample containing cytosol were prepared as described by Trounce et al. Further the fraction separated was used to determine the lipid peroxidation as well as endogenous anti-oxidant levels. Total content of LPO was estimated from TBAR. The SOD limits were calculated according to the method narrated by Misra. It is always expressed as the total amount of enzyme which inhibits the oxidation of epinephrine by 50% which was equal to 1U per mg of the protein. The enzyme levels of catalase were analysed according to hydrogen peroxide decomposition method and always expressed in μmol of hydrogen peroxide metabolized/mg protein/min.

Histological studies: After humane sacrifice of the wistar rats the organs were immediately processed in 10% formalin and left overnight which were later embedded by paraffin. The embedded sections in paraffin were later cut into 5μm thickness with the help of a microtome. The sections were deparaffinized by immersing in xylene for 20 min then dropped into ethanol at decreasing concentrations for 5 minutes each. Final step followed by staining the sections with hematoxylin and eosin. The changes in histopathology of the vital organs were evidenced and micro graphed under a high contrast microscope.

IMMUNOHISTOCHEMISTRY

The tissue sections were deparaffinized using xylene and rehydrated with the help of decreasing concentrations of ethanol. Antigen retrieval was done by the process of incubating the sections in concentration of 0.01 M of citrate buffer maintaining a Ph of 6.0 atleastfor 10 minutes at 100 °C. After that 3% hydrogen peroxide was prepared in PBS, which was used to further neutralize the endogenous peroxidase.. Before incubation with insulin and TNF alpha primary antibodies the blocked tissue sections were kept in appropriate blocking serum for non-specific binding at a dilution of 1:5000 in 5% normal serum at room temperature for 1 hour. Then the sections were kept for incubation with biotinylated secondary antibody for 30 minutes at room temperature after rinsing the tissue sections four times with PBS. Further the tissue sections were then exposed to avidine and biotinylated HRP complex in PBS for another 30 minutes. 3,3-Diaminobenzidine staining technique was used to visualize the site of antibody binding which appeared as dark brown precipitate. Tissue sections were then counterstained with hematoxylin for nuclear staining. The immuno peroxidase changes produced and marked in the pancreas and heart were viewed studied with the help of high resolution microscope.

Statistical Analysis

The datas were analysed by SPSS software and summarized as Mean ± SEM. Statistical significance were tested by using one way analysis of variance (ANOVA) and P value <0.05 is considered as significant.

3. RESULTS

Phytochemical tests for Ipomea Nil extract

Sl. No	Chemical test	Results
1	Alkaloids	
	a. Dragendroff''s	**+**ve
	b. Mayer's	**+**ve
	c. Wagners	**+**ve
2	Carbohydrates	
	a. Fehling's test	**+**ve
	b. Benedict's test	**+**ve
	c. Barford's test	**+**ve
3	Proteins and amino acids	
	a. Biuret's test	**-**ve
	b. Ninhydrin test	**-**ve
4	Steroids and terpenoids	
	a. Salkowski test	**-**ve
	b. Libermann buchard test	**-**ve
5	Tannins and phenolic compounds	
	a. Dil.HNO_3 test	**+**ve
	b. 5 % $Fecl_3$ test	**+**ve
6	Flavanoids	
	a. Shinoda's test	**+**ve
	b. NaOH test	**+**ve
7	Glycosides	

	a. Keller-killani test	+ve
	b. Foam test	+ve
	c. Borntrager's test	+ve
	d. Baljet test	+ve
8	Saponins	
	Foam test	+ve

(+ve) Present   (-ve) absent

Oral glucose tolerance test
Effect of Ipomea nil on serum glucose levels in glucose loaded rats

| GROUP	Serum glucose (mg/dl) (Mean ± SEM)				
	Time after glucose administration in minutes				
	0 min	30 min	60 min	90 min	120 min
I	70±14	105±2.4	121±7.1	128±2.3	118±2.4
II	85±1.6	88±2.4	83±0.00	90±0.00**	83±0.3***
III	95±8.2	106±18.9	116±23.5	105±16.5*	98±7.1**
IV	71±19.2	88±2.4	100±0.00	103±0.00**	91±2.3**
V	67±7.4	83±3.3	100±0.00	91±2.3**	88±2.1***
Oral glucose tolerance test (OGTT)					

All values are expressed as mean ± SEM, One way Analysis of variance, followed by Dunnets, *p<0.05,**p<0.001 & ***p<0.0001, when compared Group II with normal control and remaining groups with disease control.
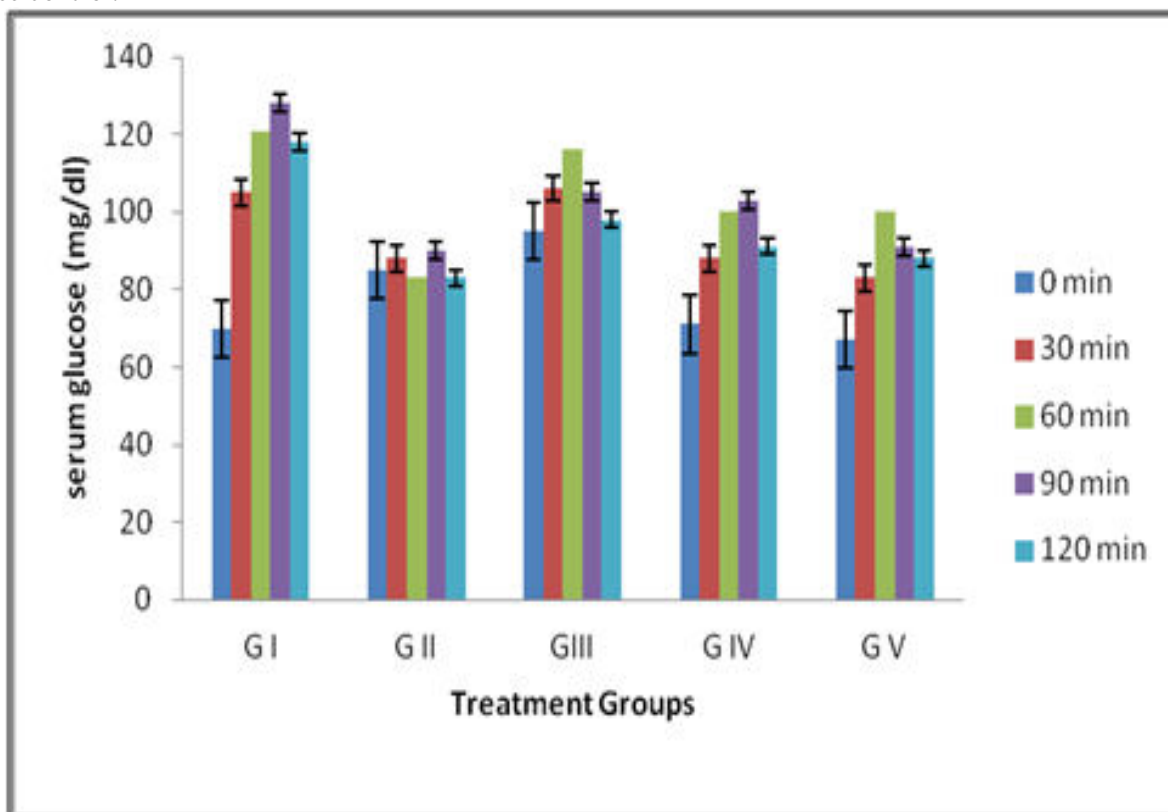
Effect of Ipomea nil on serum glucose levels in glucose loaded rats
On 0th, 30th, and 60th minute, it was observed that there was no significant variation in the blood glucose levels when compared with control group respectively.

On 90th minute, the blood glucose levels of Group-II (90±0), Group-III (105±16.5), Group IV (103±0), Group V (91±2.3) showed increase in the levels when compared with that of control (128±2.3) respectively.

On 120th minute, Group-II showed significant increase in blood glucose levels compared to control. Group-III (98±7.1) when compared with control (83±0.32) there was increase in the blood glucose levels. Group IV (91±2.3), Group V (88±2.1) significantly increased the glucose levels when compared with control respectively.

Anti diabetic activity on STZ induced diabetic rats
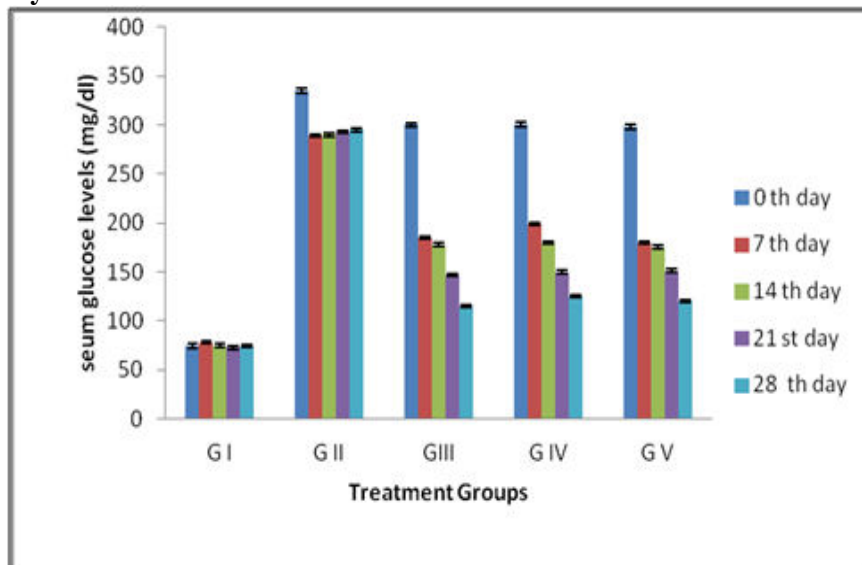
Effect on serum glucose levels:

On 0th day, the blood glucose levels of control group (335±18.4) showed significant increase compared to normal (75.4±2.4). The blood glucose levels of standard and high dose extract treated group (301±12.2) and (294±19.7) showed increased levels compared to control (335±18.4), where as low dose extract treated group (285±11.7) showed significant increase (P<0.0001).

On 7th ,14th , 21st and 28th day, control group (289±18.4), (232±14.9),(242±11.7) and (253±9.2) showed significant increase in the blood glucose levels compared to normal (78±1.4), (75±2.4), (73±1.8) and (75±1.4). the blood glucose levels of standard (185±1.2), (178±4.3), (147±1.4) and (90±0.83) and high dose extract treated groups (199±1.4), (180±1.2), (150±1.2) and (125±1.4) showed significant increase compared to control (p<0.001).

Effect of Ipomea nil on serum insulin level
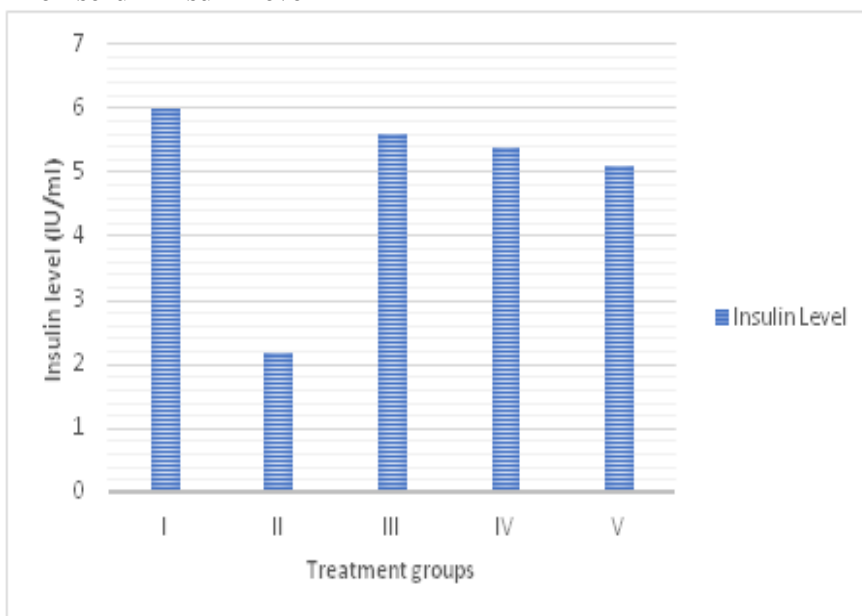
Effect of Ipomea nil on serum lipid profile

Effect of Ipomea nil on serum lipid profile in experimental rats were evaluated and results were represented following.

All values are expressed as mean ±SEM, one way Analysis of variance, followed by Dunnets,*p<0.05, **p<0.001, ***p<0.0001, ns-non significant when compared Group II with normal control and remaining groups with disease control.
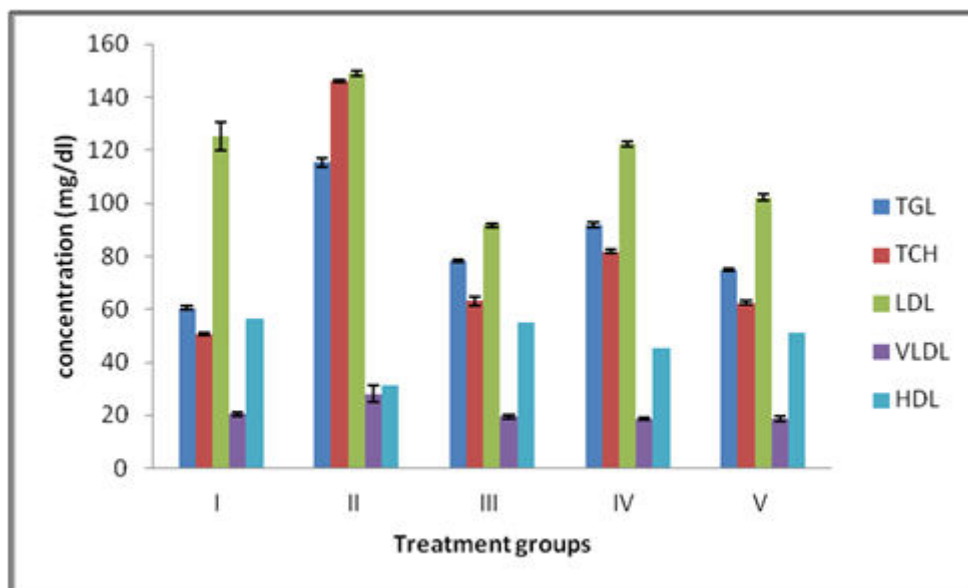
Effect of Ipomea nil on serum lipid profile

Effect of Ipomea nil on liver profile

Effect of Ipomea Nil on liver profile in experimental rats were evaluated and results were represented
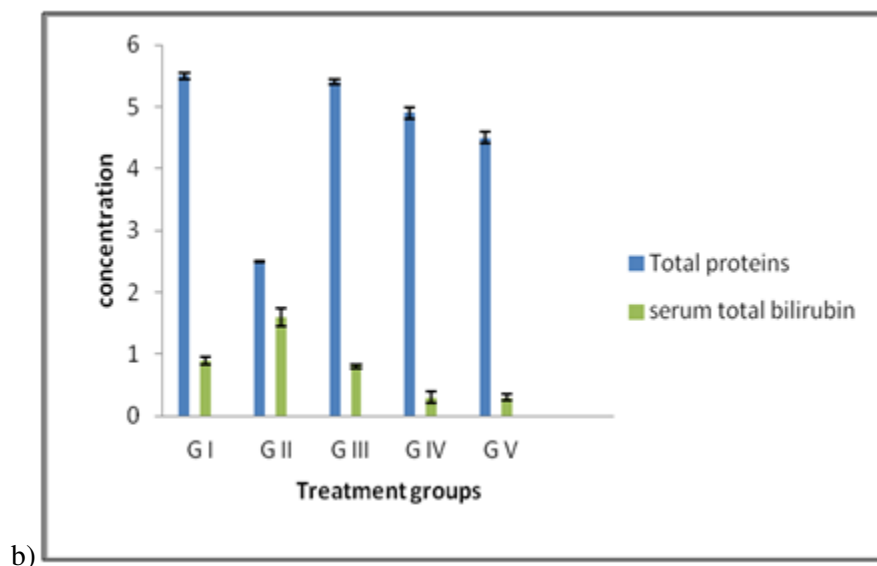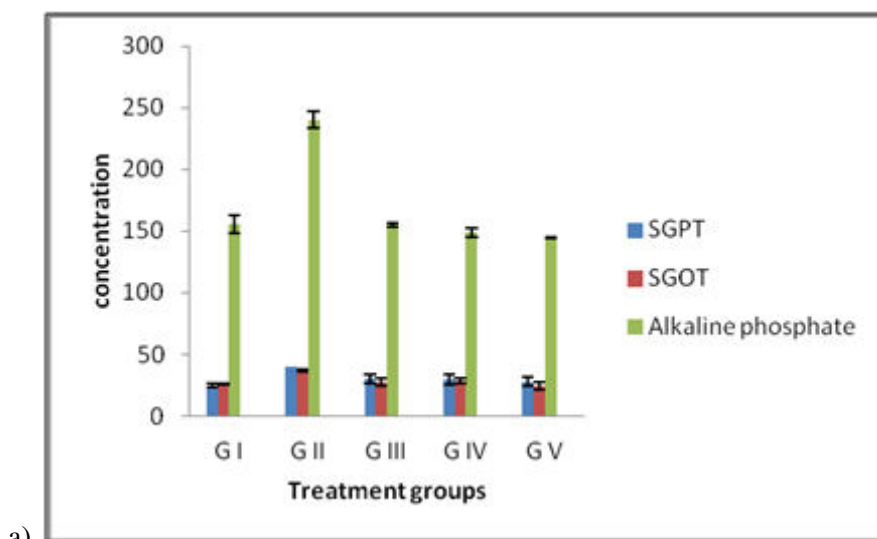
a)

b)

All values are expressed as mean ±SEM, one way Analysis of variance, followed by Dunnets,*p<0.05, **p<0.001, ***p<0.0001, ns-non significant when compared Group II with normal control and remaining groups with disease control

Effect of Ipomea nil on renal profile
Effect of Ipomea Nil on renal profile in experimental rats were evaluated
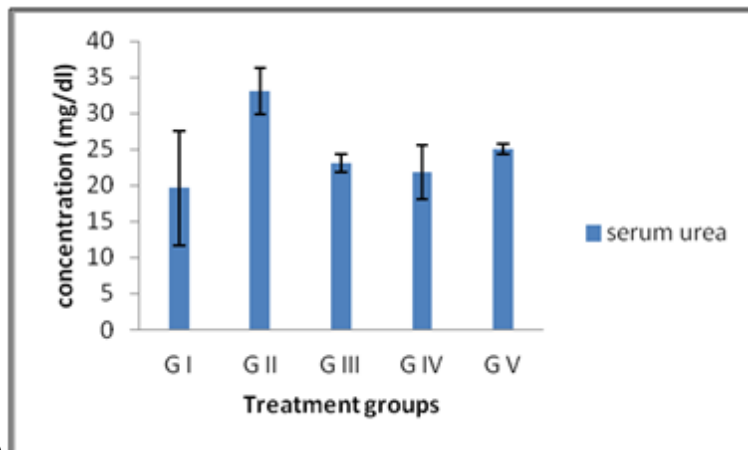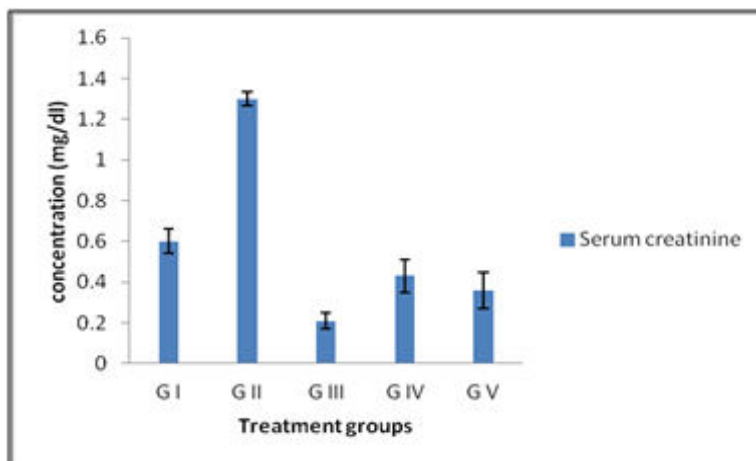
a)

b)

All values are expressed as mean ±SEM, one way Analysis of variance, followed by Dunnets,*p<0.05, **p<0.001, ***p<0.0001, ns-non significant when compared Group II with normal control

Effect of Ipomea nil on carbohydrate metabolizing enzymes
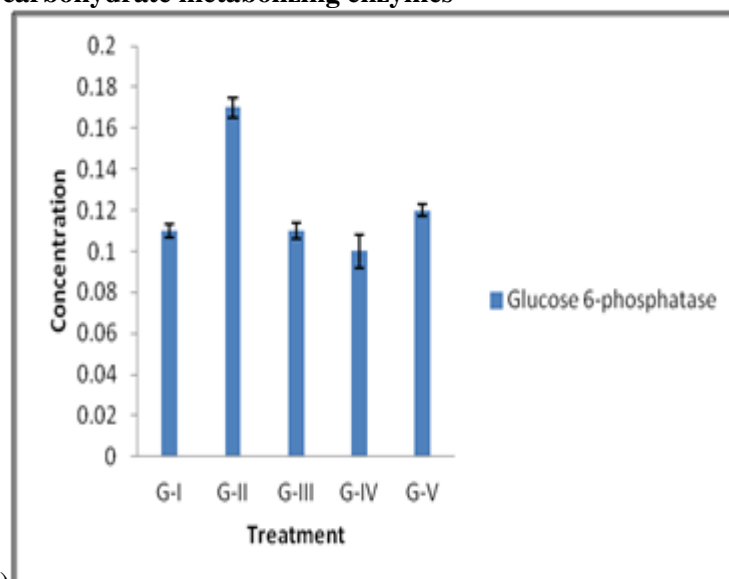
a)
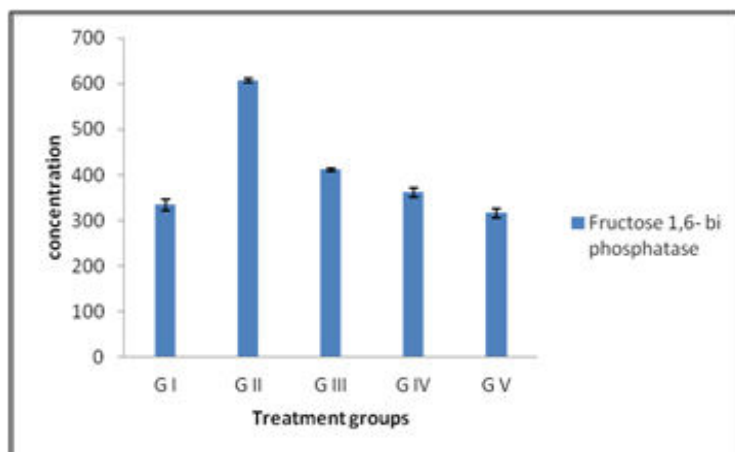
b)

Effect of Ipomea Nil on Glucose-g-phosphatase and Fructose1,6- bi phosphatase

Oxidative stress parameters
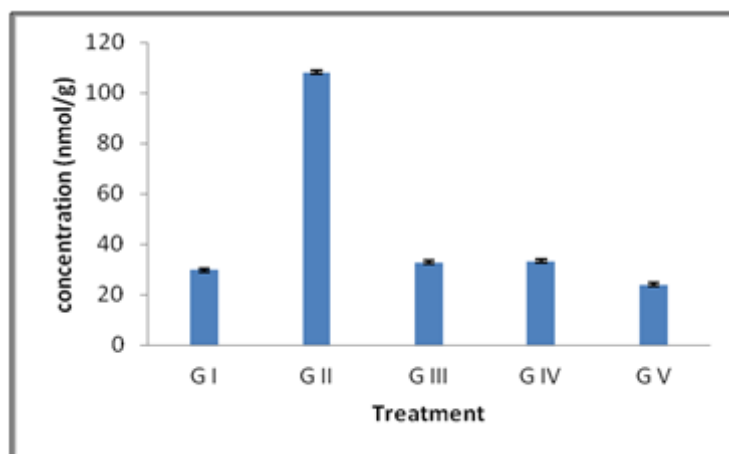
A)
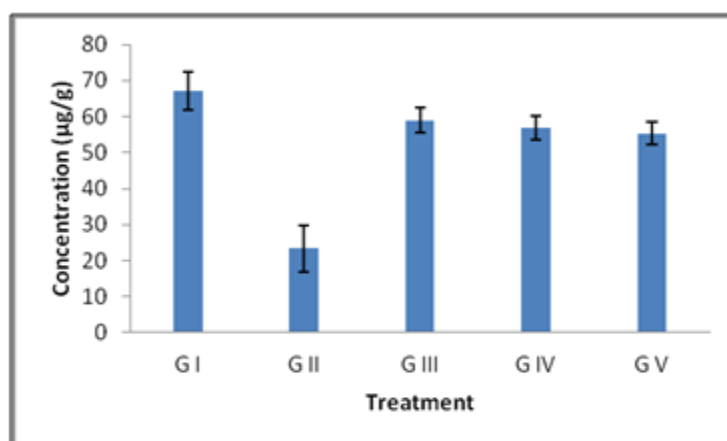
B)
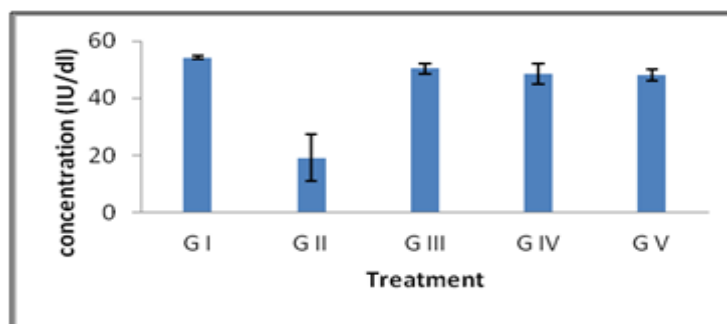
C)
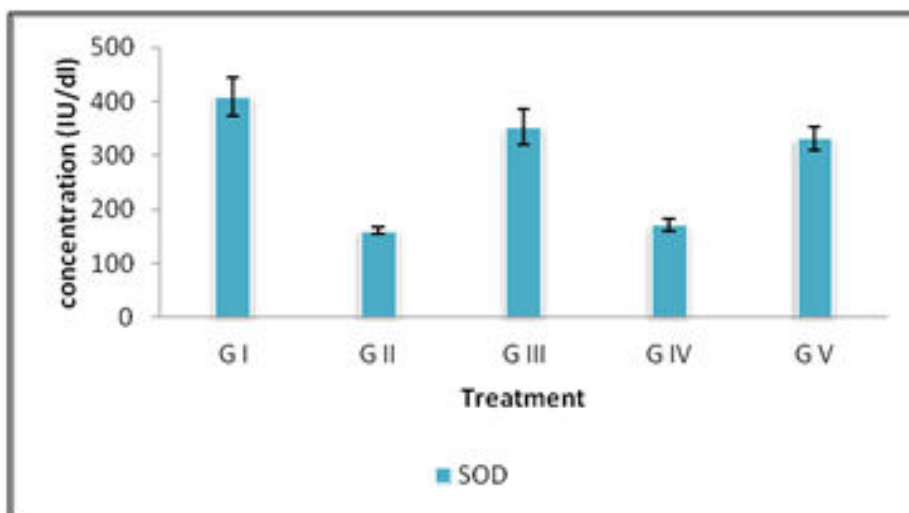
D)

Effect of Ipomea Nil on A) Thiobarbituric acid reactive substances (TBARS) levels
B) Glutathione (GSH) levels

C) Catalase (CAT) levels

D) Superoxide dismutase

HISTOPATHOLOGICAL STUDY
GROUP-I: (Presence of normal pancreatic islets)
The normal cyto-architecture of Pancreas tissue with lower magnification (10X); And Higher magnification (40X).

a)   b)

Group I: 10 X   Groups I: 40 X
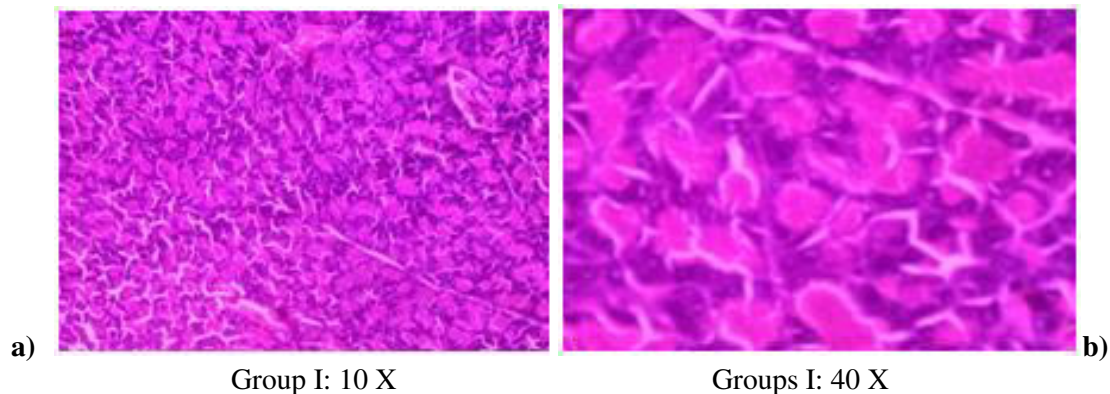
GROUP-II: (Expansion and dilated islet cells)
The degenerative changes in Pancreas tissue take place and it shows Expansion and dilated islet cells structural damage.

c)   d)

Group II: 10 X   Group II: 40 X
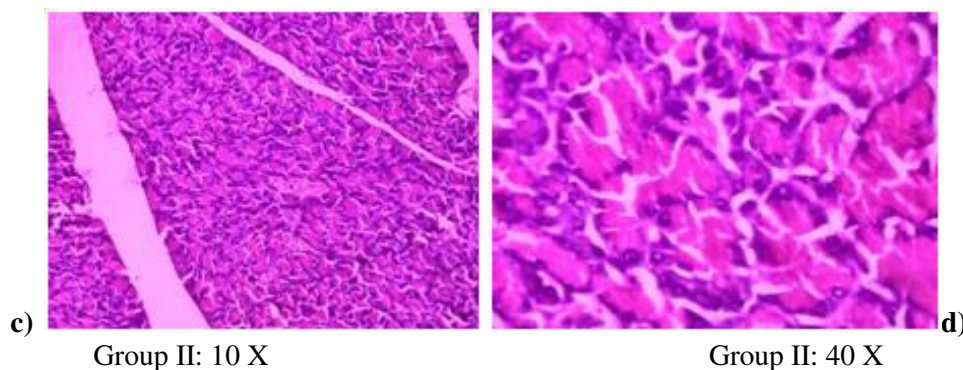
Group-III: (STZ+Glibenclamide) absence of dilation and prominent hyper plastic of islets.
The Pancreas tissue found to be normal cyto-architecture which indicates the regeneration of Pancreas tissue.

Group III: 10X   Group III: 40X
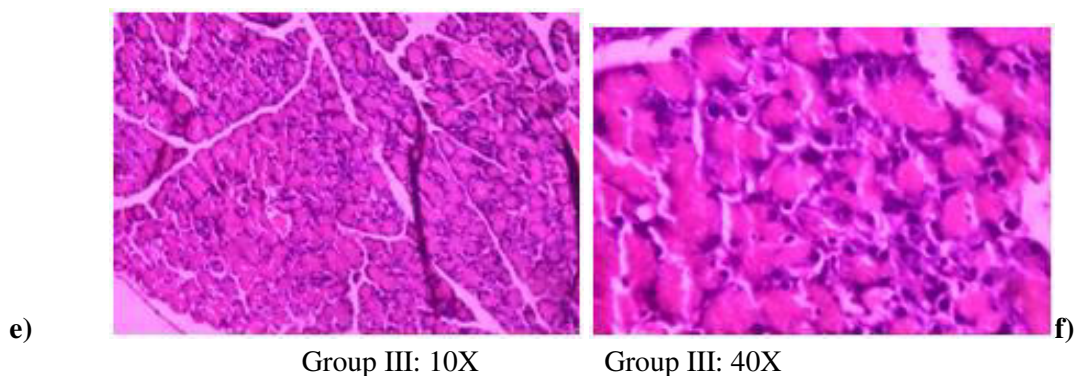
Group-IV: (Moderate expansion of pancreatic islets, showing prominent hyper plastic islet).
The regenerative changes in pancreatic tissue takes place and tissue shows similar to normal cyto-architecture of Pancreas.

Group IV : 10X   Group IV: 40 X
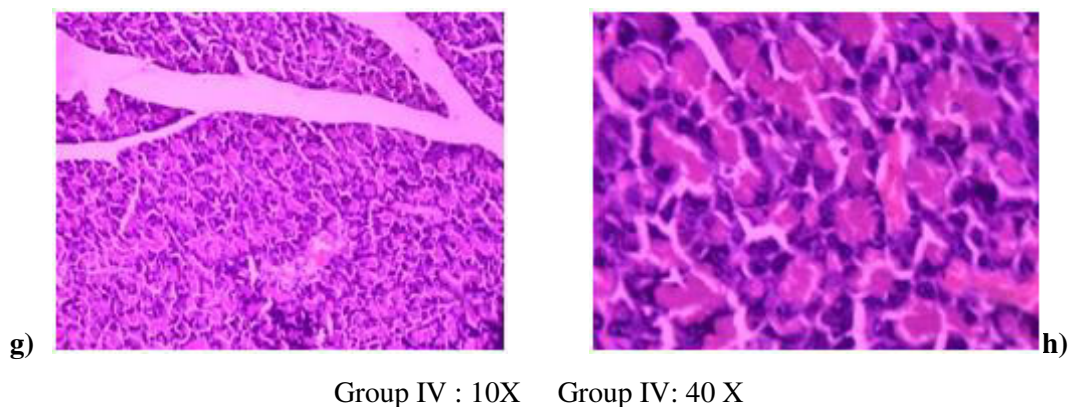
Group-V: (Absence of dilation and prominent hyperplastic of islets)
The regenerative changes in Pancreas tissue takes place and it shows similar to normal architecture.

Group V: 10X   Group V: 40 X
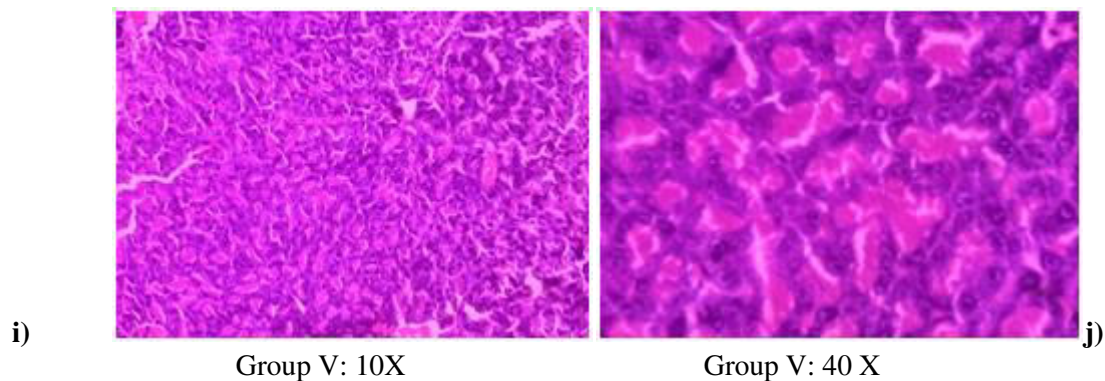
IMMUNOHISTOCHEMICAL STUDY
A. Expression of Insulin Antibodies in Pancreas
GROUP-I: (Presence of normal pancreatic islets)
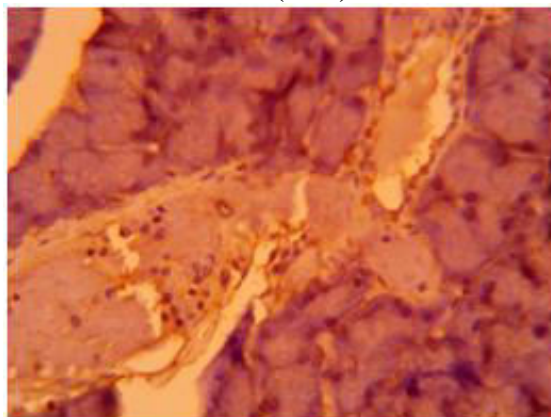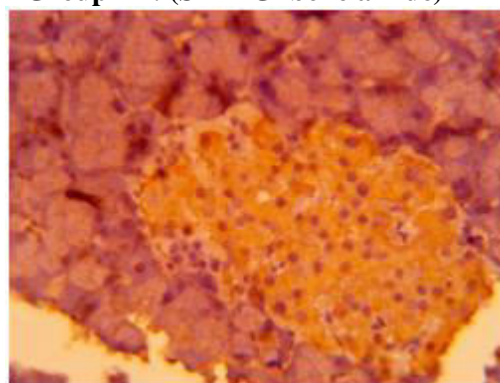
.a)

GROUP-II: (STZ)
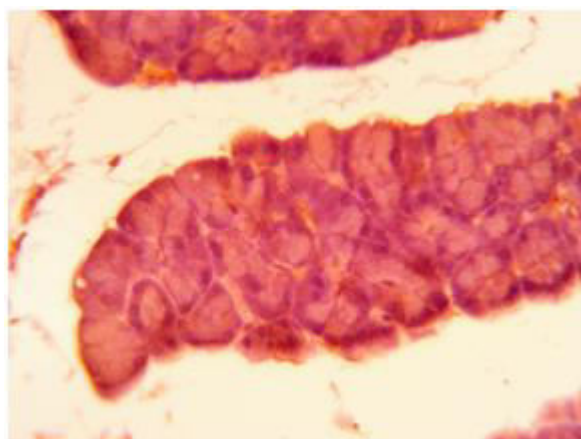
b)

Group-III: (STZ+Glibenclamide)

c)

Group-IV: (STZ+200mg/kg hydroalcoholic extract of Ipomea nil)

.d)

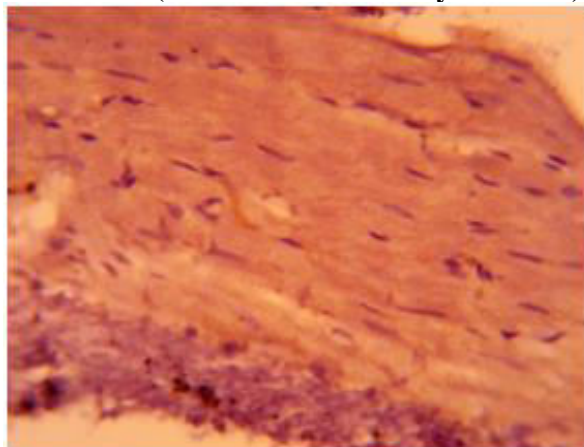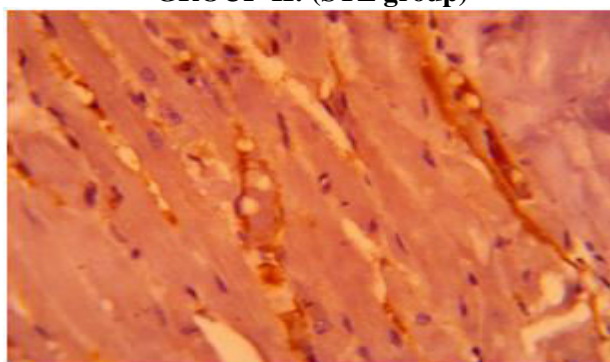**Group-V: (STZ+400mg/kg hydroalcoholic extract of Ipomea nil)**.

e)
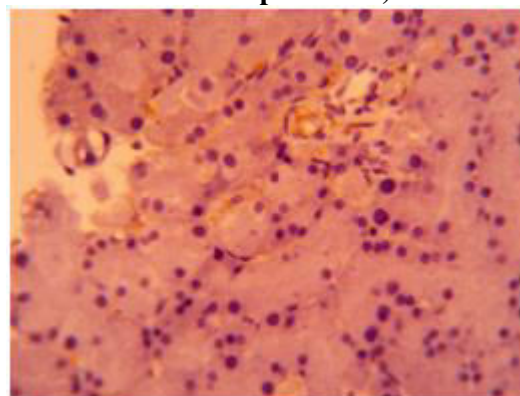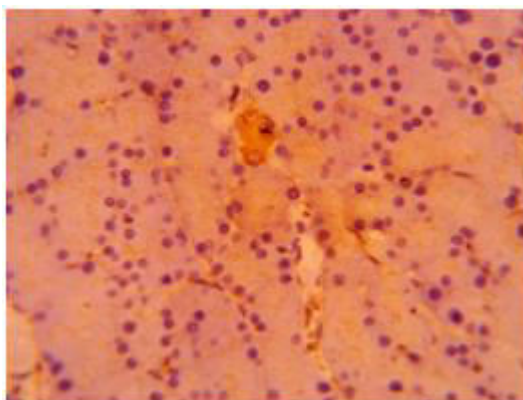
Figure (a-e): Expression of insulin antibodies of Pancreas tissue

B. Expression of TNF-α Antibodies in Pancreas

GROUP-I: Normal

a)

GROUP-II: (STZ)

b)

Group-III: (STZ+Glibenclamide)

c)

Group-IV: (STZ+200mg/kg hydroalcoholic extract of Ipomea nil)

.d)

Group-V: (STZ+400mg/kg hydroalcoholic extract of Ipomea nil)

e)

Figure (a-e): Expressions of TNF alpha of Pancreas tissue
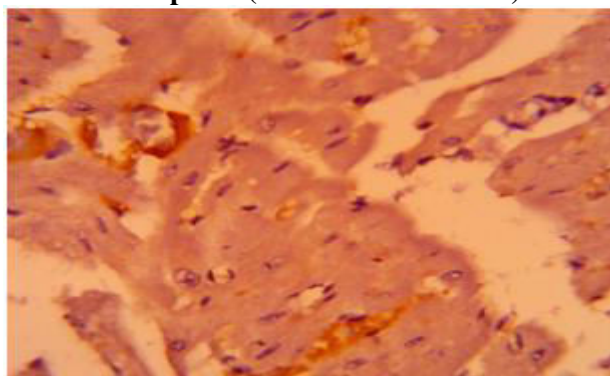**C. Expression of Bcl2 Antibodies in Heart**

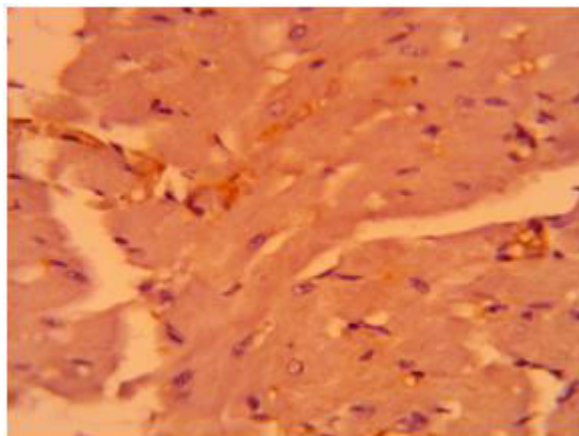**GROUP-I: (Presence of normal myocardium)**
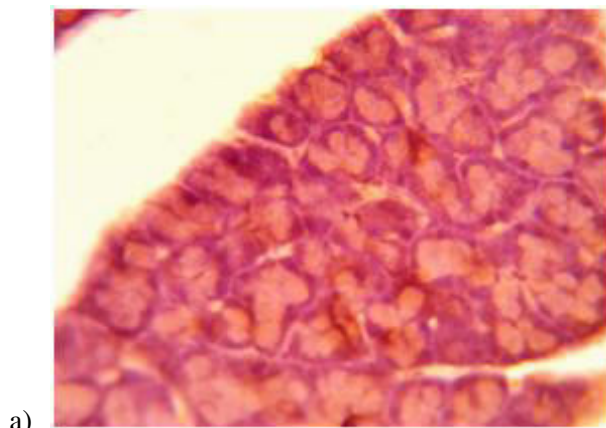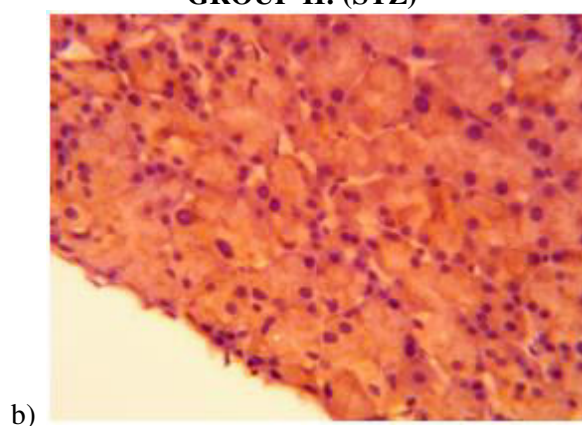
GROUP-II: (STZ group)

Group-III: (STZ+Glibenclamide)

Group-IV:(STZ+200mg/kg hydroalcoholic extract of Ipomea nil)

Group-V: (STZ+400mg/kg hydroalcoholic extract of Ipomea nil).
Figure (a-j): Expression of Bcl2 antibodies of heart tissue

4. DISCUSSION

This study evidences the potency of Ipomea nil to overcome the adverse effects of diabetes on the pancreas in STZ induced diabetes. Diabetes mellitus is becoming a growing concern in multiple patients and represents one of the main threats to human health. Multiple studies has reported the potential hypoglycemic effect of plant aqueous extract responsible for reducing the glucose level in blood of STZ induced diabetic rats. Evidences as well as past literatures suggest, there is no viable study about the hypoglycemic effect of hydroalcoholic extract of Ipomea nil. Therefore, the present study was undertaken to investigate the hypoglycemic effect of hydroalcoholic extract of Ipomea nil on STZ induced diabetic rats. Glibenclamide was used as a reference standard drug to compare the anti-diabetic properties of the extract. STZ has been widely used for inducing diabetes in a variety of animals by affecting degeneration and necrosis of pancreatic β cells. In this study STZ was used to induce diabetes as it was reported to selectively destroy the β cells of Langerhans. Reduced number of these cells would result in decreased synthesis of insulin synthesis and secretion.

Further, the experimentally induced diabetic animals may exhibit most of the diabetic complications such as myocardial, gastrointestinal, nervous, vas deference, liver, kidney, and urinary bladder dysfunctions through oxidative stress. Several researchers and scholars has already reported that STZ- induced diabetes mellitus and insulin deficiency lead to increased blood glucose, by inducing necrosis of β cells of the islets of langerhans, thus causing hypo-insulin and hyperglycemia. This present study exhibited 28 days treatment with hydroalcoholic extract of Ipomea nil with doses of 200 mg/kg, 400 mg/kg significantly reduced fasting serum glucose in STZ induced diabetic rat compared to STZ untreated control in a dose dependent manner. The results showed that the serum glucose levels in treated group with lower and higher doses of hydroalcoholic extract of Ipomea nil were steadily lowered during the whole experiment. Administration of glibenclamide to STZ induced diabetic rats for 28 days, resulted in significant reduction of blood glucose levels in comparison to the STZ control group.

The comparison between levels of insulin produced from islets of Langerhans of experimental diabetic rats were low as when compared to non-diabetic group of rats. Insulin levels released from beta cells of pancreas in non-diabetic rats was not significantly different when compared to non treated, non diabetic rats as treated with both the doses of the extract. Treatment with Ipomea nil extract in diabetic wistar rats resulted in dose dependent increase of pancreatic insulin expression levels when compared to non-treated group. Again in same manner glibenclamide treatment of diabetic rats exhibited higher pancreatic insulin expression level when compared to non-treated diabetic rats. The insulin expression evidenced in diabetic rats recieving the test drug treatment were lesser as compared to the insulin expression levels in the pancreas of non-diabetic rats.

The rate-limiting step in the uptake and metabolism of glucose by insulin target cells is glucose transport, which is mediated by specific glucose transporters of the plasma membrane. Among various glucose transport systems, the liver plays a dual role, as a glucose uptake occurs from circulation when gluconeogenesis and glycogenolysis are low however; glucose is released when gluconeogenesis and glycogenolysis are activated. In the present study, hepatic expression was higher in diabetic STZ animals compared to normal rats.

The treatment significantly reduced the expression of the gene coding the regulatory enzyme of gluconeogenesis and glycogenolysis in the liver of STZ rats. These results indicate that the extract affect the last step in gluconeogenesis and glycogenolysis. Glucose is formed from gluconeogenic precursors in liver, and also

from glycogen in liver. Both gluconeogenesis and glycogenolysis resulted in the formation of glucose 6-phosphate, which has to be hydrolysed by G6 phase thus plays a critical role in blood glucose homeostasis.

Hexokinase is the rate-limiting glycolytic enzyme. That is severity impaired during diabetes. The activities of both glucose-6-phosphatase and fructose-1, 6 biphosphatase are increased in the liver during the diabetic conditions. Treatment with the extract has appreciably normalized the activity of these enzymes.

It has been reported that STZ induced diabetic rats account for the observed decrease in the total protein content[11]. Increased urea production in diabetes might be due to enhanced catabolism of both liver and plasma proteins. Test drug treatment has appreciably normalized the content of protein and urea. In response to STZ treatment, creatinine was increased in the serum suggesting an impairment of kidney functions but Ipomea nil extract showed a clear improvement in kidney functions, perhaps due to the anti-oxidant properties. However oral administration of hydroalcoholic extract of Ipomea nil to experimental induced diabetic rats did not affected much change in the body weights of the rats. Current study evidenced a significant higher level of consumption of average food and water than in the normal conditions. Hepatic functions were evaluated by determining levels of serum ALT and AST in hyperglycemic rats. Enzyme activities of aminotransferase (ALT and AST) is of clinical and toxicological importance, as changes in the level of these enzymes are indicative of tissue damage by toxicants or pathological conditions.

The structural component of all cell membrane is cholesterol. It is the medium and an important form in which transportation of lipoproteins of lipoproteins takes place in the body. Upregulation of serum total cholesterol, triglycerides and LDL-cholesterol proves to be significant but with markedly decreased level of serum HDL-cholesterol in experimental diabetic rats. High levels of TC, LDL,VLDL cholesterol and TG while low levels of HDL cholesterol has been evidenced during diabetes. Even presence of all these factors contribute to the coronary artery disease. So many studies proposed that most of the drugs that down regulates total cholesterol also exhibit HDL cholesterol. This current study significantly modified serum lipid profile of diabetic rats with significant decreases in TC, LDL, VLDL and TG and significant increase in HDL. So it is evidenced in a promising manner that this extract decreased the elevated TC levels after treatment of 28 days and also increased the HDL Levels. Marked increase in triglyceride levels may be due to the lack of insulin during diabetic condition. Insulin is known to activate the enzyme lipoprotein lipase and hydrolyses TG under normal condition. So this current study effectively reduced TG possibly by decreasing the non-esterified fatty acids in diabetic rats. The significant control on up regulation of serum lipids of diabetic animals may be controlled by administration of plant extracts which has the potency to prevent simultaneous coexistence of hypercholesterolemia and hypertriglyceridemia. Thus can reduce cardiovascular instances.

The phytochemical analysis of hydro-alcoholic extract of Ipomea nil detected the presence of alkaloids, saponins, tannins, phenol, steroids and glycosides. [12,13] It is evidenced from this study that destruction of the pancreas was markedly reduced in diabetic rats receiving the extract treatment. This effect could be due to ability of this drug to decrease hyperglycemia and the level of oxidative stress and inflammation. In diabetes hyperglycemia could cause decrease in tissue anti-oxidant levels, while increases the free radical levels. The latter could cause damage to the cell membrane, inducing cell necrosis and inflammation through effects of the lipid by products. TBAR and glutathiones are important biomarkers of oxidative damage initiated by ROS. Hyperglycemia is also responsible to cause inactivation of anti oxidative enzymes through glycation. Additionally in diabetes increased level of TNF-alpha results in decreased insulin sensitivity as a result of impaired insulin signalling pathway. TNF-alpha can also activate other apoptotic proteins and caspases. Figures proves the expression level of inflammatory markers like TNF- alpha respectively in the islets of Langerhans of rts receiving different treatment. In no diabetic rats level of TNF-alpha were low with the extract treatment which did not cause changes in marker expression level. Highest TNF-alpha were observed in non treated diabetic group. Administration of Ipomea nil extract to diabetic rats resulted in reduced levels of TNF alpha expression. Glibenclamide treatment in same manner resulted in expressing levels of these proteins to decrease when compared to the non-treated diabetic rats.

Cardiac abnormalities as the post diabetic complications were something common due to expression of Bcl2 expression in myocardial cells causing apoptosis. According to the cardiac immunohistochemical analysis the Bcl-2 expression protein levels were down regulated in the diabetic rats which was then restored with extract treatment. So we postulate that the treatment of diabetic rats with hydroalcoholic extract of Ipomea nil could aid in decreased lipid peroxidation by increasing the activity levels of SOD, CAT and other enzymes in the pancreas.

5. CONCLUSION

Finally the present study shows that the hydroalcoholic extract of Ipomea nil has potential ant diabetic action in STZ induced diabetic rats and the effect was found to be more similar to the reference drug glibenclamide.

6. REFERENCES

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Intervention Program among the Adolescent Girls of Jammu and Kashmir

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ABSTRACT

Aneamia is one of the most significant nutritional problems among adolescent affecting their growth and overall development. This is critical phase of life for upgrading their view towards proper nutrition and knowledge level. The current study is interventional based study among adolescent's girls of Jammu and Kashmir between the age group of 13-18 years. Initially respondent's hemoglobin level was checked. After imparting nutritional education interventional programme respondents were again analyzed to measure the improvement in Hb level and increase in the knowledge about aneamia. Overall results among both the regions indicated 56% respondent's having hemoglobin >7g/dl were reduced to 24% respondents and 34% respondents having moderate aneamia decreased to 21% post intervention. Regarding the knowledge about aneamia among the respondents there was marked increase after intervention program me. Hence the results showed that nutrition education intervention is an essential parameter to develop awareness and knowledge among adolescent girls to control aneamia.

INTRODUCTION

Aneamia is a universal health problem among young women and children all over the world. WHO estimates that nutritional deficiencies are utmost factors attributed to aneamia and about 43% and 51% women and children are affected globally (Gupta et al , 2017).All over the world about one million people are iron deficient (Luxemburg et al., 2019). Iron deficiency aneamia is a condition in which a person lacks enough healthy red blood cells or hemoglobin. (Khera., 2019). Iron deficiency aneamia (IDA) is a comprehensive complication which affects 9% toddlers, (9-11%) adolescent girls and less than 1% adolescent boys. It not only affects developed as well as developing countries thus forming nutritional health hazard worldwide. Infants and toddlers who are given large amounts of cow's milk and teenage girls who did not take iron supplements or iron fortified foods are at a high risk of iron deficiency aneamia. Teenagers have rapid growth and development but dietary intake of iron is below average are more susceptible to this deficiency. This condition among adolescent gets accelerated with onset of menarche and depletion of iron stores leads to aneamia (Whitfield et al., 2015). Adolescence is an interposed period that leads to a move from childhood to adulthood. It is marked by major psychological, behavioral and physical changes related to the physical activity and fast growth spurt with more nutritional requirements" (Chandhrakumari et al., 2019).This complicated phase of life with increased nutritional demands is accompanied by acute physical, psychosocial, and cognitive development. During adolescence there is increase of 50% of the weight, more than 20% of their adult height, and 50% of their adult skeletal mass which is attributed to high nutritional demand. Adolescence nutritional problems develops under nutrition which are further related with stunting and thinness, catch-up growth, and intrauterine growth retardation in pre- adolescent girls, iron deficiency and aneamia, iodine deficiency, vitamin A deficiency, calcium deficiency, other specific nutrient deficiencies, e.g. zinc, folate and obesity. Iron deficiency aneamia (IDA) is vital problem during adolescence period and the major causes are: accelerated development, hormonal changes, malnutrition and starting of menstrual period in girls. Iron being a pivotal component for functioning of various organs hence its depletion leads to impaired perception and learning difficulties which lead to poor academic performance .Folic acid and vitamin B12 deficiency among adolescents are the leading cause of megaloblastic aneamia. Animal origin foods are the main sources of Vitamin B12 and folic acid is found in fresh fruits and vegetables. Neuropsychiatric problems, abnormal behavior, lack of attention, learning difficulties leads to failure or less favorable results among the affected adolescents and these problems are directly related to deficiency of vitamin B12.In developing countries the causes associated with under nutrition of adolescence are economic conditions , periodic food storage , child labor , poor knowledge about effects of under nutrition , food quality and reduced availability of health and nutritional services . As per statistics 43% of adolescent deaths take place during pregnancy, thus making it a very crucial phase of life (Miah et al., 2014) The consequences of aneamia results in .multiple health problems among pregnant women and adolescent girls followed by maternal mortality and morbidity in severe cases. About 700 to 800 million people are affected throughout the world with prevalence of iron deficiency aneamia. Reproductive women are most vulnerable due to poverty, inadequate diet, repeated pregnancies and lactations, availability of basic health immunities .Early marriages expose adolescent girls to greater risk of morbidity and mortality which makes them highly susceptible group .A study on aneamia shows that more than 70% of adolescent girls in low income

communities of India had Hb levels < 11gm/ l. Aneamia can be reduced by supplementation, fortification and improved diet (Patil et al 2014). Globally pregnant women and young children have higher prevalence of aneamia with a percentage of 51 % and 43% respectively. 37% school going children, 35% non-pregnant women and 18 % adult males were found with prevalence of aneamia. From the available data regarding aneamia in adolescent and elderly people it was found that prevalence rate of aneamia among adolescent girls and adult females was more or less similar. In the developing countries the prevalence of aneamia is 3-4 times higher than the developed countries. Most of the recent studies on prevalence of aneamia have been focused on pre-schoolers hence more attention is needed regarding aneamia in school children. Anemic individual tend to have less physical cognitive development thus having minimum work output hampers the development of the country. In the era of technology a nation heavily depends upon skilled work force hence the behavioral impact of aneamia is pivotal. Thus high frequency of aneamia among the population of a country can significantly decrease its intellectual and economic prospective (Sundaresan et al., 2011

India has the biggest youth percentage among the population with a conservative figure of 190 million adolescents which include 22% females. A total of 27 % adolescent in developing countries and 6 % in developed countries were found to have prevalence of aneamia. As per the reports from UNICEF more than half adolescent girls are anemic. "According to Karin Hulshof united India there is a concern of anemic girls being under nourished which becomes their reason for drop out from school and gets married at early age (Rati et al 2014).

REVIEW OF LITERATURE

Sathya et al., (2017) conducted a study to determine the prevalence of aneamia among women in Coimbatore urban areas. The survey of the study revealed that women with normal Hb levels were 35.6%. It was also identified that that (24 %) had mild aneamia, 58 % had severe aneamia and 4% had severe aneamia. Shedole et al., (2017) conducted a cross-sectional comparative study on prevalence of aneamia amongst six hundred fifty adolescents aged between 13-16 years from Karnataka. In the study respondents were from standard 8th -10th. Overall pattern of prevalence of aneamia was 84.46%. It was also identified that prevalence in rural areas was high 96.88% and in urban areas it was 72.42%.

Joshi et al., (2018) undertook a study among 88 adolescent girls from Anganwadi center aged between 10-19 years in rural urban and tribal blocks of district U.S Nagar. The pattern of prevalence of aneamia was 83.18 % among the respondents. The study revealed that highest percentage of respondents 88.74% were suffering from moderate aneamia, followed by 33.88% having mild aneamia and 7.38% had severe aneamia. Sharma et al., (2018) performed a study to investigate the "prevalence of aneamia among women by several background characteristics". In this study it was shown that compared with urban women, the prevalence of aneamia among rural women is more significant. Various lifestyle habits are closely related to aneamia. Further research has also noted that the economic gap leads to improper food, malnutrition, and various deficiencies. Swami et al., (2018) carried out a study "to find out prevalence of aneamia, to assess self- reported symptoms of aneamia among school adolescents of Gwalior township". The study comprised of four hundred adolescent girls. According to the study aneamia was found to be present in 60% girls and 38% boy's .The pattern of prevalence of aneamia among adolescents was very high.Sinha et al., (2018) initiated a study to find "The prevalence of aneamia among school going adolescent girls in selected rural community of Guwahati, Assam". The sample size included 110 young girls aged between 11-19 years. The study revealed that 89.1% respondents were anemic. Out of the sample size selected, 50% respondents had moderate aneamia , 39.80% had mild aneamia and 10.20% had severe degree of aneamia. High pattern of prevalence of aneamia was associated with menarche and health related knowledge. Sumarlan et al., (2018) did a cross sectional study to determine "Iron status, prevalence and risk factors of iron deficiency aneamia among 12-15-year-old adolescent girls from different socio-economic status in Indonesia. The sample size includes hundred girls with lower socioeconomic status and one hundred five girls with higher economic status. The survey of study revealed that there is no relationship between iron deficiency aneamia and nutritional status, menstrual status and characteristic socio economic status, iron intake and parental educational level and income. Prevalence of non-aneamia iron deficiency was higher 17.2%.Mahmood et al., (2018) in their study on "Association of aneamia with dietary practices in adolescent girls" across six villages of two union councils of Rawalpindi. In the study one hundred four unmarried adolescent girls aged 11-19 years were included. The study estimated 71.2% of the respondents to be anemic. Prevalence of mild, moderate and severe aneamia among girls was to be 53.8 %, 15.4 % and 1.9 % respectively. As per the research it was found that respondents who had aneamia were also deficient in vitamin A and zinc. Anwar et al., (2018) conducted a study in Oman to determine nutritional aneamia in adolescents. According to the study it was identified that 54 % girls were anemic. Most of the girls had mild to

moderate anaemia. Girls studying in the 10th grade had higher prevalence of anaemia. Further it was concluded that mild and moderate anaemia was closely related with mother's education. Chandrakumari, et al., (2019) performed a cross sectional study on "prevalence of anaemia among adolescent girls in rural areas of Tamil Nadu". The sample group included two hundred and fifty five adolescent girls. In the research it was estimated that overall pattern of prevalence of anaemia was 48.63%. It was also revealed that 55.64% adolescent girls had mild degree of anaemia. Further it was highlighted that 73.73% respondents in the age group of 10-14 years had mild anaemia. Significant prevalence of anaemia detected in 55.24% respondents in late adolescents from low socio-economic income group. Rohisha et al., (2019) carried out a study on "prevalence of anaemia among tribal women in Kerala". The sample group included four hundred and forty five tribal women of reproductive age group. According to the study it was reported majority 89% tribal women had anaemia, 62% had moderate degree and 11% tribal women had severe anaemia respectively. Choudary et al., (2019) initiated a cross sectional study on " socio-demographic determinants causing anaemia in adolescent girls in the field practice area of urban health training center , RVRS medical college Bhilwara". Adolescent girls enrolled in the standards 9th-12th were taken as a sample for the study .The study revealed that majority 97% respondents belonged to the socio-economic status II,III, IV. The association between anaemia and socio-economic status was found to be significant.Al-Jamea et al., (2019) made a cross sectional study to determine "the prevalence of iron deficiency anaemia and its associated risk factors among healthy undergraduate college students in Saudi Arabia". In the study it was estimated that the overall prevalence of anaemia was 35.3%. It was also analyzed by the study that regular consumption of breakfast decreased iron deficiency anaemia when compared with respondents taking irregular breakfast. Andriastuti et al., (2019) carried out a cross sectional study "to determine the prevalence of anaemia and iron profile among children and adolescent with low socio economic status in Jakarta". The study revealed that overall prevalence of anaemia was (14%) among the respondents. The study further concluded that prevalence of iron deficiency anaemia , iron deficiency and iron depletion was highest among females than in males.

Bodat et al., (2020) undertook a study to assess "prevalence of anaemia among school going adolescent girls in rural area of Pune, Maharashta, India". A sample group of seven hundred forty respondents enrolled from 6th -12th standard were included in the study. It was noticed that overall 87.6% respondents had anaemia. Further breakdown of data showed that 47.06% respondents had mild, 52.48% respondents had moderate and 0.46% respondents were suffering from severe anaemia. The study put emphasis on imparting knowledge to respondents, mothers and in addition giving iron rich food in schools and providing awareness regarding rich and low cost diet.

Wang et al., (2020) carried out a study to examine the "reducing anaemia among school-aged children in China by eliminating the geographic disparity and ameliorating stunting". According to the study children aged seven, nine, twelve and fourteen years old were selected 2014 cycle of Chinese national surveys on children constitution and health. In the study it was seen that pattern of prevalence of anaemia was higher among girls 10.8% when compared to boys 7%. Anaemia was found to be marked in stunting boys than non -stunting boys. It was estimated that children having stunted growth had 30% more risk than non –stunted children. As per the study there was a great need for intervention for adolescent girls and children having anaemia burden.

Ekasanti et al., (2020) did a study to know "determinants of anaemia among early adolescent girls in Kendari city". In the study it was reported that 28.9% respondents had prevalence of anaemia. The study also found that the major cause of anaemia in early adolescent was menstrual status. It was concluded that vitamin C, economic status, mothers education, infectious diseases were the risk factors and should be intervened. Varma et al., (2020) initiated a study to assess the "socio-demographic determinants in prevalence of anaemia in adolescents of rural area of Maharashtra". Adolescent boys and girls aged between 10-15 years were taken as a sample in the study. According to the study it was revealed that 61.19% respondents both male and female were anemic. The pattern of prevalence of anaemia among boys was 53.79% and 71.7% among girls. In the respondents belonging to low economic status anaemia was found to be more prevalent. Joag et al., (2020) conducted a study on "clinico - hematological profile of nutritional anaemia among adolescent girls in rural area. A total of three hundred eighty respondents formed the sample group. In the study it was identified that 45.3% adolescent girls were anemic. As per the study foremost reason of the prevalence of anaemia was iron deficiency and underweight when compared with BMI. Tura et al., (2020) undertook a study to examine "prevalence of anaemia and its associated factors among female adolescents in Ambo town, West Shewa, Ethiopia. In the study it was estimated that 39% respondents were anemic. The degree of anaemia was found to be more in female adolescents and for every ten adolescent girls four suffered with anaemia. Tandoh et al., (2021) performed a study "to determine the prevalence anaemia and under- nutrition of adolescent females in schools in Ghana".

According to the study the pattern of prevalence of aneamia was 50.3%. In the study it was revealed that aneamia and under-nutrition results in low educational performance and overall wellbeing of adolescents. Saxena et al., (2021) conducted "a cross section study on iron deficiency aneamia in adolescent girls". The results of the study showed that the overall prevalence of aneamia was 73.6% in the total sample size of 736 respondents. In regards to the severity 536 respondents suffered mild aneamia, 173 suffered moderate aneamia and a nominal 27 respondents had severe aneamia.Al-Jawaldeh et al., (2021) initiated a study titled "Are countries of the eastern Mediterranean region on track towards meeting the world health assembly target for aneamia". In the review study conducted it was identified that from the Eastern Mediterranean Region pattern of prevalence of aneamia was between 22.6% and 63 %. The prevalence of aaneamia among pregnant women was between 27% and 69.6% and 23.8% among women of reproductive age. The research showed that the main factors related to aneamia included iron deficiency anaemia , improper hygiene , parasitic infections and various deficiencies. Sahu et al., (2021) carried out a study to examine" the prevalence of aneamia and compliance to weekly iron-folic acid supplementation program amongst adolescents in selected schools of urban Puducherry, India". In this study it was revealed that prevalence of aneamia was 62.7%. The study concluded that teachers have a pivotal role in implementing the weekly iron-folic acid supplementation (WIFS) started by Government of India in 2012 as it will help in eradicating the prevalence of aneamia. Santhi et al., (2021) conducted a study to assess the "awareness on nutritional aneamia and its prevention among adolescent girls. The study revealed that maximum respondents 63% had very less knowledge about aneamia, 27% had partial awareness and 10% were aware about aneamia and its prevention. It was identified by the study that there was a close association between degrees of awareness on nutritional aneamia with age of adolescents.

METHODOLOGY

A cross sectional study was conducted to assess the Effectiveness of Health and Nutritional Education Intervention Programme to improve the knowledge of aneamia among adolescent girls of Jammu and Kashmir. The present study was carried out among government school going adolescent girls between the age group of 13-18 years. Information was gathered using questionnaire which consisted of socio demographic characteristics, knowledge based questions, dietary information and nutritional status. For the convenience of respondents sample questions were translated in local language. Blood sample collection was also obtained among the respondents in order to check their Hb level. For collection of blood sample proper permission was taken from the Directorate of School Education within both regions of Jammu and Kashmir. Ethical clearance was also obtained. Blood samples were collected with the help qualified technician across the region.After assessing Hb levels among the participant's reports were handed out to the respective school authorities which were passed on by them to the respondents. On the basis of blood test results respondents were classified into anemic and non-anemic group.Nutrition education was imparted among anemic respondents regarding iron rich foods and foods that enhance its absorption. After a gap of one month 10% severe aneamic respondents with Hb level < 7g/dl were again analyzed for Hb measurements.

RESULTS

A total of 800 adolescent girls were included in the current study out of which 400 belonged Jammu region and 400 were from Kashmir region. It was found that 50% respondents from each region had prevalence of aneamia .Adolescent girls were analyzed for estimation of Hb levels. Nutrition education intervention program was initiated to improve the knowledge and awareness about aneamia among school going girls .After imparting nutrition education respondents were again analyzed to check their improvement in Hb levels and knowledge about aneamia.
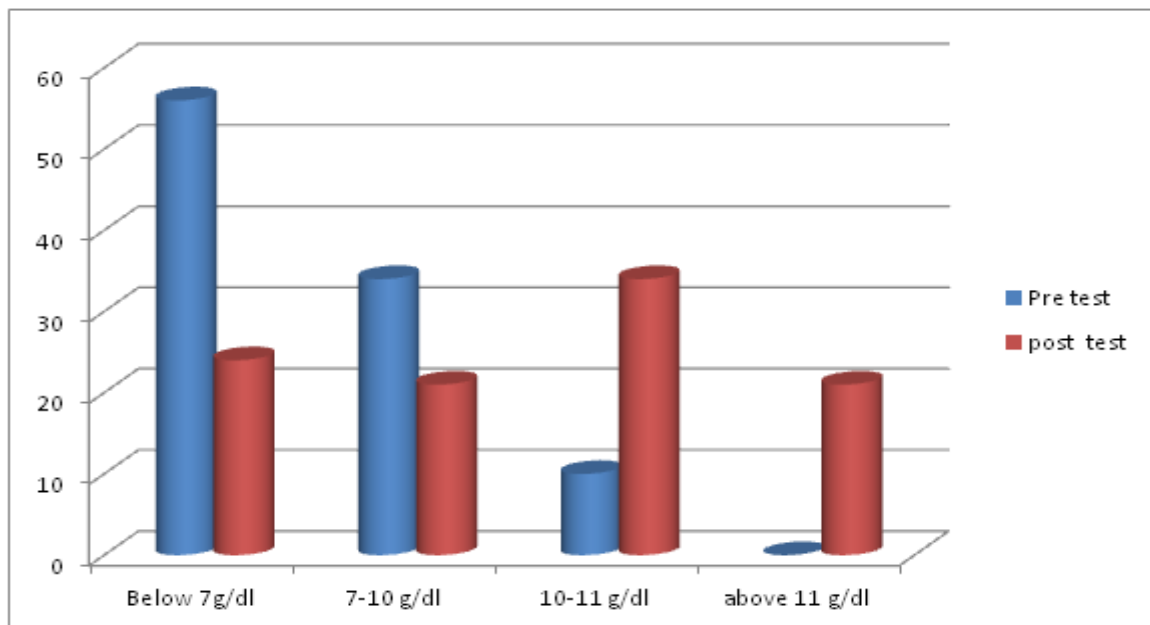
Table : 1 Bio chemical changes pre and post interventional program

Hb Level	Pre-Test	Post -Test
	N / %	N / %
Below 7g/dl	56 (56)	24 (24)
7-10 g/dl	34 (34)	21 (21)
10-11 g/dl	10 (10)	34 (34)
above 11 g/dl	0 (0.0)	21 (21)
Total	100	100

Table 1 depicts that there was a significant improvement in the hemoglobin level among the subjects within both the regions of Jammu and Kashmir. The effect of intervention is evident from the fact that in the pre- test

56% subjects had Hb below 7 g/dl category which was reduced to 24% post intervention. In the category of 7-10g/dl initially 34% subjects were anemic which was decreased to 21% post intervention. Similarly 10-11g/dl category comprised of 10% subjects however after intervention there was an increase in percentage of non-anemic subjects in that category to 34%. Pre intervention none of the subjects had Hb level above 11 g/dl but there was increase in percentage and about 21% subjects were above 11g/dl post intervention.

Bio chemical changes pre and post interventional program

Table 2: Pre and Post Intervention Program Changes

| Knowledge About Term Aneamia	Pre-test	Post-test
	N /%	N /%
Yes	57 (57)	99 (99)
No	43 (43)	1 (1)
Total	100	100
Deficiency of Mineral Causing Aneamia		
Iodine	49 (49)	0 (0.0)
Copper	5 (5)	0 (0.0)
Zinc	9 (9)	1 (1)
Iron	37 (37)	99 (99)
Total	100	100
Vitamin Enhancing Absorption of Iron		
Vitamin A	38 (38)	1 (1)
Vitamin C	26 (26)	99 (99)
Vitamin D	19 (19)	0 (0.0)
Vitamin K	17 (17)	0 (0.0)
Total	100	100

Table 2 identifies percentage of respondent's having awareness regarding the term aneamia within across the regions . It revealed that pre-intervention 57% respondent's had awareness about the term aneamia whereas post intervention 99% respondent's developed awareness about the term aneamia. Regarding the deficiency of mineral which causes aneamia it was obtained that among the pre-test group 49% related aneamia to deficiency of iodine , 5% related it to copper , 9% related to zinc while as 37% respondents associated aneamia with deficiency of iron. Post intervention program showed improvement among the respondents and wherein 99% respondents associated deficiency of iron with aneamia. Regarding the knowledge about vitamin that helps in the absorption of iron before intervention program 38% respondents opted Vitamin A, 26% linked Vitamin C, followed by 19% who chose Vitamin D and 17% respondents associated Vitamin K as the enhancer of iron absorption. After imparting nutrition education 99% respondents associated Vitamin C with increased iron absorption.
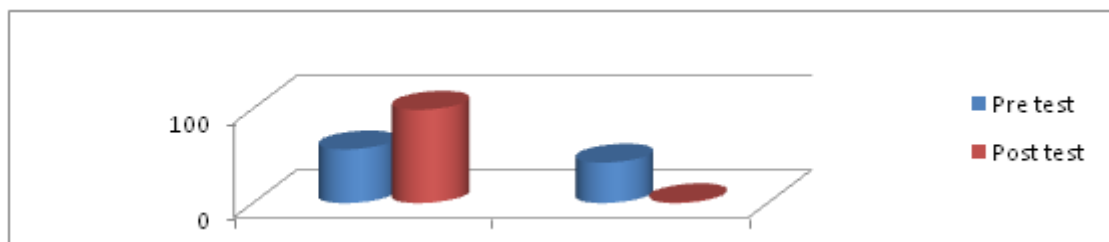
Knowledge About Term Aneamia
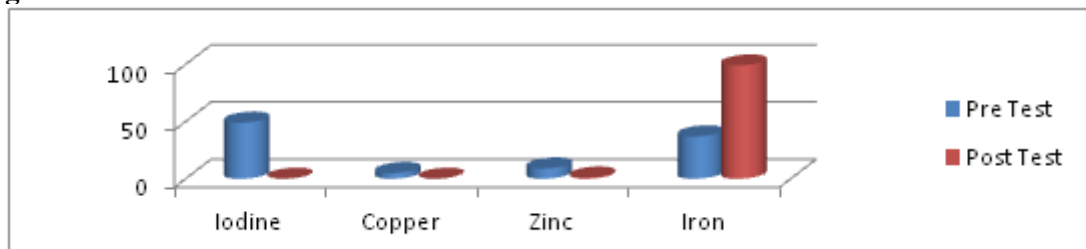

Deficiency of Mineral Causing Aneamia
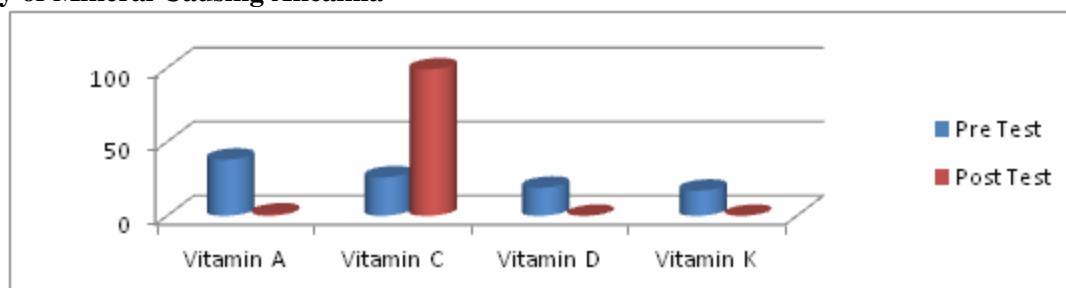
**Vitamin Enhancing Absorption of Iron**

Table 3: Pre and Post Intervention Program Changes

	Pre-test	Post-test
Knowledge of Blood Cell Causing Aneamia	**N / %**	**N / %**
RBC	84 (84)	98 (98)
WBC	8 (8)	1 (1)
Platelets	8 (8)	1 (1)
Total	100	100
Life Threatening	**N / %**	**N /%**
Yes	58 (58)	100 (100)
No	42 (42)	0 (0.0)
Total	100	100

Table 3 presents information regarding awareness among the respondents regarding type of blood cells causing aneamia. It was reported that before imparting nutrition education 84% respondents linked depletion in red blood cells as a cause of aneamia and post intervention 98% respondents associated reduction in red blood cells as the major cause of aneamia. Regarding the knowledge related to the life threat posed by aneamia it was observed that before intervention program 58% respondents agreed that aneamia is life threatening while as 42% respondents were not aware that aneamia is life threatening. Post intervention program 100% respondents termed aneamia as life threatening.
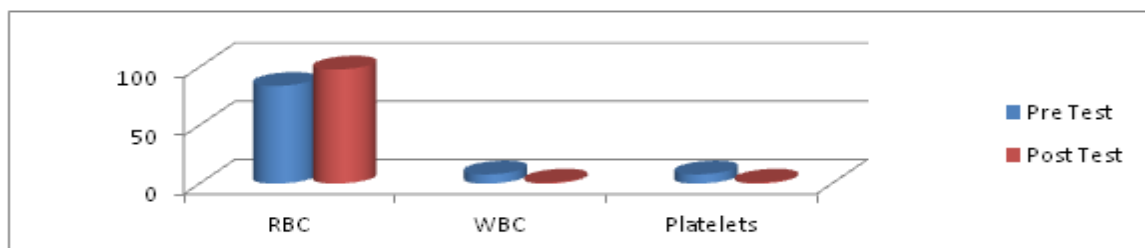
Knowledge of Blood Cell Causing Aneamia
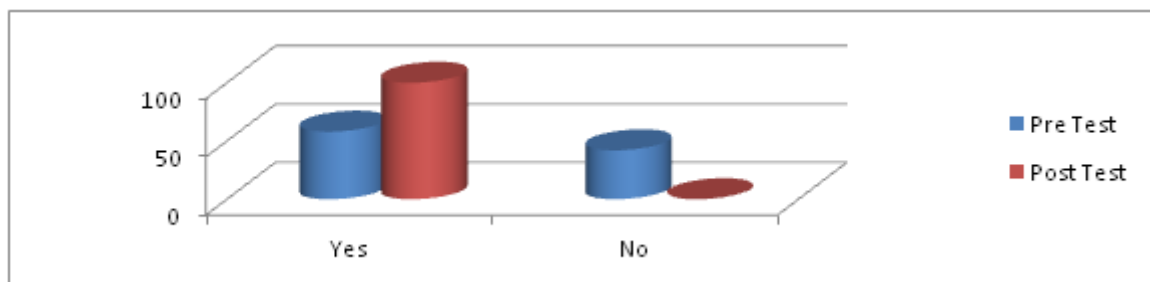
Life Threatening

DISCUSSION

After Health and Nutrition Education Programme there was significant improvement in the hemoglobin level of the respondents. The percentage of respondents having severe aneamia decreased. A higher percentage of respondents with Hb level 10-11 g/dl increased post intervention. Kamalaja et al .,(2018) reported that post nutrition intervention program there was an evident improvement in the hemoglobin levels among the respondents especially in the severe and moderate anemic group. Pre-intervention 56% respondents had knowledge about the term aneamia which was increased to 99% respondents post intervention. Neeta et al., (2018) reported a significant increase in the knowledge related to term aneamia post-nutrition education intervention. The present study revealed that 30% respondents associated iron as a mineral causing aneamia before intervention however after intervention 99% respondents associated iron with aneamia. Soodi et al., (2021) reported that minimal percentage of participants had knowledge about the deficiency of mineral causing aneamia. Pre-intervention 84% respondents had an opinion that lack of red blood cells cause's aneamia however after imparting nutrition education 98% respondents associated reduction red blood cells as a major cause of aneamia. Regarding absorption of iron 26% respondents had knowledge that Vitamin C enhances absorption of iron and post intervention 99% respondents were aware that Vitamin C helps in the absorption of iron. Angadi et al.,(2016) in their study titled knowledge attitude and practices about aneamia among adolescent girls of Karnataka concluded that after intervention program majority of the adolescent subjects asociated that Vitamin C increases iron absorption.. Only 58% respondents before intervention related aneamia as a life threatening disease but post intervention 100% respondents termed aneamia as life threatening. Similar results were corroborated with the present study by Soodi et al., (2021) in which they reported that very less percentage of respondents viewed aneamia as a life threat. However post intervention it was noted that high percentage of respondents became aware that aneamia can pose serious threat to life.

CONCLUSION

Based on the results it can be concluded that nutrition education plays a significant role in upgrading the knowledge about aneamia among the adolescent girls. If nutrition education program along with other nutrition programs are initiated in school that will help in reducing the risk of aneamia. Moreover if these programs are made compulsory in schools will definitely result in positive change in the nutritional status of future mothers who in turn will improve nutritional status of family members.

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Comparative Analysis of Free Paclitaxel Vs Liposomal Paclitaxel to Induce Apoptosis and G2/M Phase Arrest in Non-Small Cell Lung Cancer A549 Cell Lines

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ABSTRACT

Paclitaxel (PTX) is a well-known prescription for lung cancer approved by the FDA. However, medical applications of PTX are limited by their lower solubility. Cremophor EL and albumin associated PTX (Taxol) administration reported severe side effects. Hence, this context necessitates the invention of new delivery carriers for PTX. Recent reports were evident that Liposomes (LPs) are a promising technique to ease the delivery of PTX without side effects. Hence, the present study was aimed to prepare the PTX-loaded (1,2-Dilauroyl-sn-glycerol-3-phosphocholine) DLPC-LPs and compare its anti-cancer activity on A549 Lung cancer cell lines against free PTX. The ratio (1:20:2 PTX:DLPC:Cholesterol molar ratio) which achieved 96.3% of encapsulation efficiency, was selected for further analysis. The physical characterization results suggested that the prepared LPs achieved a spherical shape with 102 d nm average size and zeta potential value was 20.0. . PTX LPs showed good stability after one month of storage. The IC50 value of PTX LPs (0.004 µg/ml) was low as compared to free PTX (0.010 µg/ml) in the A549 in lung cancer cell lines. PTX LPs (69.76% ± 0.92) show higher apoptotic cells than free PTX (32.1% ± 1.08). PTX LPs (50.2% ± 2.78) caused significantly stronger G2/M phase arrest over free PTX (38.3% ± 2.64). The results indicated that DLPC LPs-encapsulated PTX could be a promising drug to treat lung cancer.

Keyword: Paclitaxel, LPs, EPR, Lung cancer, Stealth LPs
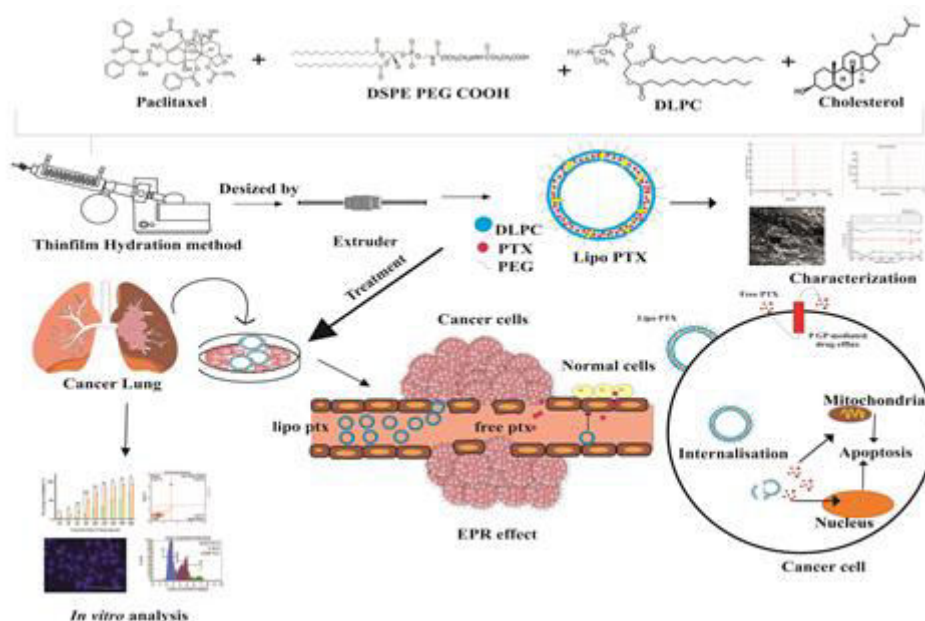
Graphical abstract

INTRODUCTION

Lung cancer is the most prevalent malignant tumour on the world and leading high fatality rate .18.4% of all cancer deaths, or around 1.76 million deaths in both genders, posing important epidemiological welfare of publics (Saito et al., 2021). Consumption of tobacco is regarded as the most major causative factor for the development of lung cancer (Corrales et al., 2020).

Non-small cell lung cancer considered about 80% of lung cancer victims among the various types (Kramer et al., 2021).This type of cancer tends to spread to other places of the body as it grows. Chemotherapy, surgery, radiation therapy can be used as treatment of lung cancer. Mainly in chemotherapy part, targeted therapy or combinatorial chemotherapy treatments can be used in current treatment. Depending on how close the area of interest is to the tumour, radiation therapy might cause harm to neighbouring tissues (heart). The most common

side effects of surgery are bleeding, blood clots, and tissue damage (Barbuti et al., 2015, Akbarzadeh et al., 2013 and Baldi et al., 2011).

Chemotherapy is particularly effective in killing quickly dividing cells. Chemotherapy can reduce the size of the cancer and make it easier to remove it. The tubulin-binding drug paclitaxel is frequently prescribed to treat non-small cell lung cancer (NSCLC) (Barbuti and Chen et al., 2015). For the treatment of advanced NSCLC, a combination of paclitaxel and a platinum molecule has been approved. Nonetheless, single-agent therapy with weekly paclitaxel has obtained response rates of up to 86 percent, combination therapy has achieved response rates of up to 87 percent, and radiation has achieved response rates of up to 100 percent. Unlike other tubulin-binding anticancer medicines, paclitaxel blocks cell cycle progression, prevents mitosis, and inhibits cancer cell development by preventing tubulin assembly into microtubules and promoting tubulin assembly into microtubules and preventing microtubule dissociation.(Dwivedi et al., 2014, Premprasert et al., 2018, Dziedzic et al., 2017)

Cremophor EL is considered as an toxic exipient associated with adverse effects such as vasodialation, hypersensitivity, cardio- toxicity, erythrcytes aggregation, renal and neurotoxicity. The another chance of paclitaxel administration called Albumin-bound paclitaxel are known to cause side effects like eye disorders called cystoid macular edema(Priyadarshini and keerthi 2021, Mokhtari et al., 2014, Romaszko et al., 2017, Amin et al., 2018). Posology is most essential in administration of anticancer drugs to prevent adverse effect. Pretretment of patients with antihistamines, corticosteroids and H2 antagonists prior to the administration of paclitaxel is needed to enhance the administration. LPs are the potential excipients may deliver its cargo at high drug load to the same tumor cell in one shot, which may overthrow the drug efflux mechanisms of cancer cell and eventually enhancing the anticancer effect of the chemotherapeutic agents (Lee et al.,2017, Hassanpour et al., 2017, Shashidhar et al., 2018, liu et al., 2017).

Despite being so prominent, LP's also having some drawbacks. Reticuloendothelial cells engulf the liposome. To vanquish these drawbacks the liposome were surface modified with PEG which decrease the rapid clearance and prevent the aggregation of LPs (Huang et al., 2015, El-Shenshawy et al., 2012, Alves et al., 2018). Selection of lipids is most essential in preparation of LPs for the successful entrapment of drugs (Patra et al., 2018). Hence in this study 1,2-Dilaugroyl-sn-glycero-3-phosphocholine (DLPC) was selected. DLPC is an amphethetic lipid which is present in common cell membrane lipid. So it can easily fuse in to the cell membrane and release its cargo.

LPs enter in to the tumor microenvironment via EPR (Enhance permeation reteation) effect which depends upon the pathophysiological characterization of tumour and healthy cells (Jandra et al., 2021). Unlike healthier cells, cancer cells cause pores in blood vessels for the supply of nutrients. Hence the lower molecular weight drugs easily enter in to the healthier cells but nanomedicine not able to reach the healthier cells Zhang et al.,2014)The leaky nature of blood vessel enhances the entry of below 200nm nanoparticles inside the tumormicroenvironment and increase the tumour efficacy. Thus, in the current study the LPs containing both the DLPC and DSPE PEG phospholipids. Hence the present study was aimed to prepare the paclitaxel loaded pegylated LPs and to check its anti-cancer activity on A549 Lung cancer cell lines.

2.0 MATERIALS AND METHODS
2.1. Chemicals and Cell Culture
Paclitaxel, 1, 2 – dilauroyl - sn – glycerol - phosphocholine [DLPC], Cholesterol, 3,4-Benzpyrene were procured from Sigma Aldrich**,** All cell culture materials including, , Fetal Bovine Serum [FBS], Dulbecco's modified eagle's medium [DMEM], L-glutamine, were procured from Gibco [Grand Island, NY, United States]. DAPI [4′, 6-diamidino-2-phenylindole] [3- [4, 5-dimethylthiazol-2-yl]-2, 5-diphenyltetrazolium bromide] MTT, obtained from Himedia Mumbai, India. Apoptosis and cell cycle analysis kit purchase from luminex [Genetix Biotech Asia Pvt. Ltd] A549 cell line was purchased from NCCS, Pune. Cell lines were cultured in DMEM supplemented with 10% v/v of FBS, 100 μg /ml of penstrep under steady state condition at room temperature with 5% CO_2 incubator. All the solvents used in the study are HPLC grade and were purchased from Himedia.

2.2 Synthesis of Lipo PTX
The LPs were prepared via the thin film hydration method. The FL (Free LPs) was prepared by dissolving DLPC, DSPE, PEGCOOH, and cholesterol (20:5:2) with chloroform. The chloroform was removed by vacuum and the solution was kept overnight in a vacuum desicator to remove the solvent. After hydration with [PBS] Phosphate Buffered Saline [pH 7.4], the liposomal suspension was desized by extrusion through poly carbonate membranes with pore size 100nm [Avanti polar lipids, U.S.A.]. As part of this process, the of drug loaded LPs was carried out by mixing PTX, DLPC, DSPE-PEG-COOH and cholesterol in methanol at different

molar ratios (for optimization). Unencapsulated PTX was then removed using ultra centrifugation at 30,000 rpm for 15 minutes.

2.3 Determination of vesicle encapsulation efficiency

The encapsulation efficiency of PTX liposomal particles was determined by an indirect method in which the fraction of PTX that is entrapped in the nanoparticles was measured. 10 µl of PTX loaded liposomal dispersion was centrifuged at 14,000 rpm with methanol for one hour.With a UV spectrophotometer, the supernatant from the mixture after appropriate dilutions was analyzed Encapsulation efficiency = (Entrapped drug volume / Total drug volume) ×100

2.4 Characterization of LPs

Surface morphology of all liposomal formulations was characterized by FESEM. The samples were mounted on alumina stubs using double adhesive tape, coated with gold in HUS–5GB vacuum evaporator, and then examined in FESEM [Quanta 200 FESEM, Thermo fisher United States] at 20 KV acceleration voltage and at various magnifications. Lipo-PTX dispersion was measured for vesicle size and extent of size distribution using **Malvernzetasizer ZS90 [Malvern Instruments, UK**] at a 90° scattering angle using DLS. For light scattering measurements, the samples were measured at a fixed angle of 25°C. The scattering intensity was adjusted between 100-500 kcps by appropriately diluting the liposomal dispersion with double distilled water. Zeta potential was measured using laser doppler micro-electrophoresis method by zetasizer. Zeta potential was also measured by filling the samples in disposable zeta cell cuvettes and placing it in the sample chamber of ZS 90. Stability studies were carried out by keeping the samples at 4˚C; the samples were diluted with water. The physical appearance, average size, PDI, EE [%] of the dispersion was measured.

2.5 In vitro Drug Release Profile

The sample dialysis bag with a MW cutoff of 12,000-14,000 was loaded with 10 l of lipo-PTX and 990 l of methanol of each formulation to determine how the drug would release.

To determine the pattern of drug release from LPs, 10µl of lipo – PTX with 990µl of methanol of each formulation was loaded in the dialysis bag [Hi-media, 12,000 - 14,000 MW cut off] For about 24 hours, the bag was soaked in methanol at 37°C. The samples were withdrawn at definite intervals of 0, 12, 2, 4, 6, 8, 10, 12, 14, 16, 18 and 24. A multimode plate reader [Synergy H, BioTek, USA] was used to read the concentrations of drug released at 227 nm during the above-mentioned intervals.

2.6 In-vitro Anticancer Activity of PTX and Lipo-PTX in A549 lung cancer cell lines by MTT assay

MTT assay was used to measure Lipo-PTX's in vitro cell growth inhibition in A549 NSCLC cell lines. With the assay mentioned above, LipoPTX and free PTX were analyzed for their anti-proliferative effect. 96 well plates were seeded with $1x10^4$ cells and cultivated for 24 hours in a CO_2 incubator. Assays were conducted with Lipo-PTX and free PTX diluted into DMEM media at concentrations ranging from 0.001 - 5g/ml using 20ul of MTT [5mg/ml] added to each well and incubated the cells at room temperature for 5 hours. We then flicked off the medium and dissolved the purple formazan crystals produced by live cells in DMSO. For complete solubilization, the cell plate was shaken for 10 minutes, followed by 30 minutes of incubation.The untreated well was considered as control. We measured the absorbance of samples of Lipo-PTX and free PTX treated cells at 570nm with a Multi Plate reader [Synergy H1, BioTek, USA]. Anti proliferative effect of both free PTX and Lipo-PTX were calculated according to the following equation:

% Inhibition = OD of individual test group / OD of control group x 100

Where, OD sample and OD control represented the absorbance of the samples and controls, respectively.

DAPI staining

2.7 In vitro apoptosis assay

In both Lipo-PTX and free PTX treated A549 non small lung cancer cells, the Muse Annexin V and Dead Cell kit [Millipore, Billerica, MA, USA] was used to analyze the percentage of apoptotic and dead cells. In 6 well plates, 1x105 cells were plated and treated with FL, 42.7 g/ml Lipo-PTX, and free for 12 and 24 hours. Afterwards, the cells in the 6 well plates were trypsinized and washed with PBS to remove the trypsin. After the aforementioned step, 200µl of apoptotic reagent added to the cells. The early, late apoptotic and necrotic cells percentage was determined by Muse Cell Analyzer [Millipore, Billerica, MA, USA]. As per the instructions mentioned in the kit, DAPI nuclear staining was applied to apoptotic cells with condensed and fragmented nuclei. A549 cells (1×10^5) were seeded in a six-well plate and a spotless cover slip placed at the bottom surface of each well, and the cells were incubated at the same conditions as in the previous experiments for 24 hours until the cell attachment to the cover slip was established. After the aforementioned step, free PTX and

Lipo-PTX (42.7 µg/ml) were added to the cells for 24 h to the cells. As soon as the medium was removed, cells were incubated with DAPI working solution for 15 minutes at 37°C. After removing the working solution, the cells were cleaned with methanol, mounted on glass slides using PBS as mounting medium, and examined under an AX70 fluorescence microscope [EVOS FLC, Thermo Fisher Scientific, USA] at 340/380 nm excitation.

2.8 In vitro Cell cycle analysis

A549 lung most cancers cells have been seeded in 6-well plates and incubated with complete DMEM medium containing 10% FBS at 37°C. 42.7 µg of Lipo-PTX and free PTX was added in the wells and incubated for 12 and 24 hours. Untreated cells were considered as control. After 24hrs treatment time the cells were trypsinized and the suspension was added in to 15ml Falcon tube. After centrifugation with 500g RPM at 4°C. The supernatant was flicked off and the pellet was fixed with 70% ice cold ethanol and stored for overnight incubation at 4°C. On next day the ethanol was eliminated via centrifugation and suitable PBS wash became given to remove the alcohol trace. in addition, fresh color less media and 100 µl of Muse mobile Cycle Reagent, were added and incubated for half-hour at room temperature in dark. The cell cycle graph and percentage of DNA in each test factors were observed by means of Muse cellular analyzer.

3.0 RESULTS

3.1 Preparation of Lipo PTX and Encapsulation efficiency

PTX was incorporated in the liposome by the modified thin-film hydration method (Zhang et al.2005a). To optimize the ratio of lipid:cholesterol concentration were changed (Table 1) on the basis of encapsulation of efficiency. Since PTX was hydrophobic concentration of DLPC increased the entrapment of PTX. The pegylation leads slight decrement of PTX due to the hydrophilicity. The cholesterol provides the rigidity for the liposome and prevents the leakages. From the results, it was found that the encapsulation of PTX was found to be maximum in the 1: 20 ratio beyond which no significant improvement was observed in the encapsulation efficiency. The pegylation decreased the entrapment efficiency when increased in concentration. The cholesterol concentration increased the entrapment efficiency 2 fold upon 2 molar concentrations. The best ratio 1:20:5:2 (PTX:DLPC:DSPE PEG COOH:CHOLESTEROL) was selected for the further analysis.

3.2 Characterisation of PTX liposome

Figure 1 showed the FESEM images of the PTX loaded PEGylated liposomes. Lipo – PTX were found to be smooth spherical shape where as FL was found to be coarse surface. The size distribution of the FL and Lipo-PTX was found to be 80 and 102 d nm respectively as measured using dynamic light scattering (Figure 2). Figure 3 indicated the zeta potential of the liposomal formulations was −19.2± 3.93 mV for blank liposomes and 20.2 ± 1.34 mV Lipo PTX. Lipo PTX indicated good stability and maintained their size for 1 month in a PBS (7.4) medium. There were no leakages observed significantly upon storage (Table 2).

3.3 Drug Release study of Lipo-PTX

Nano-formulations were typically measured in-vitro by the dialysis method. . In the present study, the release profiles of free paclitaxel and paclitaxel liposomes were shown in figure 4. The free PTX 100% release at 10 h, meanwhile the Lipo -PTX was sustained and continued till 24 hours.

3.4 Antiproliferative effect of both and Lipo-PTX in A549 NCSLC cell lines by MTT assay

The anti-cancer activity of free PTX and Lipo PTX in A549 lung cancer cell lines by MTT assay were shown in fig5. The results showed that both free PTX and Lipo PTX could induce cytotoxicity in a concentration dependent manner. Lipo-PTX (0.003 µg/ml) showed significant inhibition than free PTX (0.10 µg/ml) in the A549 Lung cancer cell lines.

3.5 Effect of Lipo-PTX to induce apoptosis in A549 cells

The apoptosis assay in A549 cells after treatment for 24 h at concentration of 42.7 µg/ml Lipo-Gn, Cells shown in the lower left quadrant are viable, while cells in the right quadrant are apoptotic. Late apoptotic cells are visible in the upper right quadrant, while dead cells are present in the upper left quadrant. The results showed that free PTX treated cells exihibit smaller early apoptosis and higher apoptotic cells for 24 hours of treatment. Comparing with free PTX, Lipo-PTX shows greater early apoptosis and late apoptosis. Significant increase in apoptic cells [69.76%.± 0.92] noted in Lipo-PTX [0.003µg] which is greater than PTX (32.1% ±1.08) at same concentration. No significant increase in apoptotic cells in both control and FL treated cells which indicate the liposome carrier was not toxic to the cells due to the absence of drug. For qualitative apoptosis percentage assessment, DAPI staining was used. After staining the free Gn and Lipo-PTX treated cells; Under fluorescent microscope, blue colored nuclei were observed, condensed chromatin filaments or nuclear condensation indicating a loss of cell membrane integrity in drug-treated cells in contrast to untreated cells. Bright blue

fluorescence was exhibited by dead cells. These characteristics were observed more significantly in the cells incubated with Lipo-PTX as compared to the ones incubated with free PTX at the same concentration.(Figure 6)

3.6 Cell cycle analysis of Lipo – PTX
Figure 7summarizes the cell cycle arrest of A549 cells upon treatment with both PTX and Lipo PTX). Both drugs arrest the cells at G2M phase. Lipo PTX exihibit 2 fold increased cell cyle arrest (50.2% ± 2.78) when compared to free PTX (38.3% ± 2.64). There were no G2M phase arrest noted with FL and Untreated cells.

4.0 DISCUSSION
A limitation of the use of paclitaxel is its solubility-related issues, which are addressed by nanoemulsion techniques such as liposome technology (Sideris et al., 2016, Abu Samaan et al., 2019). Liposomes have a bilayer that resembles the plasma membrane of cells, which fuses with the bilayer and releases its cargo (Viswanathan and Grace, 2017, Weaver, 2014 and Li et al., 2015). In this study, lipo PTX was prepared by thin film hydration, one of the easiest methods of liposome synthesis. The concentration of Lipids, cholesterol was changed to obtain optimum ratio for better entrapment of liposome. DSPE PEG COOH was added to the formulation to prevent the uptake of liposomes by reticulo endothelial cells (Gan et al., 2017). Since PTX was hydrophobic, which is incorporated in the acyl chains of lipid Proper proportion of cholesterol maintain the rigidity as well as the shape of the LPs and prevent leakages. 1:20:5:2 (PTX:DLPC:DSPE PEG COOH: CHOLESTEROL) was exhibited better entrapment efficiency. Our results agrees with recent study by lopez et al., 2021 that the PTX efficacy was increased when encapsulate in LPs. As mentioned in our previous publications (Guo et al., 2015) the characterization studies exhibited the prepared LPs attain smooth spherical shape, positive zeta potential charge and size below 200 d nm which enhance the target ability of LPs by EPR effect (Zhu et al., 2018). The coarse appearance of FL was due to unentrapment of drug and positive charge increase the attraction of LPs by negative charge of tumour cells. Lipo PTX exhibit good colloidal stability due to proper concentration of lipids and cholesterol in the preparation. Implementation of an extruder in downsizing process results in liposomes smaller than 200 d nm. The anticancer activity of Lipo PTX was significantly high when compared with PTX due to prevention of drug efflux. Both PTX and Lipo PTX showed apoptosis mediated A549 cell death. The significant increment of cell death upon Lipo PTX treatment was due to accumulation of more drug in microenvironment. Our results agrees with the reports of Sun et al 2017 which stated that Lipo PTX increases the mitochondrial mediated apoptosis by activating caspases 3 and 9. Lipo PTX showed better G2M phase arrest due to increased mitotic arrest of PTX (Sun et al.,2017). Both fluorescent based assay revealed that LPs formulation enhance the efficacy of PTX. A study reported by Lee et al 2020 stated that PTX LPss increased the G2M phase arrest in A549 cells (Xu et al., 2017).

CONCLUSION
The developed Lipo PTX formulation is successful in achievied smooth spherical shape, optimal particle size, and exihibit sustained release, which enhances the EPR effect. Lipo PTX is more cytotoxic than PTX, even when used in low concentrations; therefore, Lipo PTX will be a potential drug to treat NSCLC.

CONFLICT OF INTEREST
No conflict of interest is associated with this work.

Tables

Table 1: Optimization of Encapsulation efficiency for[6]- gingerol loaded LPs

S No	Drug: DLPC : DSPE PEG: Cholesterol (molar ratio)	Encapsulation efficiency (%)
1	1:10:1.5:5	62.4% ± 0.051
2	1:15:3:3	78.0% ± 0.053
3	1:20:5:2	98.8% ± 0.030

Table 2: Parameters of colloidal stability

S No	Parameters	0 day	1 month
1	Particle size (nm)	189.4nm	191.3nm

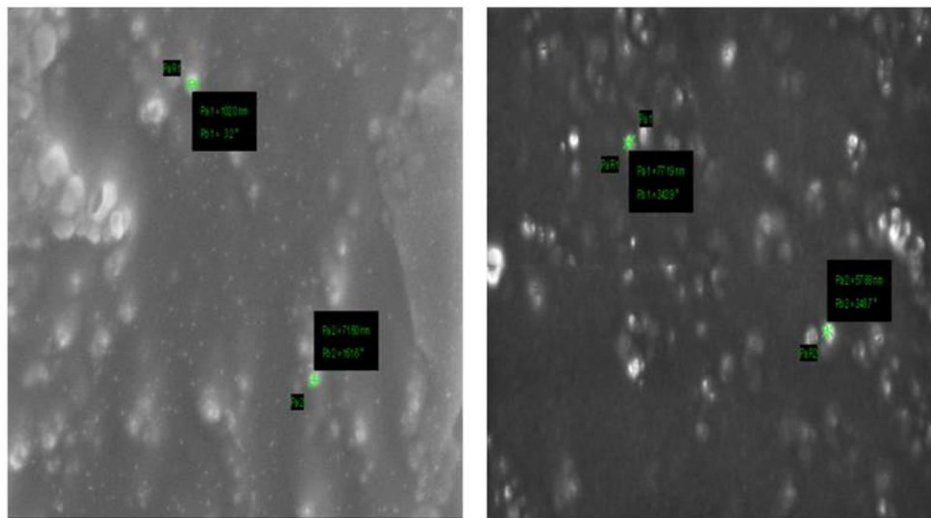| 2 | PDI | 0.638 ± 0.020 | 0.529 ± 0.011 |
| 3 | Encapsulation Efficiency | 98.8% ± 0.030 | 96.2% ± 0.024 |

Figures

Figure 1: Morphology of developed liposomal vesicles (a) (Free liposome)FL (b) Lipo - PTX (Paclitaxel encapsulated liposome).
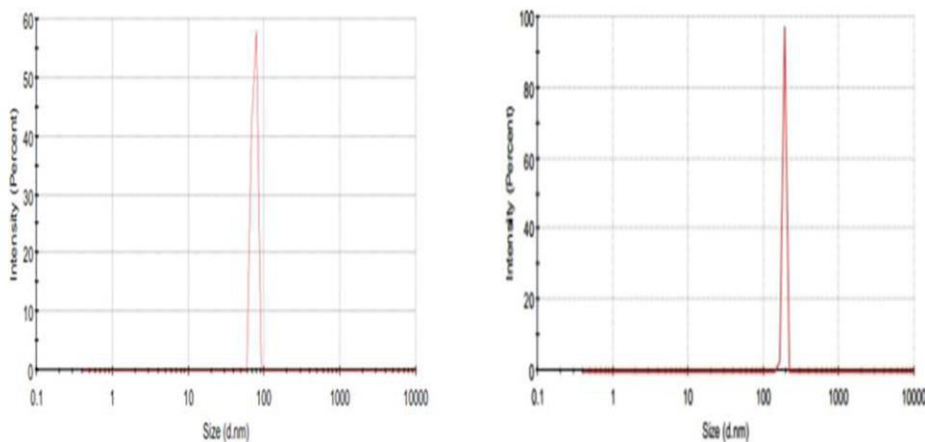

Figure 2: Size range of developed liposome vesicles (a) FL (Free Liposome) and (b) Lipo - PTX (PTX encapsulated liposome)
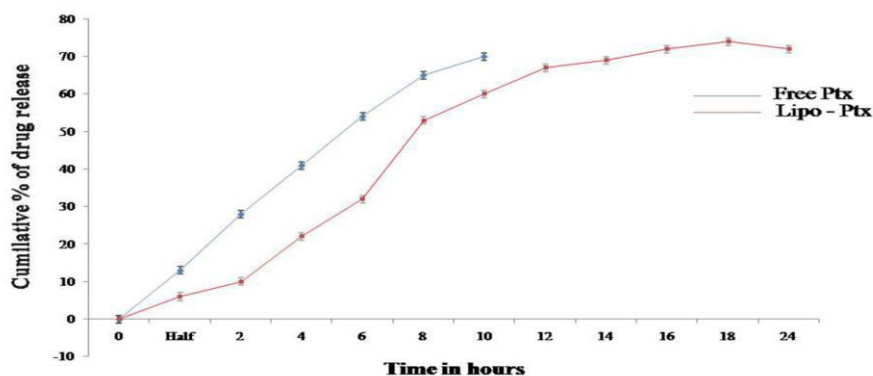

Figure 4 *In vitro* release of PTX release from liposomes through dialysis membrane .Values are expressed as mean ± SD; n=3. blue colour indicates (PTX). Red colour indicates Lipo – PTX (PTX encapsulated liposome) .
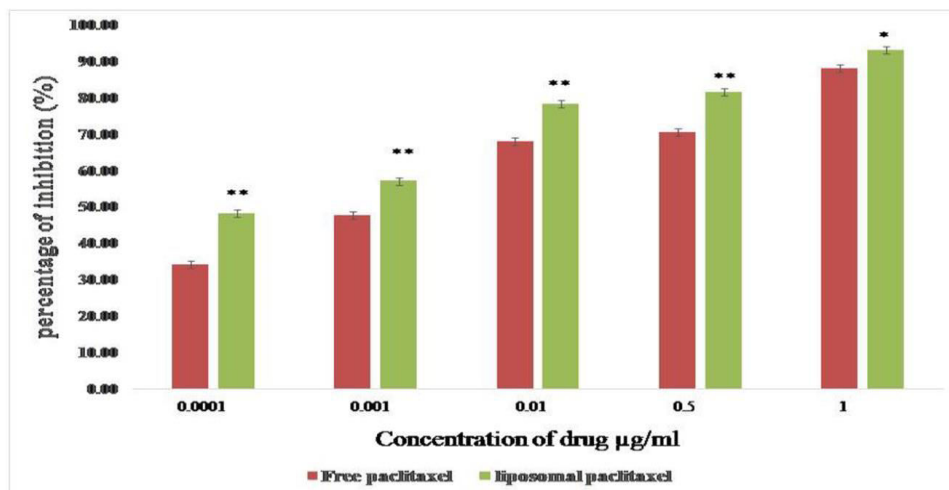
Figure 5 *In vitro cytotoxic effect of PTX (Free paclitaxel) and Lipo – PTX (paclitaxel encapsulated liposome) on A549 lung cancer cell lines.* Values are expressed as Mean ± SD (n = 3). Most significant - ***$P \le 0.001$, Maximum significance **$P \le 0.01$, Significant *$P \le 0.05$, ns ≥ 0.05.
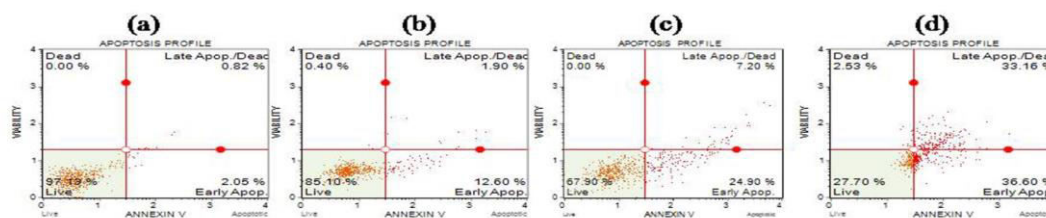

Figure 6. Effects of Lipo – PTX and PTX on the apoptosis of A549 cells. (a) Control (b) Free liposome (FL) (c) (FreePTX) (d) (PTX encapsulated liposome) Lipo – PTX for 24 h . Apoptosis evaluation of FL , Gn and Lipo - Gn against A549 cells for 24 hours. The data represent the mean ± SD (n = 3); Significant - *$P \le 0.05$, Maximum significant - **$P \le 0.01$, Most significant - *** $P \le 0.001$.
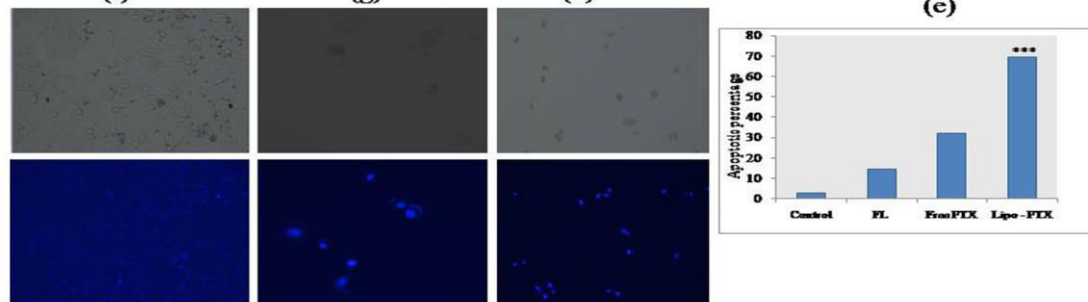

Figure 6 Effect of Lipo – PTX and PTX on nuclear fragmentation of A549 cell lines
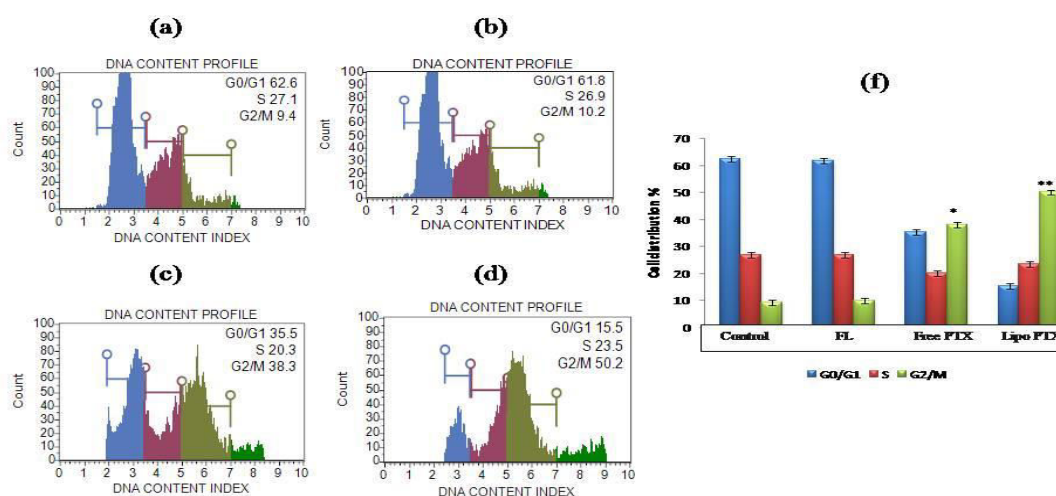(f) Control, (g) (Free PTX) (h) Lipo – PTX(PTX encapsulated liposome)

Figure 7. Effects of PTX and Lipo – PTX on the apoptosis of A549 cells. (a) control; (b) (Free liposome) FL (c) (Free Paclitaxel) PTX (d) (Paclitaxel encapsulated liposome) Lipo - PTX for 24 h; (f), Percentage of cell cycle arrest on treatment with FL, PTX, and Lipo – PTX against A549 cells at 24 hrs. The data represent the mean percentages ± SD of total cell cycle arrest (n = 3); significant - *$P \le 0.05$, maximum significant - **$P \le 0.01$, most significant - $P \le 0.001$.

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Health Issues Among the it Professional with Special Reference to Punjab it Sector

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ABSTRACT

The IT professionals using computers for few hours a day are prone to develop problems like vision problem, eye strain, shoulder problems, Musculoskeletal disorder, Carpal tunnel syndrome, obesity, diabetes, stress, neck and shoulder problem and back pain, etc. The current study has proposed to find these problems and associated factors with their working environment conditions and bringing policy level changes to for their health betterment. The study has been conducted in Mohali with the respondent strength of 417 employees from 12 companies.

Keywords- Information Technology, Chronic Occupational diseases, Health issues

INTRODUCTION

The Information Technology (IT) industry is an essential component of the technology-driven knowledge economy of the 21st century. In fact, globally India has been recognised as a knowledge economy due to its impressive IT industry. The IT-based services and products have become indispensable for flourishing any business enterprise and accomplishing success. Information Technology not only contributed to the economic development of the country from the literature, it is noticed that long hours working of IT professionals will boost the symptoms of diabetes, obesity, blood pressure, musculoskeletal and visual deficiencies. Many health-related problems are common among IT professionals due to their hectic life style. In addition to this, the researchers have found that prolonged sitting posture will create high levels of insulin during the fasting period itself and also higher chances for the people to get diabetes and obesity. Overall, it is clear that job nature of IT professionals creates various health problems. There are numerous studies have focused the research on the health problems of employees in general and in specific to IT professionals. The present study was conducted with the objective to determine the prevalence of health problems and their association with and computer work related factors among IT professionals of Mohali IT hub.

OBJECTIVES OF THE STUDY

1. To comprehend the work carried out in the area of occupational among IT professionals in India.

2. To study the continuous health problems faced by the IT professionals.

NEED OF THE STUDY

The research has brought to lime light on the fact that over three-fourth of the study subjects have suffered one or more health problems due to the invariable use of computers in their day-to-day work places and nearly half of them had an average knowledge on health issues. It is obvious that their work environment has a direct adverse effect on their wellbeing and there is a wider gap between their knowledge on health problems and their management. They are required to be addressed by organising health check-ups at regular intervals, undertaking many research projects on their health issues and managements, and conducting awareness programs to both employers and employees. An appropriate ergonomic can be applied in all working places and it could facilitate enabling environment that will enhance the quality of the works of IT professionals and minimize their health problems.

The employees should be motivated to practice the knowledge into their daily lives. Constant monitoring and evaluation of the employees' health is very crucial to alleviate is these problems at the initial stages.

METHODS

The present study was done among IT professionals in Mohali from June 2021 to December 2021. A total of 417 employees from 12 IT companies were included in the study according to cochran's formula.

The respondents included people who are computer professionals working on personal computers for more than 4-6hrs/day and who is working from at least 1 year in the company. The respondents were described the purpose of study and were assured about the confidentiality and secrecy of the information so obtained.

Data was collected by a self-administered, pre-structured, pre-tested questionnaire that included socio-demographic details such as age, gender, working hours, marital status, annual income, and detailed information about experiencing of various health issues like back pain, diabetes, blood pressure, obesity, visual and musculoskeletal problems. The questionnaire was sent to participants through email. The data thus collected from primary research was converted into meaningful data and analysed by studying the proportions and associations by applying Chi-square test. The p-values lesser than 0.05 indicates a positive correlation between the variables.

RESULTS

The present study included 417 IT professionals. Majorities (54.9%) of the respondents were male and remaining (45.1%) are females. About 50.8% of the participants were having the age less than 25 years, 42% were between 26–35 years, 5.8% were 36–45 years and remaining 1.4% was 45 years above. Among the participants 50.8% of respondents were married, 46% were unmarried, 2.9% was divorced and remaining 0.2% are widowers. The annual income of the majority of respondents (48.4%) was between 2–5 lakhs. The professional experience of 44.4% respondents was less than 2 years, 42.2% respondents are having 3–5 years, and remaining 13.4% is split equally between respondent with 6–10 years' experience and more than 10 years. About 49.6% of the respondents spend their time in front of a computer between 7–8 hours. Majority of the respondent (54.2%) take break every 1 hour, 30.5% take break every 2 hour, 8.2% respondents take break every 30 minutes and remaining 7.2% take break once in every 4 hour. The sitting posture of majority (50.4%) of the respondents are leaning back, followed by 38.4% of the respondents prefer leaning front and remaining 11.3% prefer sitting straight. In the current study, the participants had an average level of knowledge about the computer related diseases. 71% of the professionals constantly gazing the computer monitors were more likely to get computer vision syndrome. Similarly, the other study revealed that the same percentage of the subjects suffered with the same problem due to the continued exposure to computers.

DISCUSSION

We studied health issues related to visual problems, musculoskeletal problems, stress ,obesity,diabetes and other health problems among IT professionals in Mohali city. The present study findings observed that most of the IT professionals has the experience of less than 2 years and spend about 7-8 hours in front of the computer and; notably, they take only break at every 1 hour and most of them agreed their sitting posture is leaning back. It was clear sitting for a long time in front of computer leads to more health problems in IT professionals. It was also agreed by previous researcher in their finding. Health problems such as visual, musculoskeletal and stress problems were observed. Related to visual problems pain, irritation, redness of eye and blurring of vision was seen in most of the patients. This was consistent with the reports of various authors.7-10 In our study, musculoskeletal problems include are pain or stiffness in lower back, pain/stiffness in wrist/hand/fingers, pain/stiffness in shoulder and pain/stiffness in neck.

Similar to this, the association between the level of computer usage (in a day) and musculoskeletal problems were Stress is one of the major problems faced by IT professionals. Higher stress conditions of moody; short temper; accelerated speech; nail-biting; restlessness; getting confused easily; gain/loss of weight and nervousness were noticed among respondents. In order to gain the association of socio-demographic and

computer work related factors, the findings noticed that visual problems were higher among female IT professionals than male. In the study it has been found that that female had higher visual problems than male. Further, the findings show that in terms of gender perspective, there were higher stress conditions among male than female.

Overall, the higher health problems were observed among male than female in Mohali IT Park. It is observed that male encountered higher health problems than female students while using a computer for a long time. On contrary, the study had identified that women using four hours of the computer in a day are more affected by musculoskeletal disorders. With respect to age group and computer related problems, the study specified people less than 25 years of age group confronted several health problems.

CONCLUSION

In conclusion, IT professionals sitting a long time in front of computer leads to more health problems which include visual, diabetes, blood pressure, musculoskeletal and stress problems. In terms of visual problem, study concluded that pain, irritation, redness of eye and blurring of vision, while musculoskeletal problems include pain or stiffness in lower back, pain/stiffness in wrist/hand/fingers, pain/stiffness in shoulder and pain/stiffness in neck and higher stress conditions of moody; short-temper; accelerated speech; nail-biting; restlessness; getting confused easily; gain/loss of weight and nervousness were more common. With respect to age and gender, male and age of fewer than 25 years were predominantly affected by various health problems due to use of the computer in a long time. Hence the establishments hiring them, as well as the IT professionals themselves need to be alerted regarding the significance of the regular health check-ups and proper working environments.

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