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Special Issue on

RECENT DEVELOPMENTS IN SOCIAL SCIENCES, ARTS AND SCIENCES

Special Issue Editors

Rev. Sr. Dr. MARY PRAMILA SANTHI | Dr. S. SIVARANJINI

Dr. KAMALAVENI | Dr. S. NITHYA

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Research should be at the core and must be instrumental in generating a major interface with the academic world. It must provide a new theoretical frame work that enable reassessment and refinement of current practices and thinking. This may result in a fundamental discovery and an extension of the knowledge acquired. Research is meant to establish or confirm facts, reaffirm the results of previous works, solve new or existing problems, support theorems; or develop new theorems. It empowers the faculty and students for an in-depth approach in research. It has the potential to enhance the consultancy capabilities of the researcher. In short, conceptually and thematically an active attempt to provide these types of common platforms on educational reformations through research has become the main objective of this Journal.

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FOREWORD

I am pleased to provide the foreword for the manuscript volumes presented at the BODHI Hybrid International Interdisciplinary Conference on Recent Trends in Social Sciences, Arts and Sciences, held on Tuesday 17 October 2023. This conference was a collaborative effort organized by St. Antony's College of Arts and Science for Women in Dindigul and Oriental College in Kohima, Nagaland. Notably, this event marks the third consecutive international conference organized by SAC in recent times.

SAC always firmly believes that collaboration between institutions to conduct conferences and seminars offers numerous advantages, including a broader range of expertise, increased resources, enhanced program content, networking opportunities, and more. Such collaborative efforts contribute to the advancement of knowledge and facilitate interdisciplinary and international connections, ultimately benefiting the academic and professional community at large.

SAC never fails in its commitment to research by the faculty and the students. Presenting research papers at conferences is a critical aspect of faculty research that supports the dissemination of knowledge, peer engagement, networking, and professional development while contributing to the academic community and enhancing the researcher's own work.

At the same time, it recognizes that student research is not only a valuable component of higher education but also a meaningful way for students to grow academically and personally, contribute to the academic community, and prepare for future academic or professional endeavors. It fosters a culture of inquiry and discovery that is fundamental to the advancement of knowledge and society.

I wish to express my sincere gratitude and appreciation to Dr. S. Balakrishnan, Publisher & Managing Editor of BODHI Journal. The objective of organizing conferences extends beyond the presentation of research papers; it is to incorporate valuable suggestions from the scholarly audience and to publish these papers, making them accessible to a wider readership who may not have had the opportunity to attend the conference. Ultimately, the impact and success of a manuscript are measured by its citation, and BODHI, being an indexed journal, plays a pivotal role in facilitating this significant service.

I commend the commendable efforts led by the principal, the conference convenor, coordinators, and the enthusiastic student participants. I extend my best wishes to all of them for their future endeavors.

God Bless!

17.10.2023

Sr.Arul Devi

SECRETARY
St. Antony's College of Arts & Sciences for Women
Amala Annai Nagar, Thamaraipadi,
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Date:27.10.2023

I am writing to express my enthusiastic endorsement for the book publication of the International Multidisciplinary Conference on "Recent Developments in Social Sciences, Arts, and Sciences", jointly organized by ST. ANTONY'S COLLEGE OF ARTS AND SCIENCES FOR WOMEN DINDIGUL, ORIENTAL COLLEGE KOHIMA & BODHI INTERNATIONAL JOURNAL OF RESEARCH IN HUMANITIES, ARTS AND SCIENCE, INDIA.

The conference, which brought together scholars, researchers, and practitioners from diverse disciplines, served as a platform for meaningful interdisciplinary dialogue. The papers presented showcased the latest developments and advancements in social sciences, arts, and sciences, highlighting the interconnectedness of these fields and the collaborative spirit of the academic community.

I extend my heartfelt gratitude to the authors for their scholarly contributions and to the organizing committee for their meticulous efforts in ensuring the success of the conference. I trust that this book will find its place among the distinguished publications and catalogs, reflecting the high academic standards and the spirit of interdisciplinary collaboration upheld by the conference.

I wish the co-organizers, professors and scholars the very best in all the future events.

(Mr. Viu Belho)
Chairman,
Sponsoring Body,
Oriental College Kohima

Editorial

BODHI's multidisciplinary international conference conducted through a hybrid mode, collaborated and organized by St. Antony's College of Arts and Science for Women, Dindigul, TN and Oriental College, Kohima, Nagaland aims to leverage the benefits of both in-person and virtual participation to promote inclusivity, knowledge sharing, collaboration, and sustainability while accommodating the diverse needs and circumstances of participants. Hybrid conferences enable participants from around the world to attend and present their research, regardless of geographical constraints. This inclusivity promotes a broader exchange of ideas and collaboration. Moreover, virtual participation allows individuals who may have limitations related to travel, finances, or physical disabilities to access conference content and engage with the academic community.

The purpose of a multidisciplinary conference is to create a platform for cross-disciplinary collaboration, problem-solving, and knowledge exchange. It play a vital role in advancing research, innovation, and the collective understanding of complex global challenges. This conference served as a collaborative platform for two host institutions, each offering a wide range of academic disciplines, including arts, sciences, social sciences, and the humanities. Students from diverse academic backgrounds had the opportunity to attend a keynote address that transcended the traditional boundaries of academic disciplines. Moreover, they could enrich their knowledge in their respective fields by participating in two concurrent technical sessions. The closing valedictory address emphasized the importance of human values.

BODHI stands out by publishing both in-person and online papers after conducting thorough plagiarism checks. Some papers are sent back to authors for revisions, while others are declined due to issues with originality. BODHI actively promotes student involvement, regardless of their academic year, as it is dedicated to fostering a culture of research among them. The journal firmly holds the belief that academic paper writing should not be limited to a select few academic elites.

Rev. Sr. Dr. Mary Pramila Santhi
Dr. S. Sivaranjini
Dr. Kamalaveni
Dr. S. Nithya

Aim & Objectives

Academic Excellence in research continues promoting research support for young Scholars. Humanities, Arts and Science researches motivate all aspects of encounters across disciplines and research fields in multidisciplinary views, by assembling research groups and consequently projects, supporting publications with this inclination and organizing programmes. Internationalization of research work is the unit that seeks to develop its scholarly profile in research through quality publications. And visibility of research creates sustainable platforms for research and publication, such as series of books; motivating dissemination of research results for people and society.

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Communication

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Abstract

The titanium oxide (TiO$_2$) doped cobalt (Co) and cadmium (Cd) nanoparticles were synthesized using the perfume spray Pyrolysis method. Subsequently, the nanoparticles were annealed at 100 °C for 1 hour in air atmosphere. The structural and optical properties were investigated using XRD, UV–visible spectroscopy, Fourier Transform Infrared Spectroscopy. The results demonstrate thatco-doping with cobalt and cadmium leads to a shift in the absorption edge of TiO$_2$ towards the visible-light region. The increase in the bandgaps can be attributed to quantum confinement effects and small size effects of CoTiO$_2$ and CdTiO$_2$. The FTIR spectra of CdTiO$_2$ nanocomposite exhibit bands at 3000– 3500 cm^{-1}, which can be attributed to stretching vibration modes of OH groups (TiO$_2$-OH). It is believed that these TiO$_2$-OH groups arise from the hydrolysis reaction during the microemulsion process. The Peak at 1659 cm^{-1} is attributed to the bending modes of –OH groups from water molecules adsorbed on the catalyst surface.
Keywords: CoTiO$_2$, CdTiO$_2$, Quantum Confinement Effect and FTIR Analysis.

Introduction

For the range of potential applications in industrial and military, the government has invested lakhs and lakhs of rupees for the research of nanotechnology [1].The possible shapes and structures of nano objects is vast and fascinating, spanning for example dots, pillars, spirals, flowers, cups, donut and many more where a small selection is displayed.

The application range of TiO$_2$ can be extended by improving properties of this material through doping with transition metals like Fe, Mo, Nb, Sb, V &W. Naturally occurring mineral titanium dioxide exists in rutile and anatase forms. The white powder form of Titania has important property of absorbent and odorless which is used mostly for whiteness and opacity. Due to whiteness properties, it is used as

products such as paints, coatings, papers, inks, toothpaste, face powder, and food coloring. Titanium dioxide acts as bleaching agent for brightening, acid resistance and hardening the enamels of porcelain.[2] Its absorbing property makes use as skin care products to protect from ultraviolet radiation. Titanium dioxide have high corrosion resistance, light weight, high tensile strength and it have ability to withstand in high temperatures. The peculiar properties of Titanium dioxide are used as space crafts, naval ships, pipes in power plants, aircraft and missiles. In nanotechnology, Titanium dioxide plays an important role in medicines and numerous food products. Titanium dioxide is environment friendly, relatively stable, have excellent biocompatibility with low or no toxicity, and low cost. These properties make Titanium dioxide an excellent candidate for biomedical applications such as drug delivery and cancer therapy [3]. Particularly, in the field of nanomedicine, TiO_2 nanoparticles are under investigation as useful tools in advancing imaging, nanotherapeutics and skin care products for dermatologic diseases [4]. The element was first found in the condensation of vapors (mixed with soot and zinc oxides) that rose out of a furnace in which zinc oxide was being roasted.

Nanna B., et al., reported that the use of engineered nanoparticles (e.g., in industrial applications and consumer products) is increasing. Consequently, these particles will be released into the aquatic environment. Through aggregation/ agglomeration and sedimentation, sediments are expected ultimately to be sinks for nanoparticles. TiO_2 nanoparticles are potential carriers for cadmium and it was found that 25% and 6% of the total cadmium mass in the test system for L. variegates and D.magna tests were associated to suspended TiO_2 particles, respectively. Though exact localization in this organism was more difficult to assess, the uptake seems to be within the coelomic cavity. Despite facilitated uptake of cadmium by TiO_2 nanoparticles in D. magna, resulting in increased total cadmium body burden, no change in toxicity was observed. [5]

Wu Pingxiao, Tang Jianwen, Dang Zhi et al., analyzed that the nanoparticles of TiO_2 doped with nitrogen and cadmium are synthesized by sol–gel method followed by 2 hr calcination at 400 °C in air atmosphere. The results show that nitrogen and cadmium co-doping cause the absorption edge of TiO_2 to shift to the visible-light region. The Cd^{2+} doping hinders the recombination rate of excited electrons/holes and prevents the aggregation of powder during the calcination. Superior catalytic activity of the co-doped TiO_2 was observed for the decomposition of rhodamine B under visible light irradiation. Theinterstitialnitrogen atoms in co-doped TiO_2nanoparticles powder are responsible for the visible light photocatalytic activity.[6]

S.E.A. Sharaf El-Deen et al., reported that, pure TiO_2-nanoparticles and TiO_2/Sewage Sludge (TS) as biomass material were synthesized via a Sol–gel method. The adsorption potential of nanosized TiO_2 and TS for removal of Cd (II) was investigated in a batch system. The XRD analysis showed that pure TiO_2 is in amorphous phase before calcination and in anatase phase at annealing temperature of 400 °C. TiO_2/sewage sludge that calcined at 400 °C was found to be the best adsorbent for cadmium removal from aqueous solution. Kinetic and isotherm studies were carried out by considering the parameters, pH, initial concentration and contact time. The optimum pH value for Cd (II) adsorption onto TS^{400} was found to be 6. Langmuir isotherm showed better fit than Freundlich isotherm and the maximum adsorption capacity was found to be 29.28 mg/g which is higher than that of many other adsorbents reported in literature. The adsorption kinetic data were well fitted with a pseudo-second-order model. These results demonstrated that TS^{400} was readily prepared and is the promising and effective solid material for the removal of Cd (II) from aqueous solutions [7].

Experimental

The nanoparticles of TiO_2 doped with cobalt and cadmium were synthesized by Perfume Spray Pyrolysis method followed by 1 hr annealing at 100 °C in air atmosphere. Its chemical composition

and optical absorption are investigated by XRD, UV–vis absorption spectra, Fourier Transform Infrared Spectroscopy. The results showed that cobalt and cadmium co-doping cause the absorption edge of TiO_2 to shift to the visible-light region. The Cd^{2+} doping hinders the recombination rate of excited electrons/holes and prevents the aggregation of powder during the calcination.

Cd-doped TiO_2 powders were produced by the modified synthetic procedure of Perfume Spray Pyrolysis technique. Appropriate amounts of TiO_2 (Merck) were doped with 1 wt% of $CdNO_3$ (Merck), 1 wt% of $CoNO_3$ were completely mixed and left in a furnace at 100°C for 60 min. Then it was sprayed on a copper plate which was kept on a hot plate of 140º C, the prepared nanoparticles were washed adequately with distilled water. After dissolution, the nanoparticles were dried in an oven at 100°C [1]. The block diagram was shown in Figure 1, Figure 2 shows the perfume spray pyrolysis technique
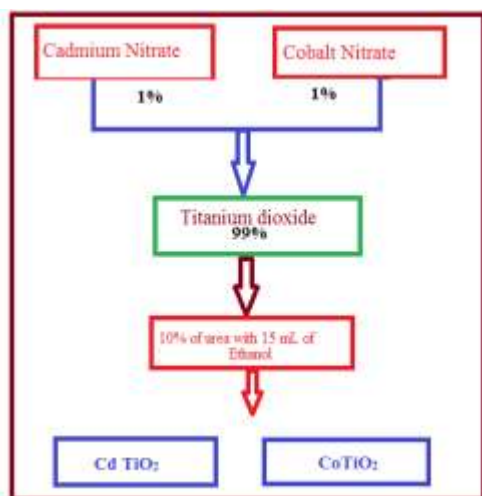
Figure 1 Flow chart of preparation method of CdTiO$_2$ and CoTiO$_2$

Result and Discussion

X-ray diffraction analysis is a typical technique for determining the compositions of crystalline materials. Basically, Rhombohedral and Orthorhombic are common TiO_2 phases from a crystal structure point of view, the latter two were abundantly found in $CoTiO_2$ and $CdTiO_2$. Figure3 represents the impact of cobalt and cadmium doping on the crystal structure of the produced nanoparticles. Co- and Cd-doped with TiO_2 consist entirely of the Rhombohedral and Orthorhombic phase, the diffraction peaks appear tabulated in Table 1 and 2 and correspond to the (110) crystal planes, respectively. This suggests the formation of pure phases of Cobalt and Cadmium TiO_2 according to the XRD database (JCPDS card no 21-1282) and (JCPDS Card no 76-1600) [2]
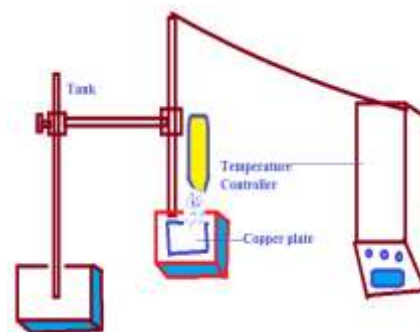
Figure 2 Preparation method of perfume spray pyrolysis technique

Flow chart shows the experimental demonstration and percentages of the samples. The solution was sprayed on the copper plate, after cooling the copper plate, the powder was collected and then annealed for 100º C, because of spraying on the copper plate, the diffraction planes were shifted from its prominent peaks to 0.05º and the prominent planes are (1 1 0).
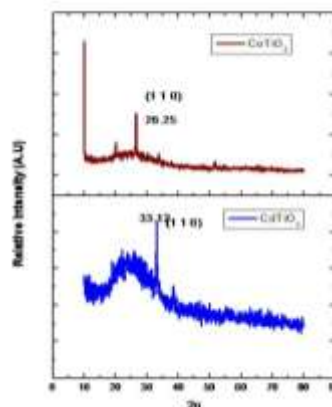
Figure 3 XRD Analyses of CdTiO$_2$ and CoTiO$_2$

Table 1 Structural Parameter CoTiO$_2$ and CdTiO$_2$

Samples	2θ (obs)	2θ (Std)	d (obs)	d (std)	FWHM	hkl	$D = \dfrac{0.94\lambda}{\beta Cos\theta}$	Strain = $(d_{std}-d_{Obs})/d_{std}$
CoTiO$_2$	26.25	25.547	3.3645	3.4839	0.2356	1 1 0	36.204	0.0343
CdTiO$_2$	33.12	34.141	2.7076	2.6241	0.4151	1 1 0	20.866	-0.03182

Table 2 Structural Studies of Samples CoTiO$_2$ and CdTiO$_2$

Samples	System	JCPDS file	Lattice constant	
			Standard	Calculated
CdTiO$_2$	(Rhombohedral)	82-1131	a = 5.820 A°	a = 5.124 A°
CoTiO$_2$	(Orthorhombic)	76-1600	a = 3.732b =9.718 andc = 10.069 A°	a = 3.658 b =9.102 andc = 9.998 A°

UV-Vis Analysis of CoTiO$_2$ and CdTiO$_2$

The absorbance and transmittance spectrum of the doped CoTiO$_2$ and CdTiO$_2$ samples is shown in Figure 4, 5 and 6, 7. The absorption peak at wavelengths <400 nm was associated with the intrinsic bandgap absorption of TiO$_2$ [8]. The addition of Cd ions caused significant changes in the absorption spectrum of TiO$_2$. The UV–vis Cd-doped TiO$_2$ samples contained intensive shoulder at 400–600 nm that might be attributed to the presence of clusters absorption of spatially confined electrons in Cd nanoparticles [3].

Figure 5 Absorbance of Cd Doped TiO$_2$ Nanoparticles
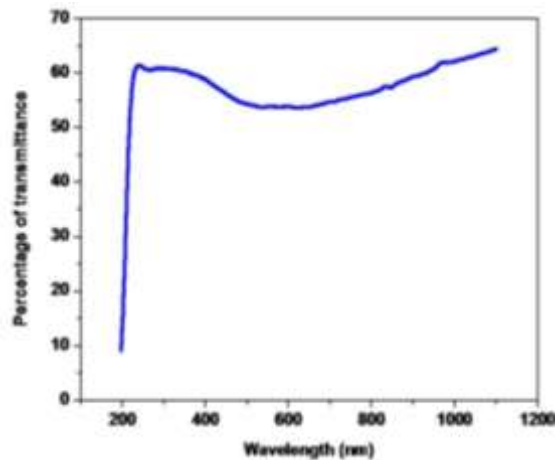
Figure 6 Transmittance of Co Doped TiO$_2$ Nanoparticles

Figure 4 Absorbance of Co Doped TiO$_2$ Nanoparticles
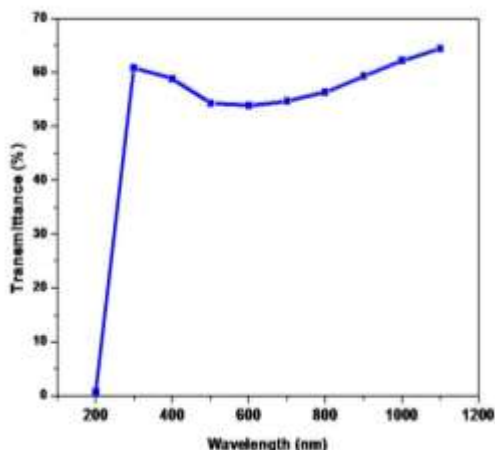
Figure 7 Transmittance of Cd Doped TiO$_2$ nanoparticles
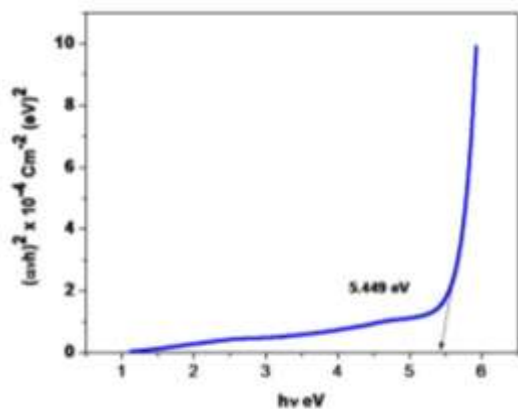
Figure 8 Bandgap of Co Doped TiO$_2$ nanoparticles
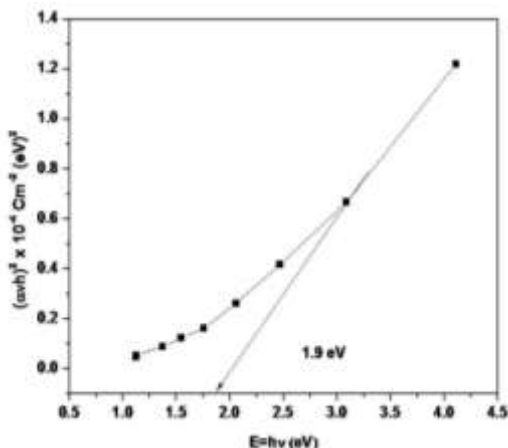
Figure 9 Bandgap of Cd Doped TiO$_2$ nanoparticles

Accordingly, this absorption feature suggested that the photocatalytic activities of Cd-doped TiO$_2$ could be activated by visible light. On the other hand, the valence band electrons of TiO$_2$ were excited to localized energy levels created by doped Cd in the bandgap of TiO$_2$ at longer wavelengths. The bandgaps of sample were calculated according to the bandgap formula (optical bandgap = 1.9 eV). The bandgap Figure 8 and 9 for TiO$_2$ containing 3% Cd content decreased to 1.9 eV with increasing Cd content [4].

Absorption bands of 300 – 1500 wavelength ranges can be assigned to the charge transfer process of O^{2-} and the absorption band gap can be determined by the equation $(\alpha h\upsilon)^2 = K (h\upsilon - E_g)$ and the band gap E$_g$ can be calculated and reported in the Figures 6 and 7 which are having the values 5.499 eV and 1.9 eV. Where hυ is the photon energy (eV) and A is the absorption coefficient and K is a constant. The increase in the bandgaps can be related to the quantum confinement effects and small size effects of CoTiO$_2$ and CdTiO$_2$.

FTIR spectra of CdTiO$_2$ nanocomposite are shown in Figure 10 (a-b). Precursor samples show bands at 3000– 3500 cm^{-1} attributed to stretching vibration modes of OH group (TiO$_2$-OH) (Figure 10). It was believed that such TiO$_2$-OH groups arise due to the hydrolysis reaction in the microemulsion process [5]. Peak at 1659 cm^{-1} is attributed to bending modes of –OH groups of water molecules adsorbed on the surface of catalyst [6]. Peak at 1449 cm^{-1} can be assigned to C-O stretching in carbonyl. Peak at 2884 cm^{-1} is assigned as characteristic peak of Titanium dioxide. Peak at 1080 cm^{-1} is due to symmetrical stretching vibration of O-N group. This information indicates that –OH and –C=O functional groups are present in precursor. Functional group of 611 cm^{-1} is O-Cd-Ti [7]. CdTiO$_2$ shows a band at 611 cm^{-1} ascribed to Cd-Ti stretching sample does not show peak which corresponds to Cd-O stretching at 611 cm^{-1} which might be due to formation of core-shell structure with CdTiO$_2$ as core and Cd doped TiO$_2$ as shell.
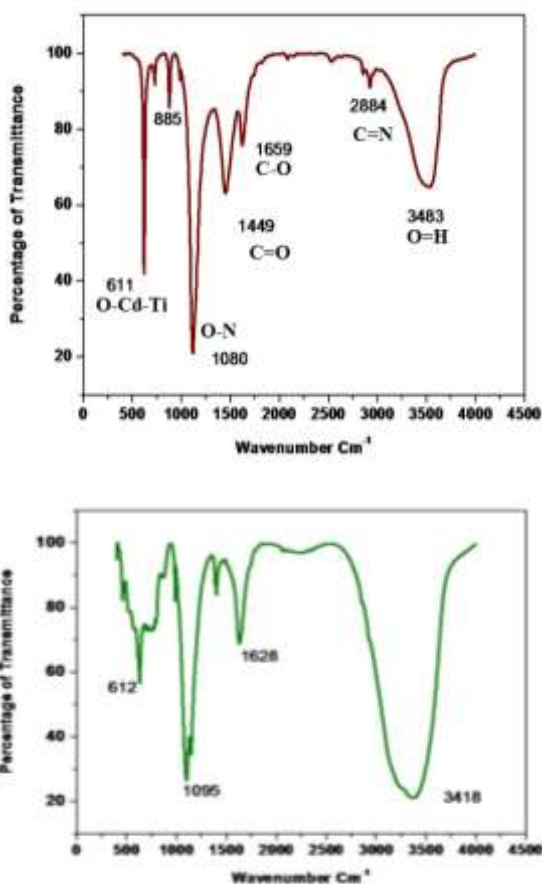
Figure 10 (a-b) FTIR Analysis of CoTiO$_2$ and CdTiO$_2$

The CoO-TiO$_2$ powder obtained by co precipitation is very well dispersed and homogeneous with good optical properties. UV-Vis and FTIR analysis were carried out for this sample. The mixed oxides were prepared it was taken as a standard due to its simplicity and low temperature used to effectively obtain a solid solution. Basically, a solution of NH$_4$OH was quickly added to a container with an aqueous solution of Cobalt nitrate (0.2 mol L^{-1}) and Titanium nitrate in the desired 1:1 ratio. A yellow hydroxides precipitate was formed instantly. Subsequently, it was filtered, washed thoroughly, stirred for one day, placed on a hot plate at 100º C for three hours we got fine powder [8].

Table 3 FTIR Analysis of CoTiO$_2$ and CdTiO$_2$

FTIR Vibrations cm^{-1} (Std)	FTIR Vibrations cm^{-1}(Observed) CoTiO$_2$	FTIR Vibrations cm^{-1} (Observed) CdTiO$_2$	Assignment
3405.13	3483	3418	$_\gamma$ (C-H)
2853.55	2884		-CH$_2$ (sym stretching)
1631.33	1659	1628	=C=N=
1451.77	1449		-CH$_2$- deformation
1099.00	1080	1095	$_\gamma$(C-H)
879.77	885		$_\gamma$ (C-H)
629.71	611	612	$_\gamma$(C-S+C=N)

Conclusion

CdTiO$_2$ core-shell nanocomposites have been successfully synthesized using perfume spray Pyrolysis method on copper plate. This nano composite shows red shift in the absorption spectra attributed to enhancement in the photo absorption capacity. Also, this nanocomposite prepared in the present work may exhibits better visible light photocatalytic activity compared to other photocatalysts for any dye degradation. In conclusion, the nanostructures of cobalt oxide were synthesized by Co precipitation technique. Cubic spinel Co – TiO$_2$ FT-IR study showed the inclusion of hydroxide in the as prepared powder. The band gap value is very much greater than bulk nearly 5.449 eV. Optical absorption properties of CoTiO$_2$ and CdTiO$_2$ nanocomposites were investigated at annealing temperature of 100º C and shows the absorbance spectrum of CoTiO$_2$ and CdTiO$_2$.

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CHARACTERIZATION OF PURE AND Al-Zn DOPED CONDUCTING SnO_2 THIN FILMS FOR GAS SENSORS

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Abstract

The effects of pure SnO_2 and Al-Zn concentration on the structural, electrical, and optical characteristics of thin metal oxide films with nanostructures (AZSO) were investigated. Using a home-made spray pyrolysis method, the pure SnO_2 thin films and the SnO_2 nanocrystalline thin films with cobalt and zinc were created at 500 degrees Celsius on glass substrates. Tin chloride ($SnCl4.5H_2O$) was employed as the starting material, while zinc chloride and aluminium chloride were used as the doping sources, respectively. Methanol is used to dissolve the source, which is then agitated for four hours at 50^oC. 2% is the first stoichiometric ratio for doping. The resulting mixture was sprayed onto a glass substrate while maintaining nozzle distances of 25 cm and 10 ml per minute, respectively. The prepared samples were used to investigate the effects of Al and Zn doped SnO_2 films on the structural and optical characteristics of layers that were assessed using several techniques, including XRD, FESEM, UV-Visible, and EDAX. Their outcomes.
Keywords: Sensors, Nanostructure, thin film, spray pyrolysis, physical properties.

Introduction

Transparent behaviour Due to its excellent optical and electrical properties, tin oxide (SnO_2) is expected to be widely utilised in many fields [1]. It is an archetypal transparent conducting oxide that is inherently non-stoichiometric. Because of its chemical stability and its adsorptive qualities. Glass ceramics, oxides, and various types of substrate materials can all receive its deposition [2]. It has a high specific volume and outstanding cycle performance because to its high melting point, good transmission, and resistance to reactions with airborne oxygen and water vapor. A range of dangerous gases, flammable gases, industrial emissions, and pollution gases are detected using gas sensors based on thin SnO_2 sheets [3]. SnO_2 thin films are additionally utilized for transparent electrodes in displays. A transparent material with strong optical transmission in the visible spectrum (82%) exists as thin films [6]. The related doped

substances were given the names ALO and ZNO, respectively. The characteristics of ALO and ZNO films make them highly desirable for use in various gases sensors. A number of techniques, including chemical vapor deposition (CVD), sputtering, the so-gel process, and spray pyrolysis, can be used to create this kind of thin layer. Due to its high deposition rate, affordable costs, great repeatability, and ability to use wide area deposition equipment that is commercially accessible, spray pyrolysis is the deposition method that is most appealing for industrial development.

The thin, spray-pyrolyzed, doped and undoped SnO_2 nanocrystalline film was created. Zn doping has garnered the majority of study interest for a single doped Al because it has various advantages in terms of conductivity and chemical stability [7, 8]. In the current study, we describe the characterisation of thin films of SnO_2 doped with Al and Zn that were produced using the spray pyrolysis method.

The purpose of this research is to provide information on how the deposition conditions affect the rate of deposition, composition, structure, and optical and electrical properties of the films that are created. In order to define the thin films, a collection of complimentary investigational techniques has been applied. X-ray diffraction (XRD) has been used to do a structural investigation. In the UV-Vis-IR spectral region, the optical properties (transmittance and reflectance) have been assessed. The surface morphology has been studied using scanning electron microscopy (SEM), and chemical compositions have been identified using EDAX.

Experimental

The SPD process was used to deposit thin layers of Al-Zn-SnO$_2$. In this method of deposition, a starting solution including Al, Zn, and Sn precursors was sprayed onto a heated substrate using a nozzle supported by a carrier gas. In ethanol, the initial solution and doping material were dissolved, and the mixture was agitated for four hours at 50°C. Al, Zn doped SnO$_2$ solution and undoped SnO$_2$ solution had a 2% initial stoichiometry concentration. A hot plate with the glass substrate attached on it was then heated to 500°C. This was managed by a dimming thermostat and a hot plate-connected digital thermometer. Spray rate and substrate to nozzle separation were kept at 10 ml per minute and 25 cm, respectively. The flow chart illustrates the experimental process schematically.

Al-Zn-SnO$_2$ Nanostructure Metal Oxide Thin Films Preparation Flow Chart:
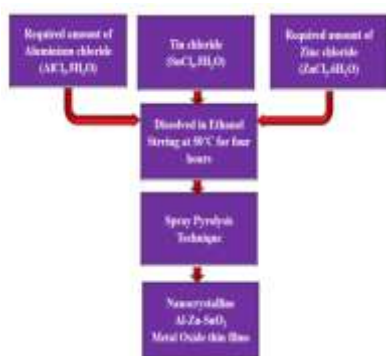
X-ray diffraction was used to investigate the crystalline structure using a diffractometer model DMA X2200 with a copper anticathode (CUK, =1.5)

and an angle range of 20° to 70°. Through the use of a field emission scanning electron microscope (FESEM), the surface morphology of the films and the cross-section film thickness were determined. UV-Vis spectroscopy (Shima DZU UV-3101PC) double beam spectrometer was used to test the optical characteristics.

Results and Discussion

Structural and morphological characterization of Al, Zn doped SnO$_2$ thin films

The XRD patterns of pure and 2% Al, Zn doped SnO$_2$ films on glass substrates, which were deposited at 500°C, are shown in Figure 1. Indexing the position of the diffraction peaks in the diffractogram allowed for the calculation of the corresponding interplanar spacing d values, which were then compared to the values specified by the JCPDS [9] standards. The crystal structure is revealed by the XRD. For undoped SnO$_2$ thin films, reflection from the (110) planes can be seen in the X-ray diffraction peaks to (110) and (021). The Scherrer formula was used to get the mean crystallite size for the (110) plane diffraction peak [10].

$$D = k\lambda / \beta\cos\theta$$

Where is the Braggs angle [11,12], is the ray wavelength (0.1548 nm to CUK), and is the observed angular width at half maximum intensity, which is equal to 0.9. The mean particle thickness of the produced and doped films is estimated to be 38.2 nm and 27.3 nm, respectively, based on the best two XRD patterns. The values that were seen and those that were reported agree [13]. Tin oxide thin films that have been doped with aluminium, zinc, and co are thus appropriate as gas sensors.
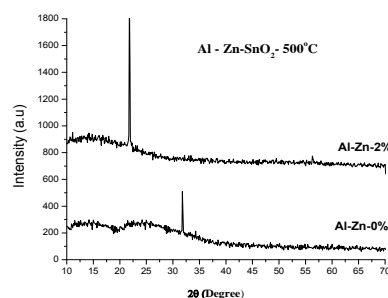

Figure 1XRD pattern of undoped and Al-Zn doped SnO$_2$ films deposited on glass Substrates at 500°C

Surface morphologies of undoped and Al, Zn-SnO$_2$ thin films at 500°C for 2% concentration are shown in (Figures 2 and 3). It was evident that the doping concentration had a significant impact on the films' surface characteristics. In both doped films, the surface morphology revealed a densely packed arrangement of crystallites. SnO$_2$ thin films that were both doped and undoped had slightly smaller grains. The micrographs showed a clear decline, which was supported by the XRD studies.
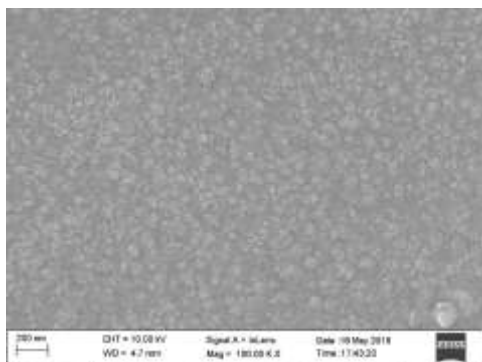
Figure 2 FESEM of undoped SnO$_2$ thin films deposited on glass substrates at 500^0 C
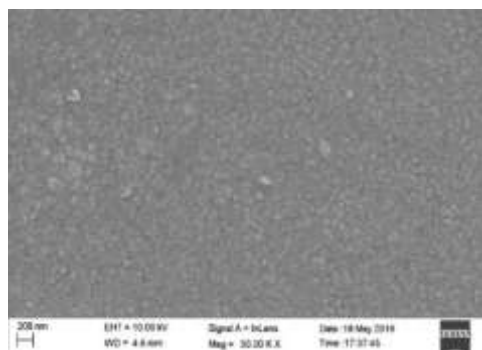
Figure 3 FESEM of 2% of Al-Zn doped SnO$_2$ films deposited on glass substrates at 500^0 C

Optical properties of Al-Zn-SnO$_2$thin films

(Figure 3) displays the optical transmittance spectra of thin films made of pure SnO$_2$ and Al, Zn doped SnO$_2$ in the 300-800 nm wavelength range. Transmittance spectra in this figure revealed a distinct absorption edge in the 480 nm to 510 nm wavelength range. In the visible region, the average transmissions of Al-Zn doped and undoped SnO$_2$ thin films demonstrated greater transmittance [14].
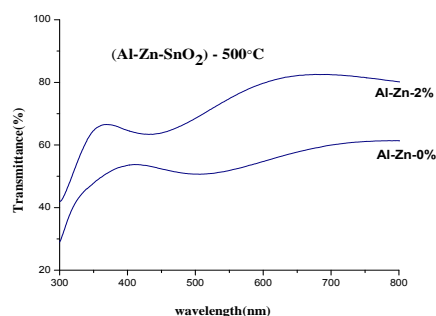
Figure 4 Transmission Spectrums of Undoped and Al-Zn doped SnO$_2$ films Deposited on Glass Substrates at 500^0 C
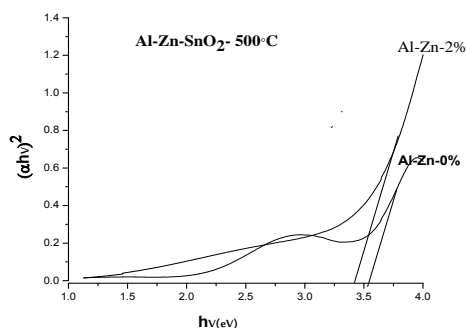
Figure 5Optical band gap of undoped and Al-Zn doped SnO$_2$ films deposited on glass Substrates at 500^0 C

The direct optical band gap for doped and undoped thin films is shown in (Figure 4). the fundamental absorption that results from electron excitation in the conduction band gap after leaving the valence band. According to the following equation, the (h) curves for the samples represent the case of a crystalline material with direct allowed transmittance (direct gap).

$$(\alpha h\nu) = (h\nu - Eg)\ 1/2$$

Where h (J.S.) is Planck's constant, (HZ) is the photon frequency Eg (eV), (m-1) is the absorption coefficient, and A* is a constant that varies depending on the material and the direct optical band gap (Eg). The plot shows that the optical gap is undoped at 3.52eV and 3.47eV.The values of literature are well-aligned. Depending on the dopants and preparation technique, these values changed. AL-Zn-SnO$_2$ EDAX spectra are displayed in (Figures 5, 6). The growth of grains with distinct boundaries may be seen in the micrographs as a sign of the samples' high crystallinity. According to the theoretical calculations, the EDAX spectra verified that all of the elements in the samples were stoichiometric.
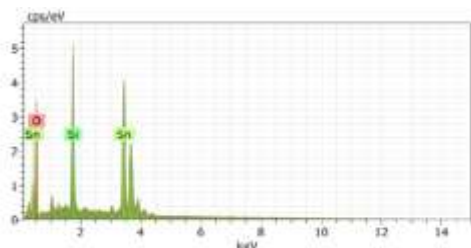
Figure 6 EDAX undoped SnO$_2$ films deposited on glass substrates at 500^0 C
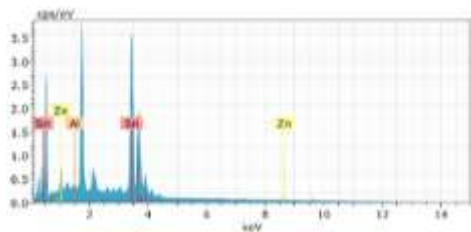
Figure 7 EDAX Al-Zn doped SnO$_2$ films deposited on glass substrates at 500^0 C

Conclusions

Spray pyrolysis was used to create high-oriented crystalline Al-Zn doped thin films on glass substrates at 500°C. Analysis of the film's shape, structure, and optical characteristics. The tetragonal rutile structure of the nanocrystalline SnO$_2$ grains was discovered to exist. XRD calculations determine the crystallite size of the films based on the type of dopant atoms. The synthesized films' high transparency in the visible area was verified by transmission measurements on the materials. For undoped and Al-Zn doped SnO$_2$ films, the band gap energy values were found to be 3.5 eV and 3.2 eV, respectively. The films' morphology, structure, and optical characteristics have all been studied. The effect of the co-dopant ratio on the structure, morphology, and optical properties has been determined to be significant.It has been discovered that the co-dopant ratio has a significant impact on the morphology, structure, and optical characteristics of the films. The examination findings of the spray pyrolysis-produced Al-Zn-SnO$_2$ thin films guarantee their stability and appropriateness for gas sensor devices.

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GROWTH PERFORMANCE OF THE ORNAMENTAL FISH, RED SWORD TAIL *XIPHOPHORUS HELLERII*, FED VARYING INCLUSION OF SILKWORM PUPAE MEAL

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Abstract

The effect of partial replacement of fish meal with Silkworm Pupae (SWP) meal (Bombyx mori) in ornamental fish Xiphophorus hellerii was undertaken with six dried diets formulated at 35% crude protein were fed to fingerlings of an average initial weight of 18.83± 0.44 g at 0 (control diet), 20%, 30%, 40% 50% and 60% inclusion levels of silk worm pupae meal for 40 days. Fish fed supplemented with silkworm pupae meal showed significantly improved growth performance and feed utilization over the control diet. The weight gain, feeding rate, growth rate, cross conversion efficiency, specific growth rate and feed conversion ratio were measured. Results indicated that, growth performance and feed utilization values were significantly ($P<0.05$) higher in fish fed with diets containing 40% silkworm pupae meal, whereas fish fed diets containing 50 & 60 % silkworm pupae meal had lower performance. The obtained results recommended that, silk worm pupae meal can be replaced in the fish meal up to 40% substitution level of Xiphophorus hellerii

Keywords: *Bombyx mori, xiphophorus helleri, growth performance*

Introduction

Aquarium keeping is amongst the most popular of hobbies with millions of enthusiasts worldwide. Together all countries Union are the largest market for ornamental fish; Ornamental fishes are attractive colourful fishes with various characteristics which are kept as pets in an enclosed space of an aquarium or in a garden pond. These fishes can also be known as 'aquarium fishes' due to its common artificial habitat of aquarium tanks. In recent days the aquaria have been entered in to the houses, schools, tourist places, laboratories, offices, markets, colonies for amusement, education and are providing relaxation to the mind and reduce the depression. An aquarium enthusiast can easily become overwhelmed by the endless variety of fish, invertebrates (including corals, anemones, molluscs), plants, and live rock available, and ultimately forget to consider their source and method of collection. Although many species in the hobby have been domesticated and are produced on farms, it is important to remember that many species are also collected from the wild and are not in limitless supply.

Fundamentally the animal is only looking at meeting it is requirement for specific nutrients. The use of a combination of ingredients is therefore necessary to combine ingredients to obtain a mixture that fulfils all the requirements of the animal. One advantage of ornamental fish over farmed fish is the requirement of low amount of feed [Pannevis, M.C. and K.E. Earle, 1994]. The Fish preferably utilize proteins for energy purpose, although conventional energy sources such as carbohydrate and lipids may also to some extent to satisfy their needs [Piper, J. and E. Pfetter, 1980.]. The performance of fish meal as a feed ingredient is quite enormous. It contains high level of protein and appreciable quantity of fats. Traditionally, fish meal is the deficient in one or more essential amino acids and preferred dietary protein source for many farmed fish species and is appreciated for its amino acid balance, vitamin content, palatability and un-identified growth factors. However, increasing cost of fish meal has created an inadequacy of its use as a protein source for fish diets. Therefore, plant proteins and animal proteins are the good alternatives source for fish meal in fish diets.However, few workshave been done on

utilization of silkworm pupae meal as feed ingredient. Solomon, S.G. and I.I. Yusufu, 2005., analysed the silkworm pupae meal for consumption purpose. The alternative raw material is investigated to reduce feed cost and perform the high-quality seed production. Silkworm pupae can be served as an additive in the fish meal. It is a by-product of silk thread factory. It has high protein and lipid value as follows (49.4%-60.9% CP) and lipid (14.2%-30.3% C Fat). Amino acid profile closed to fish meal (55% CP). The fatty acid compositions of lipids of *Bombyx mori* L. are oleic, palmitic, palmitoleic, stearic, linoleic (24.6% of total lipid), lauric, myristic, linolenic (14% of total lipid) and arachidic acids that found in saponifiable fraction of neutral lipids fraction. The unsaturated fatty acids usually constitute in one-third of the total acids. Cholesterol, β-sitosterol and a trace of camp sterol are found to be present in an oily fraction for sterols. The information on mineral and vitamin content of silkworm pupa are limited (Joachim, W.H. and F.P. Pascual, 2000 &Sreekantuswamy, H.S. and K.S. Siddalingaiah, 2006). This study investigates on the growth performance and haematological changes of the red sword tail (*Xiphophorus hellerii*) using *B. mori* pupae meal dietary supplementation.

Material and Methods
Experimental Animal

The experimental animal *Xiphophorus hellerii,* were collected from the local fish farm in Thoothukudi, Tamil Nadu and immediately transported to the Lab in a separate tank with the same water. These fishes were acclimatized to the lab condition for a month. During acclimatization the animals were fed with dried pellets. The water of rearing tank was changed periodically. After that they were transferred to the experimental tanks which are grouped in to two tanks as one set.

Experimental Diet

For the experimental supplementary feed, silkworm pupae meal was added along with chosen ingredients. The pupae were collected from Government sericulture farm at Nannagaram near Tenkasi, Tirunelveli District of Tamil Nadu, India.

After complete drying they were ground and made it to a powder. Then the powder was mixed with chosen ingredients at different levels. The experimental diets were prepared by according to Hardy, R (1980) method. Diets were formulated by including SWP meal at 0, 20%, 30% 40%,50% and 60% and designated diets as F1, F2, F3, F4,F5 and F6, respectively.

Growth parameters such as weight gain, Feed Conversion Ratio (FCR), Specific Growth Rate (SGR), Gross Conversion Efficiency (GCE), Feeding Rate (FR), Growth Rate, Weight of fish and Feed intake were calculated as follows.

Weight gain = Final body weight − Initial body weight

$$FCR = \frac{\text{Total dry weight of food consumed (g)}}{\text{Total wet weight gain (g)}}$$

$$SGR = \frac{\text{Final wet weight − Initial wet weight}}{\text{No.of days (t)}} \times 100$$

$$GCE = \frac{\text{Growth in terms of dry weight gain (production)}}{\text{Total dry weight of food consumed}}$$

$$FR = \frac{\text{Feed consumed}}{\text{Initial weight of fish X No of days}}$$

Results and Discussion

The proximate composition of silkworm pupae meal is shown in Table 1. The crude protein, fat, moisture, glycogen, chitin and ashes were found as 41%, 30%, 6.8%, 5.05%, and 3.97%, 5% respectively.

Table 1 Proximate Composition of *Bombyx Mori* Pupae Meal

Components	Amount (%)
Protein	41%
Fat	30%
Moisture	6.8%
Glycogen	5.05%
Chitin	3.97%
Ashes	5%

Table 2 Growth Performance and Food Utilization Efficiency of
Xiphophorus Hellerii **fed the Experimental Diets**

Rearing periods (Days)	F1 (0%)	F 2 (20%)	F 3 (30%)	F 4 (40%)	F 5 (50%)	F6 (60%)
	Wet weight of fish (g)					
0	18.83± 0.44	18.83± 0.44	18.83±0.44	18.83±0.44	18.83±0.44	18.83±2.44
20	21.44± 0.33	23.84 ± 0.04.	25.71±0.49	29.45±0.47	20.6 ± 0.47	14.6 ± 0.47
40	33.26± 0.41	35.11 ± 0.49	37.26±0.28	42.00±0.94	32.36± 0.36	22± 0.41
	Weight gain (g)					
20	3.60± 0.76	5.01± 0.48	7.87 ±0.72	11.61±0.23	2.76 ± 0.6	4.97± 2.05
40	12.43 ± 0.51	12.28± 0.58	12.42±0.25	13.39±0.49	12.53±0..23	8.09± 3.23
	Feed intake (g dry matter)					
20	12.19±0.021	13.45± .032	13.48±.045	13.29±.045	10.90± .087	4.85± 1.34
40	16.10 0.010	17.54±0.029	17.60±.054	18.71±.058	10.82±.065	6.90± 0.07
	Feeding rate(mg g-1 live fish day-1)					
20	18.13 ± 5.98	19.77 ±1.63	21.12±2.20	22.16±2.38	17.56 ±2.43	15.54±5.07
40	21.17±2.40	23.91±2.10	26.55±2.90	29.11±4.01	21.98±4.07	18 ± 1.87
	Growth rate					
20	4.55± .028	6.55 ± 0.67	8.21± 1.12	9.90 ± 1.34	4.89 ±1.79	3.23±0..23
40	5.95 ± 0.69	7.17 ±1.87	9.90 ± 1.55	11.05±1.65	4.21 ± 2.88	3.23±0..23
	Gross Conversion Efficiency (%)					
20	18.78±2.17	27.65±3.03	34.65±3.43	39.38±2.78	19.33±9.85	10±1.87
40	29.97 ± 3.19	35.65± 2.56	39.60±2.83	50.64±8.87	28.61±10.81	15± 0.032
	Specific Growth Rate(% day-1)					
20	18.37± 5.07	34.44± 3.25	44.8±4.85	65.77±1.54	17. ±1.18	15± 2.38
40	21.76±1.72	38.94±1.96	47.08±0.86	67.64±1.63	11.77± 0.78	10± 2.87
	Feed Conversion Ratio					
20	5.87± 0.65	4.92 ± 0.62	3.01 ± 0.78	2.28 ±0.94	6.87± 0.307	7 ± 8.87
40	6.03 ± 1.76	5.90 ± 2.87	5.01 ± 3.77	2.76 ± 0.13	5.59± 0.363	7.3 ± 2.83

Each value is the mean (± SD) of three estimations.

The present experimentation the efficiency silkworm pupae meal 20%, 30% 40%, 50% and 60% as fish fed had been evaluated using ornamental fish *Xiphophorus hellerii*as the experimental species. During the feeding trial the fishes accepted different levels of experimental diets (0% 20%, 30% 40%, 50% & 60%). The results have shown that final wet weight of fish, weight gain, specific growth rate and feed conversion ratio of *Xiphophorus hellerii,* were affected significantly (P<0.01) and feed intake, feeding rate, growth rate, cross conversion efficiency were affected significantly (P<0.05). The highest significant values of wet weight of fish, weight gain, feed intake, feeding rate, growth rate and cross conversion efficiency were obtained with the fish maintained at 40% of experimental diets. Specific growth rate (SGR) improved with increasing the

inclusion rate of silkworm pupae meal in the diet (Table 2). The significant improvements (P<0.01) in SGR were achieved in 40% of experimental diets. The least FCR value was recorded in 60% of diets. However, the lowest values were recorded in fish maintained with 50% &60% of diets.

Results of the present work indicate the growth performance of *Xiphophorus hellerii*significantly increased when fed with different levels of silkworm pupae meal incorporated diet. The final body weight, FCR, SGR, FR and GCE of *Xiphophorus hellerii* improved significantly with increasing silkworm pupae meal fed diet up to 40%. Increasing silkworm pupae meal level beyond 50%& 60 % had no significant effects on growth. These results are in agreement with those obtained by Nandeesh*et al.* [1990] who found that exploitation of 30% silkworm

pupae meal supplementation increases growth rate in common carp. Similarly Begun *et al.* found that significantly better specific growth rate, FCR and PER in rohu fed with 50% silkworm pupae diet compared with fishmeal diet. Similarly, Hossain *et al.* (1993) stated the, Silkworm pupae meal could be used as a substitute for fish meal at up to 75% of protein in Asian Stinging catfish (*Heteropneustes fossilis*) diets without adverse effect on growth. Similarly, the comparison between silkworm pupae meal and plant leaf meals (Alfalfa and mulberry) FCE, nutrient digestibility and nutrient retention were better for diets based on silkworm meal than for diets based on plant leaf meals reported by Swamy, H.V.V. and K.V. Devaraj, 1994. According to Venkatesh *et al.* (1986) found thatthe diet containing silkworm pupae enhances the growth of cat fish when compared to meat meal and groundnut oilcake. And also, Olaniyi and Babasanmi (2013) suggested that, the 100% silkworm pupae meal (*Anapheinfracta*) diet enhances better growth performance in African cat fish.

In conclusion, the present experiment showed that the silkworm pupae meal could be utilized in *Xiphophorus hellerii*diets up to 30% instead of the dietary ingredient without any adverse effects on fish growth performance and feed utilization. And supplementation of silkworm pupae meal not only enhanced the growth on *Xiphophorus hellerii* but also reduces the cost of feed formulation.

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CHARACTERIZATION OF PROBIOTIC BACTERIA FROM RAW MILK AND TREATED AGAINST GASTROINTESTINAL PATHOGENS

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Abstract

Two Probiotic bacteria was isolate from Raw milk and analysed their antimicrobial activity against with gastrointestinal pathogens like P. fluorescence, E.coli , K. pneumoniae , S. flexneri. The current study determined the antibacterial activity of probiotic lactobacilli isolates. A probiotic lactobacilli product which contains (Lactobacillus acidophilus and Lactobacillus Plantarum) strains were tested for their antibacterial activity against P. fluorescence, E. coli, K. pneumonia S.flexnerifollowing disk diffusion method. The cell-free supernatant of Lactobacilli strains isolated in the present study exhibited very remarkable and noticeable antimicrobial activity against pathogenic bacteria.

Keywords: Probiotic bacteria, gastrointestinal pathogen, antimicrobial activity

Introduction

Probiotics mean live microorganisms that have beneficial effects on their host's health. Although probiotic strains can be isolated from many sources, isolation of probiotics from cow milk is the significant one because of their beneficial effects on the health of neonates. The presence of beneficial lactic acid bacteria as found in human breast milk for considering cow milk as a source. Probiotics are live microorganisms that are similar to beneficial microorganisms found in the human gut. They are also called "friendly bacteria" or "beneficial bacteria" probiotics were available to consumers mainly in the form of dietary supplements and foods. They can be used as complementary and alternative medicines (Wells et al 2007).

Probiotics are known to produce antimicrobial compounds volatile, fatty acid and hydrogen peroxide was produced by probiotics that may provide inhibitory effect against the pathogenic organisms. Lactic acid bacteria are a group of gram-positive bacteria united by constellation of morphological, metabolic, physiological characteristics (coeuret et al 2003). They produce lactic acid either through homofermentative or heterofermentative pathway and are wide spread in nature and also found in human digestive system. Lactobacilli were considered especially as beneficial bacteria because they have their ability to break down proteins, carbohydrates and fats in food and help in absorption of necessary elements and nutrients such as minerals, aminoacids, vitamins are required for the survival of humans and other animals. Lactic acid bacteria exert a strong antagonistic activity against many food-contaminating microorganisms as a result of the production of organic acids, hydrogen peroxide, diacetyl, inhibitory enzymes and bacteriocins (Piard and Desmazeaud, 1991).

Probiotics are available in foods and dietary supplements (for example, capsules, tablets, powders) and in some other forms as well. The example of foods containing probiotics are yoghurt fermented and unfermented milk, some juice and soy beverages. In probiotics food supplements, many bacteria present originally are added during preparation.

In order to assess the properties of probiotics, the food and agriculture organization and world health organization (AO/WO) suggested that the following guidelines be used.

Probiotics Should Be

i) Be able to survive passage through the digestive tract.
ii) Be able to proliferate in the gut.

iii) Be gram positive organism and are include primarily two genera Lactobacillus and Bifido bacterium.

iv) Its specific health benefits are measured defined tests.

v) Have defined dosage regimen and duration of use.

According to ouwenant and coworkers 2012 the probiotics have been suggested to have the following functions and properties.

I. Adherence to the host epithelial tissue.

II. Acid resistance and bile tolerance.

III. Elmination of pathogens or reduction in pathogenic adherence.

IV. Production of acids, H_2O_2 bacteriocin antagonistic to pathogen growth.

V. Safety non-pathogenic, non-carcinogenic.

VI. Improvement of intestinal micro flora.

The reported health benefits of probiotics include boosting of immune system inhibition of the growth of pathogenic organisms. Prevention from diarrhea, from various causes, prevention of cancer, reduction of the inflammatory bowel movements improvement of digestion of protein and fats, synthesis of vitamins and detoxifications and production from toxic (Ragavan et al., 2011).

Some of the health benefits of probiotics are regression of tumour reducing in carcinogen or co-carginogen, reduction in serum cholesterol concentration, decreased duration of diarrhea and increased resistence to infectious diseases. It can be used therapeutically. To modulate immunity, lower cholesterol, treat rheumatid arthritis, prevent cancer, improve lactose intolerance and prevent or reduce the effects of atopic dermatitis, crohn's diseases, diarrhea, constipation, candidiasis, urinary tract infection and GIT (Beena et al., 2002).

Probiotics can be able to delivering enzyme and other substances into the intestine helps to control intestinal flora. They have anti oxidative and also used as biological preservative also. In case of gastro intestinal disorders, they include conditions where mucosal layers are harmed by antibiotic or radio therapy, acute diarrhea of bacterial or vital origin and prevention of gut colonization by pathogen. They can be used against vaginal infection also.

Most probiotics microorganisms belong to Lactic Acid Bacteria (LAB), such as Lactobacillus sp, Bifido bacterium sp and Enterococcus sp (Klein et al., 1998). The yeast Saccharomyces boulardi has been studied extensively (Elmer et al., 1999) and also other bacterial species like Bacillus sp (Senesi et al., 2001) because of safety aspects with regard to transfer of genes conferring antibiotic resistance (Lund and Edlund 2001).

During the recent years, there has been great concern about the possibility been great concern about the possibility of spreading the antibiotic resist of spreading the antibiotic resistance in the environment. Since LAB are present in the GI tract in large emergence of resistant to certain antibiotics could benefit the host organism. Literature data pointed out that some LAB, the predominant microbiota in fermented dairy and meat products, may serve as reservoirs of antibiotic resistance genes potentially transferable to human pathogens (Mathur & Singh, 2005).

Collection and Enrichment of Samples

The whey samples were collected in a sterile tube from Aavin dairy industry, Madurai. 1ml of whey samples was enriched in 100ml of peptone water, It was then incubated for 24 hrs at 370C.

Isolation of Lactic Acid Bacteria from Enriched Raw Milk Sample

Spread plate technique was used to isolate the organisms. For that 1ml of enriched sample was serially diluted up to 10 dilutions. And spread plated (0.1 ml) into MRS (Mann Rogoso and sharpe) agar plate incubated for 24 hrs at 37 c. After incubation individual bacterial colonies were selected and restreaked on the MRS agar plate to obtain the pure culture of the isolates. The pure cultured strains were maintained in 20% glycerol stock.

Identification and Characterization of Isolated Organisms

Morphological Characterization

Morphological characteristics such as abundance of growth, pigmentation, optical characteristics, size and shape were studied on MRS agar plates.

Gram's Staining

The isolate was smeared on the slide and heat fixed. The crystal violet dye was added, kept for 1min and washed in running tap water, Gram's iodine was added, kept for 1min and washed in running tap water. It was decolourized with ethanol and the counter stained with safranine and washed in running tap water. It was observed in compound microscope. The bacteria that retained the crystal violet stain (appear violet) was designated as gram positive. Those cells that stained with pink colour are called Gram negative.

Spore Staining (Schaeffer-Fultion Method)

The isolate was smeared in the slide and heat fixed. Then the slide was flooded with malachite green and steam heat the slide for 2-3 min. cool the slide and washed in running tap water. It was then added with counter strain safranin and kept for 30 sec. wash the slide with running tap water. Air dries the slide and examined under oil immersion, in microscope. The spores appeared green in colour while the vegetative cells appeared red in colour.

Hanging Drop Method

One loop full of inoculums was kept at the center of the cover slip. The cavity of slide was placed over the coverslip and turned over to prepare a hanging drop. It was viewed under microscope. The motility was determined from the swarming movement of the microorganisms.

Identification and Morphological Characterization of the Bacteria

The predominant bacterial were identified by studying their morphological and bio chemical characteristics based on Bergey's manual of systematic microbiology (1986).

Antimicrobial Activity

The Muller Hinton Agar plates were prepared and then the test pathogens such as E.coli, Pseudomonas sp, Klebsiella sp, Staphylococcussp were swabbed on agar plates. The well was cut with cork borer and partially purified bacteriocin (50μL) was added into the well. The plates were incubated at 37°cfor 48 hrs. The zone formed was compared with standard antibiotic disc.

Result

The present study focused much attention on isolation of probiotic bacteria from raw milk and whey sample from Aavin Industry, Madurai.

Isolation of Bacteria

One ml of (whey sample) raw milk was dissolved in 99 ml of distilled water and the suspension was serially diluted from 10^{-3} to 10^{-9}. An aliquot of 0.1 ml of sample was spread platedon Nutrient agar. The isolates was sub cultured in MRS medium. Theisolates were maintained as pure culture. The plates were incubated at 37°C for 24 hrs.

Morphological Characterization of the Isolates

It was found that the strain 1 was a Gram-positive Rod shaped bacteria. It produced endospores. On nutrient agar plate the strain s1 produced cream coloured, flat. It was motile in nature. Whereas the strain 2 produced yellow colour colonies. The organism was a Gram-positive rod and Non-spore forming bacteria. They are non-motile organisms. The results were depicated in (Table1).

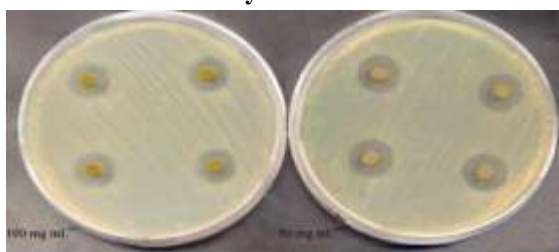**Table I Morphological Characterization of the Isolates**

Morphological and Bio Chemical Characterization	Bacillus subtilis	Lactobacillus *sp.*
Gram staining	Positive Rod	Gram staining
Spore staining	Endospores arepresent	Spore staining
Indole Production Test	Negative	Indole Production Test
Methyl Red Test	Positive	Methyl Red Test

Voges Proskauer Test	Negative	Voges Proskauer Test
Citrate Utilization Test	Negative	Citrate Utilization Test
Triple Sugar Iron Agar Test	Alkaline Slant	Triple Sugar Iron Agar Test
Starch Hydrolysis	Positive	Starch Hydrolysis
Nitrate Reduction Test	Positive	Nitrate Reduction Test
Gelatin Hydrolysis	Positive	Gelatin Hydrolysis

Anti Microbial Activity

Antimicrobial Activity

S. No	Pathogen	Antimicrobial activity	Length in (diameter)
1.	*P. fluorescence*	Amikacin Bacillus subtilis	1.9
			0.6
		Lactobacillus Sp.	0.7
2.	*E. coli*	Amikacin	2.0
		Bacillus subtilis	1.1
		Lactobacillus Sp.	0.7
3.	*K. pneumoniae*	Amikacin	2.0
		Bacillus subtilis	2.0
		Lactobacillus Sp.	0.8
4.	*S. flexneri*	Amikacin	2.2
		Bacillus subtilis	1.5
		Lactobacillus Sp.	0.9

Discussion

Milk samples from cow, goat and buffalo were collected from different areas of Madurai and processed for isolation of LAB. The colonies of LAB from raw milk sample are expected to be little higher than real microflora. This is due to contamination from the animal, especially the exterior of the udder and the adjacent areas; bacteria found in manure, soil and water may enter (Garbutt, 1997). It has been found from the study that the isolated Lactobacilli and yeast strains fulfill the probiotic characterstics and can be used as functional foods for human health.

The application of probiotics as a functional food is gaining momentum with much significance to human health each year. One purpose of using probiotics as a biological product is for prevention of human cancers such as colon cancer (commane et al., 2005; Rafter 2003). Because viable lactobacilli can inhibit food borne and enteric pathogenic micro organisms by producing lactic acid and other anti microbial substances, yoghurt and acidophilus milk have been considered to be healthy probiotic diets (Eschenbach et al., 1989).

In the present investigation, whey sample was collected from aavin dairy industry, Madurai since whey is a rich source of lactose, nitrogenous substances including vitamins and other essential nutrient were found for the growth of certain bacteria. Whey is also rich inlactic acid bacteria. The samples were spread plate on MRS agar medium (selective medium for isolating lactic acidbacteria). The isolated strain was subjected to biochemical tests and it was confirmed to be lactobacillus in accordance with the Bergey's manual of determinative bacteriology.

Before evaluating the isolated lactobacillus as probiotics against selected pathogens, important characteristics of these Lactobacilli were studied. Bacteria must tolerate gastrointestinal stress conditions for their metabolic activity, as well as to colonize in the gastrointestinal tract. Therefore, it is mandatory to evaluate the resistance ability of bacteria to gastrointestinal stress, before their use as probiotics.

Evaluation of probiotic of Lactobacillus was carried out by stimulating the environment in the Gastrointestinal Tract (GIT): subjecting the isolates to acidic pH, exposure to bile salt etc. The typical transit time of food in the stomach is approximately 20 minutes to 3 hours. Among other factors, stomach acidity varies from person to person naturally and whether an individual has fasted prior to ingestion or not (Bacha et al., 2002). High acidity in the stomach and the high concentration of bile components in the proximal intestine were the major host factors that a

probiotic strain should tolerate to express probiotic effect on the host.

The present experiment indicated that organic acid production was increased with the incubation time. On the other hand, the pH of the media decreased with the increasing acid production. Highest acidity (0.067) and the lowest pH (4.7) was observed after 72 h incubation at 37^0C for probiotic Lactobacillus sp. The speed of acidification was slow for the Lactobacillus sp.

The isolated lactobacillus sp., was screened in skim milk agar medium supplemented with CaCO3 for its acid production. A clear zone was found around the isolate which confirms the production of acid which was similar to the work of (Kaizu 1993), reported that isolated organism isolated were on the basis of acid production and those zone forming organisms were then identified and characterized for his further studies.

pH is an important factor which can dramatically affect the bacterial growth. In our experimental design it was observed for the growth of the isolated Lactobacillus sp.in various pH values ranges from 2.5 to 9.0. The reason for choosing this pH range was to determine wheather Lactobacillus species can grow in acidic and alkaline conditions and also to predict the optimum pH value for good growth. From the experimental results, it was found that the isolated Lactobacillus sp, from whey sample was able to survive in extreme acidic pH (pH 2.5 to 3.5) and basic pH (pH 7.5 to 8.5). Maximum growth (OD= 2.20) of isolated Lactobacilli was observed at an acidic pH of 5. This findings coincides with the findings of (Hammes et al., 1995). In which he observed maximum growth (OD= 2.054) of isolated lactobacilli from Bogra yoghurts was observed at pH 5.0 and for Lactobacilli isolated from Khulna yoghurt maximum growth (OD= 1.93) was observed at pH 6.5. NaCl is an inhibitory substance which may inhibit the growth of certain types of bacteria. The current result showed that Lactobacillus sp, was able to tolerate upto 6.5 % of NaCl and good growth was observed at 3 % and 4 % of NaCl. The findings of Hoque et al, 2010 showed the Lactobacillus sp. Isolated from yoghurts was able to tolerate 1-9 % of NaCl and good growth was observed at 1 % NaCl.

The experimental results also have the similarities with the findings of Elezete and Carlos (2005), in case of Lactobacilli isolated from gastrointestinal tract of swine that were tolerate to 4-8 % NaCl. Resistance to bile salt of the isolates could be attributed to their ability to produce bile hydrolase. Bile Salt Hydrolase (BSH) protects the cells that produce it from the toxicity of conjugated bile salts by deconjugating the bile acids (Walker et al., 1993). In the present investigation the efficacy of the Lactobacillus sp was tested against the different concentration of oxbile. But the isolate found to tolerate upto 1 % concentration of oxbile. This results revealed that this probiotic bacteria survived even in the gastric juice of stomach. The results of resistance to bile salt was supported by the findings of Ashraf et al., (2009), where in he reported that the viable number of lactobacillus sp decreased significantly at 1.0 % of bile salt.

Maragkoudakis et al (2006) reported that potential probiotic LAB strains isolated from dairy products could inhibit the growth of H. pylori, E.coli and S. typhimurium. Some of these pathogens was found associated with causing cancers, such as H.pyloriwith gastric and colon cancer (Shmuely et al, 2001) or E.coli with colon cancer (Travaglione et al., 2008). Antimicrobial activity of lactobacillus strains testedagainst bacterial pathogens emerges to be multi factorial and to include the production of hydrogen peroxide, lactic acid, bacteriocin like molecules and unknown heat stable, non lactic acid molecules (Servin,2004). Lactobacilli produce antibiotic like proteins bacteriocins which may help to restrict the growth of some intestinal pathogens. Bacteriocins have been reported to be inhibitory against several other bacteria (Ogunbanwo et al., 2003; Flythe et al., 2004; Moghaddam et al., 2006; Ogunshe et al., 2007). Besides, in present study also highlight the production of bacteriocin from Lactobacillus sp. MRS medium was seemed to be more suitable for the bacteriocin production. The obtained bacteriocin from Lactobacillus were tested for antibacterial activity against E.coli, Klebsiella pneumonia, S.flexneri and P.flurescence whereas the least

inhibitory effect was observed in Klebsiella pneumonia. Our results are in total conformity with the work of Nivedhana Sharma and Nega gautham (2008) where in he emphasized the role of antibacterial activity of bacteriocin isolated from Bacillus mycoides (whey sample). The bacteriocin produced by them showed strong activity against food borne pathogens Listeria monocytogenes and Leuconostocmesenteroides. Todorov and Dicks in 2004 suggested that bacteriocin production strongly dependent on pH, nutrients source and temperature. Maximum bacteriocin activity was noted at Ph 6.0, temperature 30^0C and 1.5 % NaCl (Ogunshe et al., 2007).

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GROWTH, YIELD AND SDS-PAGE ANALYSIS IN GROUNDNUT WITH SPECIAL REFERRENCE TO GAMMA IRRADIATION

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Abstract

Growth Yield analysis in groundnut leaf.In recent times efforts are being made to improve the productivity of bambara groundnut. Studies were initiated (i) to characterise and evaluate landraces and to select superior ones for irradiation, (ii) to induce genetic variation through gamma irradiation and (iii) to use biotechnological approaches to shorten the generation cycle. The results of the study indicated that gamma irradiation induced higher genetic variation of up to four times within the varieties used in the study compared to the unirradiated control. Bambara groundnut yield could be increased through selection for number of pods per plant. Using the in vitro plus in vivo system and embryo axis explants, over four generations per year were obtained compared to 1 or 2 in the field. All the plants were morphologically normal and fertile. The shorter duration, high efficiency and genotype independency makes this system well suited for wider biotechnological applications in bambara groundnut. This novel approach is being applied to the variants/ mutants obtained from gamma irradiation

Keywords: Gamma irradiation; growth, yield, SDS-PAGE analysis

Introduction

Groundnut, (*Arachis hypogaea* L.) also known as peanut or earthnut is a native to a region in eastern South America (Weiss, 1983). Groundnut is now grown worldwide in the tropical and temperate zones primarily as an oil seed crop (Bansal etal., 1993). The fat content in groundnut has been largely studied. In general, groundnuts contain 50-55% fat of which approximately 30% is linoleic acid and 45% is oleic acid. High-oleic groundnuts rather than normal groundnuts have increased self life and thus improve the oxidative stability of peanut products (Isleib et al., 2006). Groundnut seed contain 44-56% oil and 22-30% protein on a dry seed basis and is a rich so urce of minerals (phosphorus, calcium, magnesium and potassium) and vitamins (E and B group) (Savage and Keenan, 1994).

Growing this energy rich crop under energy starved conditions, mainly under rain-fed (85 % un-irrigated), vagaries of weather conditions and in low fertility light-textured soils are the main reasons for low yield in these regions. Also the groundnut, being drought tolerant in nature, suffers from the nutrient deficiencies resulting in low yield and this is probably the reason why researchers and agriculturists are not able to break the barrier of the stagnated yield of groundnut.

The groundnut (Arachis hypogaea L.) is an important food legume of tropical and subtropical areas and rank 13th among the principal economic crops of the world. It can be grown in different agro-climatic regions between latitudes 40°S and 40°N where rainfall during the growing season exceeds 500 mm. Though it is being cultivated on about 24 m ha of land, on large scale it is mainly grown in India, China, USA, Senegal, Indonesia, Nigeria, Brazil and Argentina. In India, the Groundnut is grown in about 8 m ha area producing 10.3 m t (1998- 99) and is the most important oilseeds crop of the country. Although India ranks first in area of groundnut, its productivity is much less than U.S.A., China and many other countries.

Scientific Classification of Groundnut

Common Name : Groundnut or Peanut
Botanical Name : Arachis hypogaea L.
Kingdom : Plantae
Class : Dicotyledonae
Sub Class : Polypetalae
Order : Rosales
Family : Fabaceae

Genus   : Arachis
Species   : A. hypogaea L.

Materials and Methods
Seed Material
Mature, Healthy and uniform seeds of groundnut variety JL-24 was obtained from Tamil Nadu Agricultural University, Coimbatore and used as an experimental material to carryout the mutagenic studies using gamma rays

Gamma Irradiation
The seeds were irradiated at six different dose levels such as 100Gy, 200Gy, 300Gy, 400Gy, 500Gy, and 600Gy.These doses were delivered from a 3500 curie CO^{60} gamma cell installed at a National Research Centre for Banana, QHJJ+QC2, Somarasempettai-Thogaimalai Road, Thayanur, Tamil Nadu 620102, India. The gamma source was stationery and its irradiations were done at a dose rate of 3200 Rads/min by moving down a cylindrical gasket carrying the seeds.

The experiment was laid out in randomized block design, with six treatments with control and three replications. The 150 seeds of each of the six treatments were sown in the field immediately after irradiation at the rate of 20 progeny rows/treatment with proper randomization. Data on qualitative and quantitative characters of M_1 generation were gathered from 25 plants/treatment. The seeds of M_1 generation were collected and M_2 generation is being raised for further selection.

Results and Discussion
The seeds treated with different doses of gamma rays had varying effects on the growth, physiological and bio-chemical aspects of the seedlings. The percentage of germination, root length, hypocotyls length, protein content, carbohydrate content, amino acid content, Ribo nucleic acid content, chlorophyll content and 2 amylase activity were changing depending on the doses of irradiation. Observations made with regard to aboveare reported below.

In our present investigation, SDS-PAGE analysis was carried out in control and DES treated groundnut plants of M_1 generation. The number of bands on intensity and Rf value showed several differences. Like this type of research work. SDS-PAGE analysis is a common method for leaf proteins.

Electrophoretic studies on seed proteins were carried out in blackgram by kole et al., 2002, in Brassica, Turi et al., 2010, in several legumes by Rajan et al., 2012.In this part of research work, proteins were analysed in DES derived from M_1 population of groundnut. The distribution pattern of proteinswere highly influenced by chemical mutagen. This type of research work was almost absent in crop plants based on available literature.

Like that of present research work(Muniyappan and Palanivel, 2017) Studied the protein banding pattern in various in vitro culture of groundnut with reference to physical and chemical mutagenic agents.'

M_1 Characteristics to be Studied
The following M_1 Characteristics were studied in the field
1. Percentage of seed germination
2. Plant height
3. Number of branches
4. Days of first flowering
5. Root length
6. Number of lateral roots
7. Number of pods per plant.
8. Weight of the 100 seeds.

Table 1

S. No	Dosage	Germination percentage	Survival percentage	Plant height	Number of branches	Number of leaves	Number of pods
1.	Control	97.5	92	30.6±13.72	9.6±4.30	32.4±14.52	37.6±0.16
2.	100Gy	88.41	88	25.84±11.58	8.6± 3.85	31±13.90	33.8±15.15
3.	200Gy	80.21	80	29.12±13.05	7.8±3.49	26±11.65	28.4±12.75
4.	300Gy	74.51	74	27.12±12.16	6.2±2.78	24.2±10.85	26.4±11.83

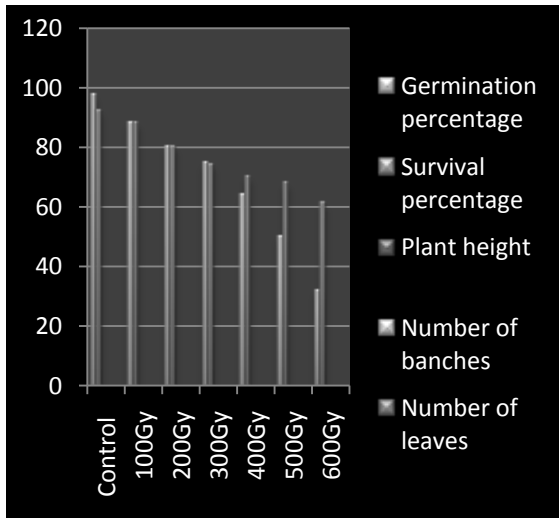| 5. | 400Gy | 64.12 | 70 | 25.26±11.32 | 6.2±2.78 | 21.2±9.50 | 23.8±10.67 |
| 6. | 500Gy | 50.10 | 68 | 24.32±10.90 | 5.6±2.51 | 19.8±7.98 | 25±11.21 |
| 7. | 600Gy | 32.00 | 61 | 18.4±8.25 | 3.8±1.70 | 17±7.6 | 19.6±8.78 |

Figure 1 Effect of Gamma rays on M_1 Growth Parameters of Groundnut *(ArachishyPogaeaL.)*

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ANALYSIS OF BACTERIAL DECOLOURATION FROM PAPER EFFLUENTS BY *BACILLUS LICHENIFORMIS*

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Abstract

Two native bacteria having high potential of degrading paper mill effluent were isolated from the soil mixed with paper mill effluents.They were identify highly degrading bacteria was observe Flask culture by Spectrophotometer. The FTIR studies confirmed that degradation efficiency.

Keywords: *Native bacteria, paper mill effluents, ftir, spectrophotometer.*

Introduction

The paper industry is the largest industry in India. India was one among top ranking paper producing country in the world.Paperindustriescause Drastic effects on the, by discharging a wide variety of wastewater. Depending upon the nature of raw material the wastewater was generated per metric ton of paper produced. Further the consumption of paper is increasing in offices, institutions, schools, colleges, packaging, writing and printing and also for the household. For, every ton of paper produced, these mill generate 220-380 m-^{3} of highly coloured and potentially toxic wastewater (Eriksson and Kolar 1985) To meet this need large quantities of paper are produced

The wastewater generated from production processes of this industry cause accumulation of chemicals such as sodium hydroxide, sodium carbonate, sodium sulfide, bisulfides elemental chlorine or chlorine dioxide, calcium oxide, hydrochloric acid, etc,. (Sumathi and Hung, 2006). The major problems of the effluent water were found with high organic content, dark brown coloration, absorbable organic halide (AOX), toxic pollutants, and Polychlorinated Dibenzo-p-Furans (PCDFS) have been indentified from emission from paper and pulp Industry.

The persistent dark brown or blackcolour in the released paper and pulp industrial effluents was due to dissolved lignin based synthetic, aromatic and chlorinated compounds derived from the blow heat condensate of pulp. These compounds being non-degradable by chemical and conventional biological methods, pose seriousproblems in the removal of colour reported by (Bajbai and Bajbai, 1994). The brown colour of the effluents may increase water temperature and decrease phytosynthesis, both of which may lead to decreased concentration of dissolved oxygen (Kingstad and lindstrom, 1984).

The pollutants discharged from pulp and paper industry affect all aspects of the environment. Presences of toxic pollutants affect aquatic system. The effects of the treated paper industry effluents on irrigated soil, which showed serious changes in soil chemistry.

The pulp and paper mill effluent imparts dark black or brown colour to the water body. The colour is mainly due to lignin and its derivatives released during various stages in the paper-making process. The complex nature of such lignin compounds and their phenolic content make them extremely resistant to biological degradation. Conventional treatment methods such as aerated lagoons and activated sludge process are ineffective in removing colour. The physical and chemical treatment methods including ultra filtration, ion-exchange and lime precipitation are expensive and are also less efficient. Therefore, alternate low-cost biological treatment processes were now being considered as viable obtion. Most of these biological processes were based on lignin–degrading Bacteria and fungi.

Biological methods were often preferred, since it has many advantages like rapid biodegradation rates, low sludge yield and excellent process ability.

Similarly some of the chlorinated compounds randomly synthesized during pulp bleaching were toxic xenobiotics that will persist for longer period in an environment.

Biodegradation

Biodegradation can be defined as the decomposition destruction of contamination molecules by the action of enzymatic machinery of biological system. Degradation of the organic type of contaminates by microbes leads to complete mineralization by releasing carbon dioxide. Biodegradation of organic compounds by soil microbes involves a process known as mineralization whereby microbes convert the organic molecules to carbon dioxide and water. (Cernigila et al 1985).

Process of Biodegradation

The process of biodegradation may be different for different substances but in general, biodegradable substances will be decomposed into carbon dioxide, methane and water as the final products.

The present study emphasizes on screening the decolouration Bacterial strains characterization and identification of these strains and assessments of decolouration potential of each individual strain.

Materials and Method
Sampling

The present investigation was conducts on paper industrial effluents released from T.N.P.L industries of pugalur, Karur (Dt) Tamilnadu. The effluents of these industries are discharge into river Kavery through a main channel. Samples were collected randomly from te main channel and sediment along with the effluent in the ratio of 1:10 (w/v) was collected.The samples were then brought to laboratory for further analysis.

Growth Studies

Growth of bacterial isolates was studied in 250 ml flasks containing 50 ml LB medium with paper mill effluent sample. Flasks were inoculated with 0.5 ml of overnight culture and agitated on a rotary shaker (150 rev/min) at 30^0 C. Growth was monitored as a function of biomass by measuring the absorbance at 600 nm using spectrophotometer (Raja et al., 2009).

Determination of Optimal Growth Conditions

The optimal growth conditions with reference to pH & temperature were determined. The bacterial isolates were grown in LB medium with different pH values (5,6,7 and 8) and incubation was carried out at temperature 4°C, 25°C, 30°C, 37°C and 40°C. The optical density of the log phase growing cultures conditions was noted at 450 nm to determine the growth (Raja et al., 2009)

Decolourisation of PME Using Isolated Bacteria

Among the isolated five bacterial colonies, three colonies BC 2, BC3 and BC 4 were found to have more decolourisation potential and so they were taken for further studies. The decolourisation was enhanced by adding carbon and nitrogen sources such as glucose, sucrose, starch and nitrogen sources viz., ammonium persulphate, sodium nitrate alone and in combination. Paper mill effluent was scanned in a spectrophotometer to ascertain the wavelength of maximum absorbance and it was noticed at 465nm. The rate of decolourisation was monitored at this wave length. For colour determination, the effluent sample was centrifuged at 1000 rpm for 30 min to remove all the suspended matter. The pH of supernatant was adjusted to 7.6 with 2 N NaOH and then used for the measurement of absorbance at 465 nm against distilled water as blank inspector photometer (Dutta et al.,2014) 91 The isolated bacteria were maintained in nutrient agar slants. The bacterial isolate was grown in 250 mL Erlenmeyer flask containing 100mL of Nutrient broth. After 24 hours the isolated culture was added to 250 mL Erlenmeyer flask containing 100 mL effluent with different carbon sources viz., glucose, sucrose, starch and nitrogen sources viz., ammonium persulphate, sodium nitrate either separately or in different combinations. Effluent alone was taken in control. The experimental samples were replicated

twice with control. 5 ml sample was drawn from the inoculated and uninoculated samples and centrifuged at centrifuged at 10,000 rpm for 15 min at 10°C. Then the supernatants were collected to obtain their Optical Density (OD) to be measured at 450nm under visible light in spectrophotometer. Finally, rate of decolourization or colour removal percentage was calculated.

Colour Removal Percentage

The percent colour reduction was measured as per the method of Dutta et al., (2014)

Colour removal (%) =Absorbance of uninoculated broth (A) – Absorbance of residual brothX 100

Degradation Studies by Flask Culture Method

The percentage of decolourationof bacterial strain *Bacilluslicheniformis* was assessed by flask culture method. The flask contains 100ml of effluents of PCP and 1ml of broth culture was added and put into the shaker for 15days. Samples were collected at different time interval for PCP estimation.

Preparation of Sample for Fourier Transform Infra Red Spectrum (FTIR)

Acid washed (0.1N HCl) 2.5 grams of soil samples was taken in a polythene centrifuge bottle and 200ml of 0.5 N NaOH was added. The mixture was shaken for 12 hours on a mechanical shaker and centrifuged at 3000 rpm for 10 minutes. Dark coloured supernatant liquid was filtered and the pH of the solution was adjusted to 1.0 with concentrated HCl. Additional 200 ml of 0.05N NaOH was added to the residual soil, shaken, centrifuged and the supernatant liquid was added to the previous extracts and pH was adjusted to 1.0 with concentrated HCl and humic acid was allowed to settle. The supernatant liquid in the acidified extract containing fulvic was siphoned off. The suspension was transferred to a polyethylene bottle and the humic acid was centrifuged off at 3000 rpm for 10 minutes. Humic acid was redissolved in 0.5N NaOH and reprecipitated with concentrated HCl. This purification was repeated several times.

The supernatant liquid in each case was transferred to the original acid filtrate. The humic acid was washed with distilled water until free of chloride. The humic acid extracted was dried in a rotary evaporator and ground to a fine powder as described by Stevenson et al., (1965).

## Spectroscopic Analysis of Effluent Sample using FTIR

For FT-IR analysis the organic colour compounds from the effluent are separated from waste water through complete evaporation. The potassium bromide (KBr, Fisher scientific IR grade) is oven dried to complete dryness and stored in desiccator until use. The compound–KBr mixture has been prepared by accurately weighing the KBr and organic compound. The mixture was quantitatively transferred to a mortar and ground with a pestle for 20-30 minutes to obtain a homogeneous mixture and a pellet has been prepared again. A pellet of same mass using pure KBr has been prepared similarly for blank reading. Analysis has been made for both the blank and organic compound –KBr pellets using a FTIR Perkinelmer, Spectrophotometer-400.
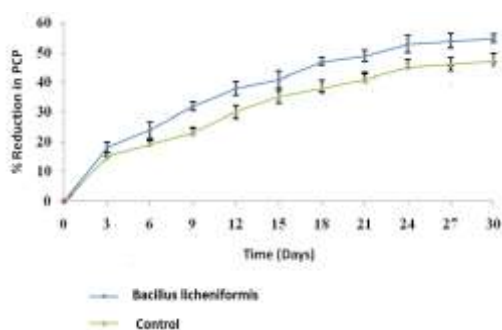
Result and Discussion
FTIR Spectral Analysis of Control Sample
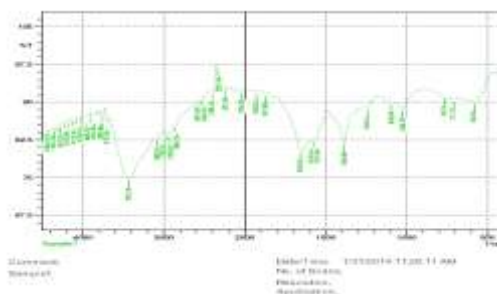
Spectral Analysis of Paper and Pulp Waste Effluents as control and expremental with *Bacillus Licheformis*
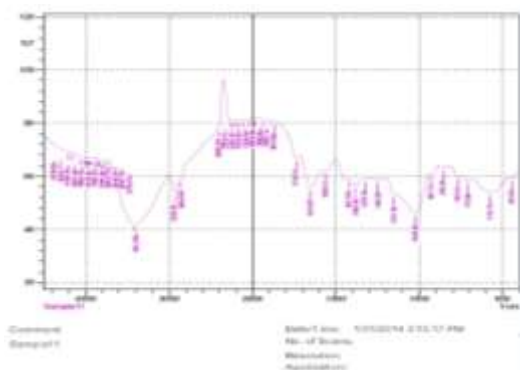
Reduction of PME by *Bacillus Licheniformis*

The bacterial communities were isolated from effluents of paper and pulp industry sediment karur. Four bacterial colonies were isolated from paper industry waste which contains chlorinated phenol. So, there is high probability of getting PCP, degrading bacterial strains. Such as *bacillus licheniformis* biochemical characteristic were confirmed by bergey's manual of bacteriology.

Visible decolourisation was observed in both control and experimental sets but with considerable differences. The spectroscopic measurements of optical density also confirmed this. The decolourisation percentage was significantly higher in experimental sets than that of the control Spectrophotometric analysis of the samples showed that the colour removal percentage was increasing from day to day in both control and experimental samples. 16.23% of decolourisation was noticed on the seventh day in the control. 58.55%, 46.88% and 24.88% of decolourisation were observed on the seventh day in the sample enriched separately with Bacilllus sp., Pseudomonas sp. and Staphylococcus sp. respectively. This clearly showed that decolourisation was only due to the addition of bacteria to the effluent. Decolourisation in control might be due to the presence of many bacteria such as Pseudomonas sp., Bacillus sp., Mycobacterium sp. Proteus sp., Actinobacillus sp. Streptococcus sp., yeast and other fungal species. In Karur, before released into the river, the effluent is mixed with sewage, for a short distance, which gives the microbial load. Significant degradation was mainly due to the addition of autochthonous bacteria to the experimental samples. Higher decolourisation in this study might also be due to the secretion of enzymes by these bacteria in response to the carbon and nitrogen sources added to the effluent. Supplementation of the medium with these resources has been reported to increase the growth of the bacteria and secretion of different enzymes in these bacteria (Amr et al 2009). Less decolourisation in control was due to the presence of lesser number of autochthonous bacteria and absence of carbon and nitrogen resources. A study on enzymes might further prove the degradation potential of these two bacteria.

FTIR analysis was used to examine the quantitative and qualitative changes in the lignin and other carbohydrate components of the untreated (Control-D) and treated (S1, S2, and S3) samples of paper mill effluents. The FTIR spectra of all these samples have been shown in the figures 19, 20, 21 and 22. A wide absorption spectrum between the wavelengths 3326 cm-1 and 2913 cm-1 was observed in the control samples. This was assigned to stretching vibration of aromatic and aliphatic –OH in the lignin (Mousavioun, 2009). The absorption at the same range of wavelength has not been very strong in the treated sample S2 and S1+ S2 and very insignificant in S1. This clearly confirmed the degradation of lignin by bacteria in the treated samples and presence of more undegraded lignin in the control sample. The biodegradation could be associated with the removal of methoxyl groups from aromatic ring in the lignin. The absorption between the wavelengths of 1639 cm-1 and 1503 cm-1 indicated the aromatic skeletal vibration (Sunakar et al., 2012). This could be assigned to C=O antisymmetric stretching vibration of carboxylic groups. Carboxylic acid groups might have arisen from the hydrolysis of ester bonds linking gallotannin groups of carbohydrate moieties (Wersharor and Kennedy, 1998). This might be due

to the breakage of aromatic ring chain in the lignin or reduction of benzene (Lang Liu et al., 2014). The absorption between 1388 cm-1 and 1218 cm-1 could be assigned to the CH deformation and aromatic ring vibrations. The absorption also meant for the presence of non-etherified phenolic OH groups. This could have resulted from the cleavage of ß-O-4 and α-O-4 lingages under alkaline pulping conditions, severe 112 condensation reactions accompanied by the cleavage of ether linkages in phenolic phenyl propane unites (Sunakar et al., 2012). The appearance of the bands in the same range of wavelength showed the existence of guaiacyl and syringyl groups in the lignin. These bands appeared almost flat in S2 sample and small in S1 and S1+ S2. This disappearance of the bands in S2 sample could be attributed to the destruction of guaiacyl and syringyl groups in the lignin by the bacteria as interpreted by Lang Liu et al., (2014). A prominent and very strong absorption peak at 1021 cm-1 was observed in control sample whereas the absorption at this wavelength was very less in the treated samples S1 and S1+ S2 and negligible in S2. The absorption at this wavelength is characteristic of alcohols, carbohydrate and inorganic compounds. This could be attributed to the presence of more undegraded cellulose in control sample as suggested by Suriyanarayan et al (2009). The weak absorption in treated samples showed that there was a significant reduction in the quantity of cellulose. The decrease in cellulose could be attributed to the bacterial degradation.

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PERFORMANCE STUDY OF OTSU'S METHOD FOR MRI IMAGES

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Abstract

In this paper workI propose a brain extraction algorithm (BEA) for T2–weighted magnetic resonance images (MRI) of human head scans. To find the Otsu's threshold first find the histogram of the given T2 images. Calculating the Mean, Weight and Variance of the foreground and background of the images. And then multiplying the weight and variance of foreground also background after that adding all to find where the minimum threshold value is occurs.

Image Thresholding

In Image processing, thresholding is used to split an image into smaller segments, or junks, using at least one color or grayscale value to define their boundary. Thresholdingin practice:

1. Analyze and recognize fingerprints
2. During the process of recovering/ analyzing/ recognizing photographed or scanned letters
3. For mammograms (e.g. boundary detection for mammograms)
4. Real-time adaptive thresholding (e.g. face detection)
5. Neural networks.

Thresholding Process

Thresholding is a non-linear operation that converts a gray-scale image into a binary image where the two levels are assigned to pixels that are below some threshold to zero or above the specified threshold value to one.

If g(x, y) is a threshold version of f (x, y) at some global threshold T.\g is equal to 1 if $f(x, y) \geq T$ and zero otherwise. You can apply a threshold to data directly from the command line, e.g.,myBinaryImage = myGrayImage>threshold Value? 255: 0

Otsu's Thresholding Method

Otsu thresholding is a simple yet effective global automatic thresholding method for binarizing grayscale images such as foregrounds and backgrounds.

The algorithm assumes that the image is composed of two basic classes: Foreground and Background. It then computes an optimal threshold value that minimizes the weighted within class variances of these two classes. It is mathematically proven that minimizing the within class variance is same as maximizing the between class variance.

Advantages and Disadvantages of Otsu's Threshold

Otsu threshold is used in many applications from medical imaging to low level computer vision. It has many advantages and assumptions.

Advantages

- Speed: Because Otsu threshold operates on histograms (which are integer or float arrays of length 256), it's quite fast.
- Ease of coding: Approximately 80 lines of very easy stuff.
- Motivation-Well-thresholded classes would be separated in gray levels
- Simplicity
- Effectiveness
- When the number of pixels in each class are close to each other

Disadvantages

- Assumption of uniform illumination.
- Unimodality of Object Function may fail
- When the object and background pixels are extremely unbalanced
- Histogram should be bimodal (hence the image).

- It doesn't use any object structure or spatial coherence.
- The non-local version assumes uniform statistics.

Since Otsu operates over the histograms, it's very wise to analyze the image histogram and decision of threshold level. Also, Otsu threshold can be extended to a multi-level thresholding which could result in segmentation.

MR Brain Image Segmentation

Segmentation of the brain structure from Magnetic Resonance Imaging (MRI) has received paramount importance as MRI distinguishes itself from other modalities and MRI can be applied in the volumetric analysis of brain tissues such as multiple sclerosis, schizophrenia, epilepsy, Parkinson's disease, Alzheimer's disease, cerebral atrophy, etc. MR brain image segmentationis one of the current extraction techniques. There are several methods to extract the brain.

Stepsfor Finding Otsu's Thresholding

To perform the thresholding I followed these steps:

- Step 1: Read the image
- Step 2: Reshape the 2 dimensional grayscale images to 1 dimensional.
- Step 3: Find the histogram of the image using 'hist' function
- Step 4: Initialize a matrix with values from 0 to 255
- Step 5: To avoid many for loops I used only 1 for loop and a function to calculate the weight, mean and variance.
- Step 6: Find the weight, mean and the variance for the foreground and background
- Step 7: After calculating the weights and the variance, the final computation is stored in the array 'result'.
- Step 8: Calculate weight of foreground* variance of foreground + weight of background* variance of background.
- Step 9: Find the minimum value.
- Step 10: Now convert the image to binary

with the calculated threshold value.

Original Image
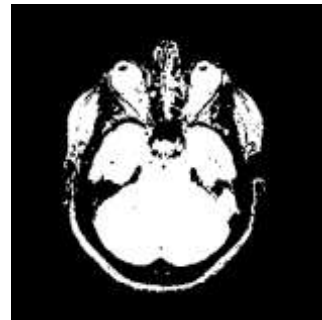
Otsu's Thresholded Image

Algorithm to Find the Otsu's Threshold

```
functionotsusthresh
global H Index;
B=imread('test1.bmp');
imshow('test1.bmp');
V=reshape(B,[],1);
G=hist(V,0:255);
H=reshape(G,[],1);
Ind=0:255;
Index=reshape(Ind,[],1);
result=zeros(size([1 256]));
fori=0:255
    [wbk,varbk]=calculate(1,i);
    [wfg,varfg]=calculate(i+1,255);
result(i+1)=(wbk*varbk)+(wfg*varfg);
end
%Find the minimum value in the array.
 [threshold_value,val]=min(result);
tval=(val-1)/256;
bin_im=im2bw(B,tval);
figure,imshow(bin_im);title('otsus');
function [weight,var]=calculate(m,n)
```

```
%Weight Calculation
weight=sum(H(m:n))/sum(H);
%Mean Calculation
value=H(m:n).*Index(m:n);
total=sum(value);
mean=total/sum(H(m:n));
if(isnan(mean)==1)
mean=0;
end
%Variance calculation.
    value2=(Index(m:n)-mean).^2;
numer=sum(value2.*H(m:n));
var=numer/sum(H(m:n));
if(isnan(var)==1)
var=0;
end
end
end
```

Results and Discussions

Performance Analysis of Otsu's Threshold

We have used 2 volumes of T2 weighted axial dataset collected from Whole Brain Atlas (WBA) maintained by Department of Radiology and Neurology at Brigham and women's hospital, Harward Medical school, Boston, USA.

The Threshold is to separate the foreground and background.To find the Otsu's thresholding for the T2-weighed image first Read the image and Reshape the 2 dimensional grayscale images to 1 dimensional. After that find the histogram of the image using 'hist' function, ThenInitialize a matrix with values from 0 to 255.To avoids many for loops I used only 1 for loop and a function to calculate the weight, mean and variance. Separately find the weight, mean and the variance for the foreground and background.

After calculating the weights and the variance, the final computation is stored in the array 'result'. Calculate weight of foreground* variance of foreground + weight of background* variance of background. Find the minimum value of the result computed. Now convert the image to binary with the calculated threshold value.

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EXPLORING THE APPLICATION OF IOT IN COVID

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Abstract
The COVID pandemic provided a much-needed sanity trying out for IoT-stimulated frameworks and solutions.Virtual technologies play the important position to assist the social, expert and monetary activities when human beings are compelled to live locked-down in their houses.Its characterized with the useful resource of more than one competing problems that seem to war with every special which includes defensive lives versus preserving livelihoods. However, this trouble can doubtlessly be addressed through extra creativity and innovation .the usage of robots related to IoT to help early prognosis is an outstanding use of these gadgets because of the truth they could assist medical examiners by processing patients remedies without the interaction of humans, the self-maintaining robotic can help combat in all COVID stages. Moreover, it elaborateson the challenges and possibilities for IoT framework solutions in the immediately put upCOVIDtechnology.The principle contribution of this evaluation paper is the in-intensity evaluation and categorization of sector-clever IoTgeneration that have the ability to be superb applications in the new normal. IoT programs in each determined on vicinity are rated for his or her capacity monetary and social effect, timeline for mass version, and era Readiness[1]degree (TRL). This paper surveys the function of IoT based technology in COVID and reviews the trendy architectures, systems, packages, additives, which includes early analysis, quarantine time, and after healing.

Introduction

The IoT packages are increasing the location of the healthcare area which has been modernizing at a short pace over time by means of utilizing a brand-new era in sporting out scientific activities with elevated accuracy. The net of factors (IoT) gadgets were very methodical in making this possible. Now Telemedicine and interactive treatment are to accompany sufferers who're at domestic or who cannot adventure to the hospital. Some of the technologies we coach inside the enterprise four. Monitoring an affected man or woman's temperature has been the primary and fundamental step in understanding if he/she has been affected. Wearable IoT gadgets like smart watches can provide vital statistics approximately the affected person's coronary[2] heart price, blood sugar degree, blood oxygen level, and so forth. This Proper air glide of spaces used by many humans has usually been an undertaking. Buildings regularly have excessively polluted air, with carbon monoxide, asbestos dust, lines of pesticides, and extraordinary natural compounds. But likely in no way has there been a lot communicate of the need to ventilate homes as there may be now, as it's far an essential safety diploma to prevent from COVID Smart robots can be used, for example, to supply substances and food (as is already the case in a few hospitals) or to dispense medicines and stocks (as is the case in a few pharmacies). But they are no longer the simplest with us in sickness. Some corporations are the use of drones to make safe domestic deliveries. Tele-remedy refers to the system of accumulating statistics approximately sufferers from a far off vicinity without requiring their physical presence within the hospital.
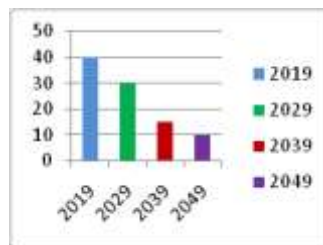
Due to the necessary social distancing and lock down being carried out all over, telemedicine has come to be the extra manner of looking for scientific help. Telemedicine is also positioned to be price-effective as it receives rid of the charge of the journey and will boom the affected individual's engagement. The incubation period of Covid-19 ranges from 1 to 14 days. But it is also possible that an asymptomatic character also can transmit the virus to distinct human beings. In this regard, IoT

gadgets had been very beneficial. Since the records' transaction a few of the scientific physician and the affected character takes place over the cloud, critical steps must be taken in defence of private facts.

Functions of IOT inCOVID

The world has been struggling with the pandemic caused by the severe respiratory syndrome corona virus 2 by striving to control spread of the virus and develop a vaccine. The most effort to find treatment or control the spread the COVID There is demand for global monitoring of patients with symptomatic and asymptomatic COVIDinfection. As the number of cases started rising and death tolls increasing, technologies like Artificial Intelligence and the Internet of Things have become valuable tools during these difficult times While the concept and the utility of Artificial Intelligence or AI are popular, IoT is a relatively lesser-known concept. Because of the COVID pandemic, the modification and deployment of IoT devices to support the healthcare sector has advanced rapidly COVID. Broke out and it's highly infectious nature was discovered and healthcare professionals all around the world face the challenge of treating the diseased with minimal contact.

This pandemic advanced the modification and deployment of IoT devices to support the healthcare sector.

1. Track Quarantine
2. Pre-screening or Diagnosis
3. Cleaning and Disinfecting
4. Innovative uses of Drones

IoT is vital for maintaining the COVID vaccine in manufacturing and shipping and tracking after the vaccine has been administered Thee fitness care enterprise understood the benefits of IoT gadgets long before the pandemic. These technologies had proved themselves in companies across many sectors before COVID examined their effectiveness.

Architecture of IOT in COVID

IoT structure this is universally agreed upon, simplest and broadly widespread format is the 3-layer architecture. It changed into first added while the earliest research into the Internet of Things was being carried out. It proposes three layers: Perception, Network, and Application.

Perception

This is the bodily layer of the structure. This is in which the sensors and linked gadgets come into play as they gather diverse quantities of facts as in line with the want of the assignment. These can be the brink devices, sensors, and actuators[3]that engage with their surroundings. Network The data it is accumulated by all of those devices desires to be transmitted and processed. That's the network layer's task. It connects those gadgets to other clever objects, servers, and community devices. It additionally handles the transmission of all the data.

Application

The utility layer is what the consumer interacts with. It's what's answerable for turning in application unique offerings to the person. This may be a smart domestic implementation, as an instance, in which customers tap a button in the app to turn on an espresso maker.
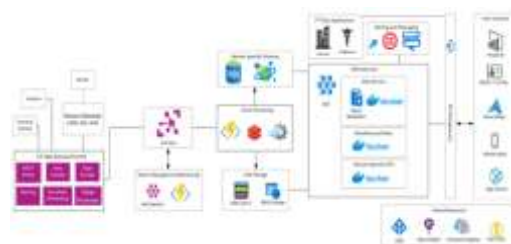

Figure 1 Architecture for IOT platform

IoT Applications and Description

Application	Description
Thermal cameras	Provide temperature and visual data through various network protocols like Bluetooth and WiFito the Internet of Things (IoT) Edge gateway.
IoT Edge gateway	Pre processthedata and can respond quickly using onboard resources.
Cloud and IOT hub communication	Controls the IoT Edge network, and streams data to Azure resources.
Azure Stream Analytics	Process data and send it to

and Azure Data bricks	database and blob storage services.
Micro services apps	Trigger alerting and messaging services like email and bots.

Desperate spatial and IOT statistics assets are to be had for tracking and analysing for COVID. Spread. A cloud-native structure (a container-based surroundings) turned into designed and developed to enable distribute, scalable, and bendy control and get entry to of the IOT data stores. Building a cloud-local architecture with open spatial standards permits interoperability and scalability. The proposed IoT architecture is geographically scalable and considers spatial indexing technology. This scalable IoT statistics cloud architecture changed into designed in a way that turned into dispensed, load balanced, and without an unmarried factor of failure. Hibernates[4], a container orchestration framework, and AWS Managed Services had been used as the building blocks. To get real time insights into facts streams and prepare them for analytics, we designed a few enrichment functionalities the usage of of the Lambda feature that blanketed, vicinity, semantics, metadata, collection approach, or contextual facts.

Components of IOT inCOVID

The framework consists of five important components: Symptom Data Collection and Uploading (using wearable sensors), Quarantine/Isolation Center, Data Analysis Center (that uses machine getting to know algorithms), Health Physicians, and Cloud Infrastructure. Wearable sensors have diagnostic, as well as monitoring programs. Their modern-day competencies encompass physiological and biochemical sensing. It is tough to overstate the importance of the issues that those technologies would possibly assist remedy. Physiological monitoring ought to help in both prognosis and ongoing treatment of a substantial wide variety of people with neurological, cardiovascular and pulmonary diseases along with seizures, hypertension, dysthymias, and asthma. Home based totally motion sensing would possibly assist in falls prevention and assist maximize an individual's independence and network participation.

Quarantine refers back to the separation of human beings who have been uncovered to an infectious infection from the ones who have now not. This is normally completed out of caution because individuals who are quarantined have no longer exhibited signs of sickness. Testing for the sickness is done at some stage in a quarantine.

Data Mining together with device mastering has also been helpful combating with the Corona virus Here is something you ought to recognize. According to the cutting-edge update from a dependable source, with Corona virus turning into a worldwide public fitness emergency, the chaos has outgrown major emergencies. Unlike SARS, the scientists this time have a better genome[5], sequencing, predictive analysis, and gadget gaining knowledge of analysis equipment which are supporting them understand in addition to monitor the outbreak.

Mapping tools are being used to tune down the spread of the disease for the past several years. This information mining method displays the information for deaths in conjunction with the confirmed cases of corona virus. Even after regulations ease up, the call for cloud sources will possibly remain in place due to a brand-new appreciation for remote access to gear, services, and packages. Governments must make the most of those budget via overhauling legacy networks, and offer employees with the latest networking functions so faraway access is always an available option.

Ventilators are a important piece of device for patients suffering from COVID.It is predicted that about 5% of all patients with COVID will require a ventilator to guide their breathing even as recovering from extreme lung disorder. It is crucial for health care centers to have a sufficient wide variety of ventilators because access to such gadget at once affect the number of deaths related to the disorder in an ICU. The mechanical ventilator aid the affected person's respiration by using supplying fantastic strain to the lungs.

This Figure shows the main components of a mechanical ventilator which are mainly the power source, control, monitors, safety features and auxiliary components.

Conclusion

IoT generation all through the COVID pandemic has tested its usefulness in assisting sufferers, healthcare carriers, and authorities. All clinical devices are related to the internet, and in the course of any crucial scenario, it routinely conveys a message to the scientific group of workers. Infected cases can be handled correctly in a remote region with well-linked tele-devices. It handles all cases neatly to provide in the long run strengthened provider to the patient and healthcare. We've reviewed the position of IoT in healthcare and to cope with continual diseases in addition to all through pandemic illness or any herbal catastrophe. IoT-enabled/related gadgets/programs are applied to lower the possible unfold of COVID to others by using early prognosis, tracking sufferers, and practicing defined protocols after patient restoration. Although IoT-based generation has the capability to change the manner we live postCOVID, it calls for further research and validation earlier than mass version and deployment of the era, as mentioned inside thepaper.This assessment summarized the important thing application domains for IoT, their predicted socio-financial impact, the timeline for deployment, and TRL. Furthermore, this evaluates elaborated on the demanding situations for application domains with unique recognition on privacy and safety implications. In addition, this take a look at discussed requirements and emerging code of practices for IoT-based packages.

Keywords

1. Readiness - the state of being ready or prepared.
2. Coronary - *an extremely dangerous medical condition in which the flow of blood to the*
a. *heart is blocked by a* blood clot
3. Actuators- a device that causes a machine or other device to operate.
4. Hibernates-*to spend the winter sleeping*
5. Genome - One complete haploid set of chromosomes of an organism.

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EMPOWERING MULTI-CLIENT COMPUTATIONAL REASONING WITH COOPERATIVE BLOCKS PROGRAMMING IN MIT APPLICATION CREATOR

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Abstract

Cooperation turns out to be progressively significant in programming as undertakings become more mind boggling. With customary text-based programming dialects, software engineers ordinarily utilize a source code the executives framework to deal with the code, combine code from various editors, and alternatively lock documents for struggle free altering. There is a restricted corpus of work around cooperative altering of code in visual programming dialects, for example, block-based programming. We propose an expansion to MIT Application Designer, an electronic visual stage for building Android applications with blocks, which will empower numerous software engineers to team up progressively on MIT Application Creator projects. We take the place that constant coordinated effort inside MIT Application Designer will support understudies in a gathering climate to collaborate with each other in manners that assist them with working on each other's getting it and practice of computational reasoning practices that may not be accomplished in the conventional one client one undertaking worldview that is at present given [1].

Introduction

Cloud-based cooperative advances, for example, Google Docs have turned into a focal piece of how groups cooperate to team up continuously on every possible kind of happy. While constant coordinated effort for programming has been investigated in research settings, a commonplace altering design in programming improvement includes engineers working independently and afterward blending their progressions through a source code the board framework, like Disruption or Git. These arrangements function admirably for text based programming dialects. Be that as it may, little work has been finished investigating continuous cooperative procedures for visual programming dialects, including blocks-based dialects including Scratch (Maloney, Resnick, Rusk, Silerman, and Eastmond, 2010) and MIT Application Innovator (Wolber, Abelson, Spertus, and Looney, 2011). The rest of this paper will zero in on the difficulties and potential advantages of constant joint effort as they relate explicitly to the MIT Application Designer programming [2].

MIT Application Creator is an online stage for building cell phone applications focusing on Android. It gives two editors to building an application: a creator where clients intuitive parts, like buttons, to spread out the UI of an application, and the blocks manager where program rationale is given utilizing a riddle block-like language in light of Google's Blockly. MIT Application Creator clients require a Google record to identify themselves to the help and undertakings are attached to these records. While it is feasible to perform bunch cooperation in MIT Application Designer given its ongoing execution, this is normally achieved by understudy bunches making a common Google record and compromising command over who is altering utilizing the single account. We propose a cooperative programming climate inside the MIT Application Creator programming that will empower various clients to participate in computational reasoning in a continuous cooperative way. Segment 2 depicts the connected work in computational reasoning and cooperative programming. Segment 3 outlines our plan and execution of the cooperative climate. Segment 4 presents a conversation that how this framework can assist clients with participating in computational reasoning.

Related Work

Brennan & Resnick (2012) gauge computational thinkingwith respect to three categories: computational concepts, computational practices, and computational perspectives. They defined "Connecting" as one of the computational perspectives, which involves programming with other sand programming for others. By collaboration, programmers are able to accomplish more than what they could have on their own[3]. With text-based programming languages, programmers usually collaborate with a version control system, such as Git.Guzzi, Bacchelli, Riche, and VanDeursen (2015) presented an improved IDE with support of version control system to help programmers to resolve conflictsand detect problems introduced by others' code. Otherthan version control system, Goldman, Little, & Miller(2011) demonstrated a real-time collaborative web-based editor for the Java programming language[4].

Collaboration in blocks-based programming languages has typically been done via remixing, such as in the Scratch language (Maloney et al., 2010) and MIT App Inventor (Wolber et al., 2011) [5]. In remixing, a developer publishes an application publicly and others use it as a starting point for an ewapplication.This remixing behavior makes it eratedevelopment between two developers more difficult because the project, rather than some subset, is the basis for remixing.

Greenberg & Gutwin (2016) [6] highlight key challenges in enabling awareness in collaborative environments. We leverage their findings by codifying awareness information via the locking mechanism sproposedin Section3. These locking mechanisms allow users to direct awareness of their peers by synchronizing access to the environment on a per-user basis. Gross (2013) provides a more in-depth review of awareness research[6].

Design and Execution

Our joint effort framework is basically intended for bunch course activities of 2-4 understudies in center school, secondary school, or school. The framework will fulfill the accompanying highlights:

1. Users are distinguished by their email address and offer tasks with others by email address. The client who makes the task can transform others' entrance level of the venture. The entrance level incorporates read, in which clients can see the task, and compose, in which clients can both view and alter the undertaking.

2. Users can realize who is at present dealing with the undertaking, and the parts or blocks that every individual is as of now chipping away at.

3. User can see others' progressions all the while. There are a few cases in MIT Application Creator:

    a. When clients work on various screens, their progressions won't be displayed until exchanging screens.

    b. When clients work on a similar screen, and they work on similar proofreader, they can see the others' change promptly on the manager.

    c. When two clients work on a similar screen, and one deals with the creator manager, and different chips away at the blocks proofreader, the one on the blocks supervisor can see new blocks when the one on the planner manager adds another part. At the point when the one on the planner proof reader eliminates a part, the other will see blocks connected with that part vanish.
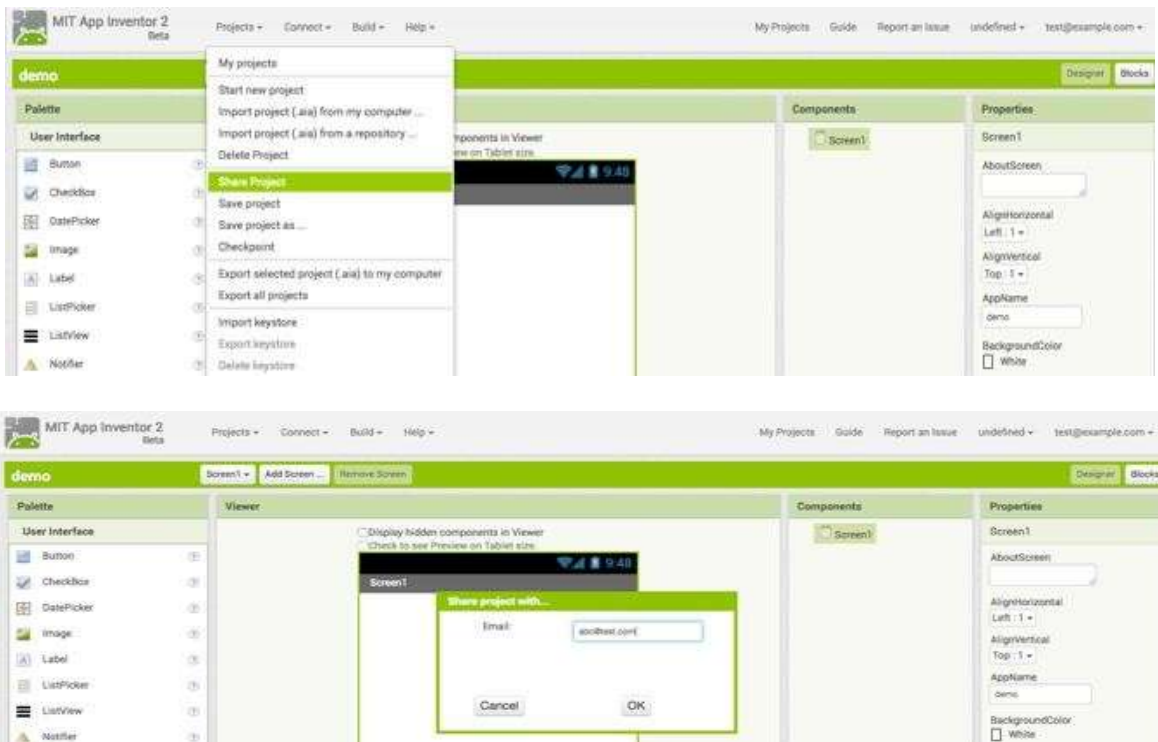
Figure 1.Share project by enter in guser's email address

User Interface Design

A client can impart an undertaking to others by giving their email address. Figure 1 shows the UI of sharing an undertaking. When the venture is shared effectively, the other client can track down the task in her undertaking traveler. Clients can realize who has opened the task by the shaded square in the venture title bar. At the point when client floats on the square, it will show the client's email address. The shade of the square demonstrates the client's tone. It is utilized to recognize what part of the program a client is altering.

Figure 2. An example of collaborative block-based programming in MITApp Inventor. This project is shared within four users. The user can see the other three users, A, B and C, on the project title bar. The block that each user is editing is highlighted with the user'scolor.

Collaboration Server

To show others' progressions right away, we use distribute buy in example to send refreshes from one client to other people. Distribute buy in design is an informing design, where shippers can send messages to a channel, and collectors who buy into that channel can get the messages. We chose to construct a NodeJS server for web clients to impart about joint effort, which runs independently from the MIT Application Innovator server, so it is not difficult to be made due. MIT Application Designer clients associate the joint effort server with attachments. We use Redis, an open source library for in-memory information structure store and distribute buy in design, to distribute and buy in refreshes

(Redis Supporters 2017), and all messages will be in JSON design. The client will make an interpretation of changes into JSON reports and send them to the joint effort server over a predefined channel. The server will apply functional changes on JSON archives to ensure changes are distributed every time to every bought in client. Then, at that point, clients make an interpretation of JSON report into occasions that update the code and run the occasions on their singular frameworks. In this way, the duplicates of the code, everything being equal, will ultimately be in distinguishable[8].

Channels

Every MIT Application Designer client is both distributer and supporter in the framework. Clients will buy into three sorts of channels:

1. **User Channel:** The client channel is indicated by the client email address. Every client buys into just a single client channel. At the point when clients share a task, they distribute the venture and client data to others' client channel. In this manner, different clients will be told that a client imparts a task to them, and that venture will show up in their undertaking list.

2. **Project Channel:** Venture channel is indicated by project id. (Every MIT Application Designer project has an id that is interesting to the MIT Application Innovator server.) When a colleague opens an undertaking, he will buy into that task channel.

   This channel is utilized for project-level messages, for example, when different colleagues open or close the venture, or when parts are added, adjusted or eliminated. At the point when a colleague distributes changes to the venture channel, all dynamic teammates on that task will be advised.

3. **Screen Channel:** The screen channel is indicated as blend of the undertaking id and the screen name. This channel is utilized to distribute changes about blocks. Each screen has its arrangement of blocks. Clients buy into this feed when they open the block proofreader of a screen. Subsequent to buying in this channel, all

changes connected with blocks in this screen will be distributed to the channel.

Discussion

The cooperative programming climate inside MIT Application Innovator gives clients another way to deal with instruct and learn. For instance, it empowers "educator understudy" or "coach mentee" jobs inside MIT Application Innovator. Educators can impart the activities to understudies in read-just mode to show thoughts and demos. Understudies can deal with bunch projects after school, since they can team up from a distance. As MIT Application Creator is worked for understudies and beginner software engineers, the cooperative programming climate offers them a chance to foster their collaboration expertise at a beginning phase. Likewise, while creating applications cooperatively, clients can figure out how to determine clashes.

This new coordinated effort component for MIT Application Creator addresses each of the four of the key computational reasoning acts of Brennan and Resnick (2012). Different clients can gradually and iteratively assemble little units either in separation or together relying upon the intricacy of the undertakings and aptitude of the people. Clients can investigate different troubleshooting procedures to help each other in resolving issues in the code. Reuse and remix of code can occur on a lot better time granularity on the request for seconds or minutes. Finally, clients can cooperate to help each other comprehend and take advantage of deliberation and modularization methods inside a program. One test for teaming up with visual programming language is that understanding others' manner of thinking is difficult. With the text-based programming language, software engineers can know others' arrangement by means of remarks. Notwithstanding, it is difficult to put remarks in visual programming climate without upsetting genuine programming rationale. One way we can deal with it is to add a screen for remarks, so clients can flip the remarks screen as the need might arise. One more method for assisting clients with understanding others is adding a correspondence

channel, so clients can trade their thoughts while they are customizing.

Our specialized methodology isn't confined to MIT Application Innovator, as it expands on Google's Blockly. It can consequently be applied to other visual programming dialects, like Scratch. It is not difficult to coordinate attachment and distribute buy in design into the framework.

Conclusions

We introduced a cooperative programming climate inside the MIT Application Creator programming and gave specialized subtleties of an execution of continuous coordinated effort. In future work, we will assess the viability of the cooperation with amateur and master clients of MIT Application Innovator to all the more likely comprehend how understudies utilize the framework to team up.

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A NOVEL SCHEME OF DOUBLE FILTERING SALT & PEPPER NOISE USING CONTRA HARMONIC MEAN FILTER

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Abstract

Noise Filters are used to remove unwanted data in images. In this paper, a novel scheme of double filtering is implemented in the presence of Salt & Pepper noise on a standard Lena gray scale image of size 256×256 pixels. In this scheme, for 10% noise level, first we denoise the noisy image with positive Q values(1 to 5) of Contra Harmonic Mean Filter, followed by negative Q values (-1,-3,-5) of Contra Harmonic mean Filter. It is found that Q=1 followed by Q=-5 performs much better than other combinations of Q in removing salt and pepper noise from the image.

Keywords: Salt and pepper noise, contra harmonic filter, denoising, double filter

Introduction

Noise is any undesired information that contaminates an image. Noise appears in an image from variety of sources. To recover an image from noise, there exist many filtering techniques that are application oriented. The existing mean filtering technique takes one pixel at a time and a sub window is considered around the pixel. The mean is calculated using the pixel values of the sub window [1] . Then the pixel is replaced with the mean value. Using this technique the noise filters work. For removing noises in an image, image filters are used.

Filters are used to increase the brightness and contrast as well as to add a wide variety of special effects to an image.[3] A novel scheme of double filtering is implemented in the presence of 10% of Salt & Pepper noises on a standard Lena gray scale image of size 256×256 pixels, different values of Q are taken.

Noises are random fluctuations or variations in the brightness or color information in images which may be produced while capturing the image. It can be defined as a process which negatively affects the quality of captured image that is being not original image content [5] Noises are random fluctuations or

variations in the brightness or color information in images which may be produced while capturing the image. It can be defined as a process which negatively affects the quality of captured image that is being not original image content [5]

Type of Noise Used

Noises are random fluctuations or variations in the brightness or color information in images which may be produced while capturing the image. It affects the quality of captured image that is not being the original image content.

A. Salt & Pepper Noise

This noise model, also known as spike noise, impulsive noise or fat-tail distributed noise, will possesdark pixels in places of bright pixels and bright pixels in places of dark pixels, which will appears as black and white dots in the image [18, 19]. The sharp and sudden changes of image signal introduces salt and pepper noises, which introduce small corruptions on the imag.

This noise model, also known as spike noise, impulsive noise or fat-tail distributed noise, will possess dark pixels in places of bright pixels and bright pixels in places of dark pixels, which will

appears as black and white dots in the image. The sharp and sudden changes of image signal introduces salt and pepper noises [3], which introduce small corruptions on the image.

Contra Harmonic Mean Filter

An image using this filter is given by the expression

$$f(x,y) = \frac{\sum g(s,t)pow\,(Q+1)}{\sum g(s,t)powQ} \qquad ---(1)$$

where Q is called as the order of the filter. [2] This filter is well suited for reducing the effects of salt and pepper noise. For positive values of Q, the filter eliminates pepper noise. For negative Q values, it eliminates salt noise.

The Proposed Contra Harmonic Mean Filter

In the proposed work, a standard Lena gray scale image of size 256×256 pixels is taken for consideration. 10% of Salt-Pepper noises are added to the image. Proposed Contra Harmonic mean filter with different values of Q is applied to reduce the noise. After applying the filter, an analysis is made to test which values of Q performs better in denoising both Salt-Pepper noises. To produce a good quality denoised image, a novel scheme of double filtering is used which has been proposed by the following algorithm.

A. Algorithm for Double Filtering using +ve q Values Followed by –ve q Values

1. Take a 3×3 sub image from the Salt and Pepper noised Lena image of size 256×256 pixels.
2. For different positive values of Q, add the pixel values of the sub image raised to the power Q+1 divided by sum of pixel values of the sub image raised to the power Q.
3. Replace the center pixel of the sub image with the result.
4. Repeat steps 1 to 3 for rows and columns up to 254×254 pixels.
5. Now, the resultant image is again applied to step2 for different values of Q(-1,-3,-5)
6. This process is repeated for different combinations of positive and negative Q values and for 10% noise level.

The results are shown in Table 1 and the denoised images are shown in Fig1.

Quality Metrics

To measure the image quality, we use Peak Signal to Noise Ratio (PSNR) for the denoised image.

The error in the reconstructed image is computed by calculating the Mean Squared Error (MSE)[2] which is given by:

$$MSE = \frac{1}{mn}\sum(Pi,j - Qi,j) \qquad ---(2)$$

The quality of the gray scale image is measured using PSNR which is given by

$$PSNR = 10\log_{10}(255pow2/MSE) \qquad ---(3)$$

Results and Discussions

In order to assess the performance of double filtering using contra harmonic mean filter, experiments were performed with standard Lena image of size 256×256 pixels. Salt-Pepper noise for noise level 10% is added to the image. Then the proposed contra harmonic mean filter is applied for filtering the noises. Experiments are conducted using MATLAB R2014a. To estimate the proposed filter, quality parameters PSNR and MSE are computed.

For visual comparisons, the denoised images with Q=+ve value followed by Q=-1 for 10% noise are shown in **Fig1**.
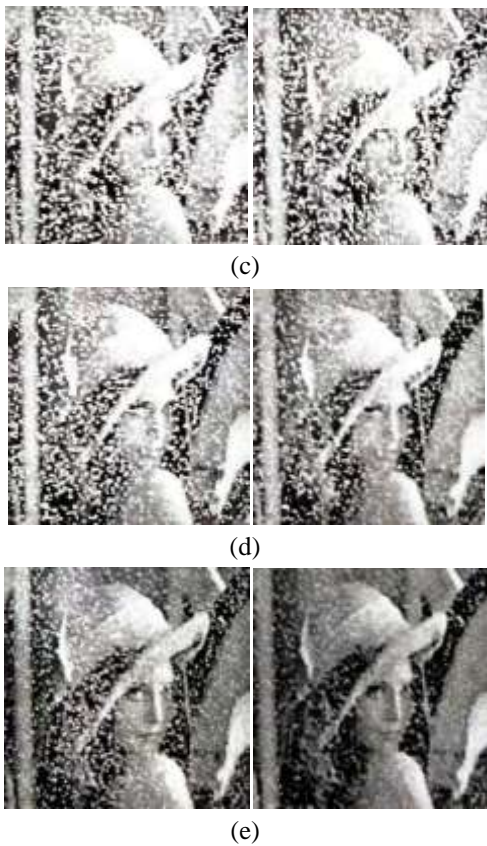

(a)

(b)

(c)

(d)

(e)
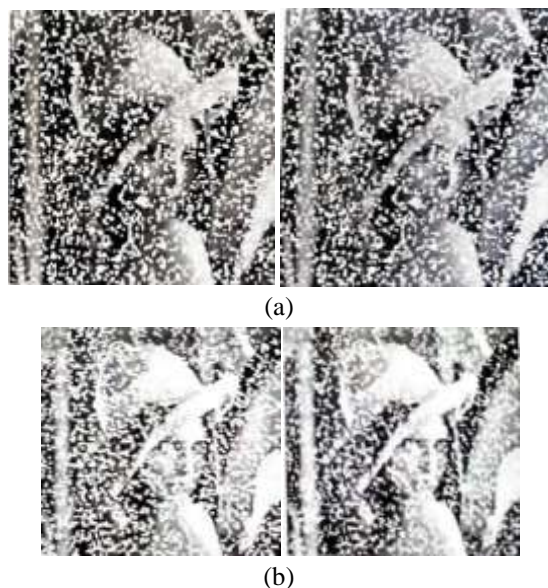
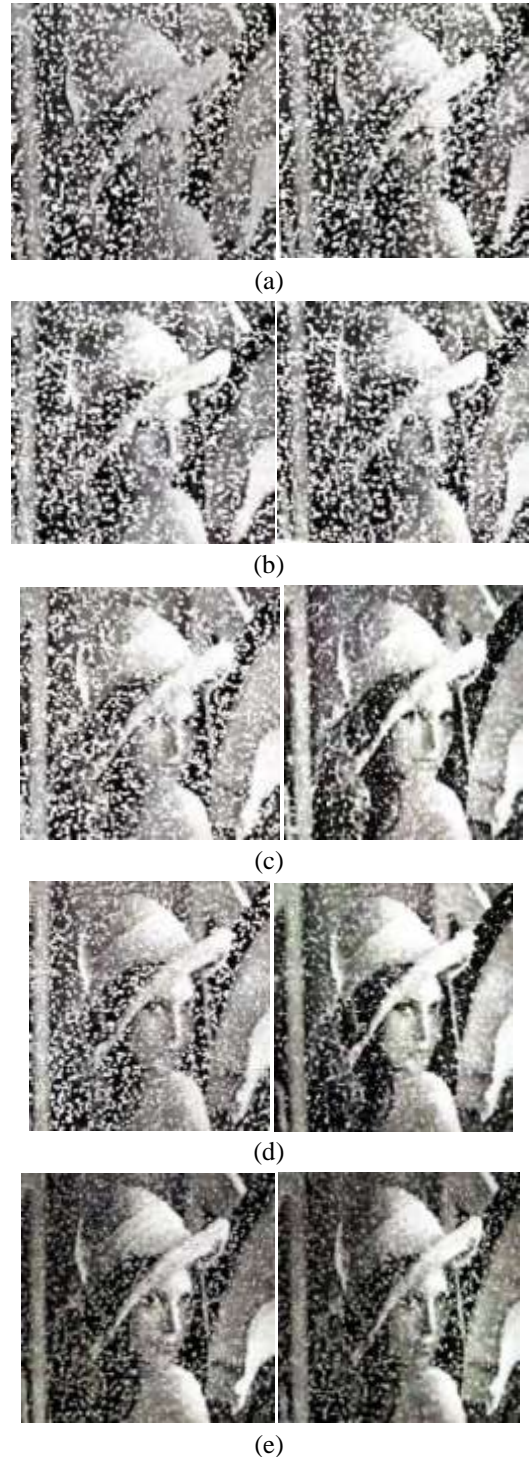**Fig 1: Denoised Lena Images using with Q=+ve value followed by Q=-1 for 10% noise**

a) Q = 5, -1
b) Q = 4, -1
c) Q = 3, -1
d) Q = 2, -1
e) Q = 1, -1

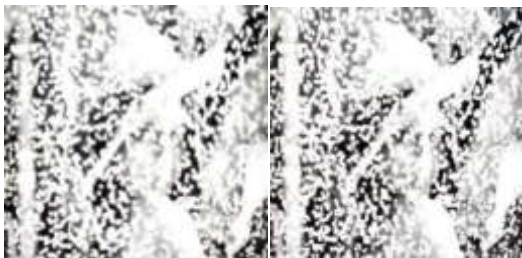**Table 1:** MSE and PSNR values produced by proposed Contra Harmonic Mean Filter with Q = +ve value followed by Q = -1 for **10% noise. Better results are produced by Q=1,-1.**

S. No	Order	MSE	PSNR (Salt)	MSE	PSNR (Pepper)
1	Q=5,-1	0.0386	62.2664	0.0905	58.5625
2	Q=4,-1	0.0352	62.6712	0.0815	59.0181
3	Q=3,-1	0.0285	63.5847	0.0658	59.9474
4	Q=2,-1	0.0186	65.4432	0.0408	62.0201
5	Q=1,-1	0.0089	68.6586	0.0159	66.1075

For visual comparisons, the denoised images with Q=+ve value followed by Q=-3 for 10% noise are shown in **Fig 2**.

(a)

(b)

(c)

(d)

(e)

Fig 2: Denoised Lena Images using with Q=+ve value followed by Q=-3 for 10% noise

a) Q = 5, -3
b) Q = 4, -3
c) Q = 3, -3
d) Q = 2, -3
e) Q = 1, -3

Table 2: MSE and PSNR values produced by proposed Contra Harmonic Mean Filter with Q = +ve value followed by Q = -3 for **10% noise. Better results are produced by Q=1, 3.**

S.No	Order	MSE	PSNR (Salt)	MSE	PSNR (Pepper)
1	Q=5,-3	0.0233	64.4500	0.0903	58.5758
2	Q=4,-3	0.0219	64.7250	0.0824	58.9731
3	Q=3,-3	0.0174	65.7368	0.0653	59.9850
4	Q=2,-3	0.0128	67.0639	0.0430	61.7944
5	Q=1,-3	0.0058	70.4873	0.0154	66.2421

For visual comparisons, the denoised images with Q=+ve value followed by Q=-5 for 10% noise are shown in **Fig 3**.

(a)

(b)

(c)

(d)

(e)

Fig3: Denoised Lena Images using Contra Harmonic Mean Filter

a) Q = 5, -5
b) Q = 4, -5
c) Q = 3, -5
d) Q = 2, -5
e) Q = 1, -5

Table 3: MSE and PSNR values produced by proposed Contra Harmonic Mean Filter with Q = +ve value followed by Q = -5 for **10% noise. Better results are produced by Q=1,-5**

S. No	Order	MSE	PSNR (Salt)	MSE	PSNR (Pepper)
1	Q=5,-5	0.0206	64.9886	0.0917	58.5071
2	Q=4,-5	0.0180	65.5720	0.0806	59.0695
3	Q=3,-5	0.0152	66.3198	0.0653	59.9791
4	Q=2,-5	0.0107	67.8296	0.0432	61.7806
5	Q=1,-5	0.0053	70.8812	0.0162	66.0243

Conclusion & Future Enhancement

This paper proposed a novel scheme of double filtering contra harmonic in the presence of Salt-Pepper noise for noise level 10% to denoise a standard Lena image of size 256×256 pixels. For different values of Q, the performance of proposed filter on the basis of quality parameters PSNR and MSE is analysed. Experimental results reveal that Contra Harmonic Mean Filter for Q =1, -5 performs

well on noise removal when compared to the other values of Q.

In future, this work can be extended for different images of different sizes with varying noise levels and various combinations of Q levels for achieving a good result.

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MULTIDISCIPLINARY RESEARCH ACROSS DATABASE MANAGEMENT SYSTEMS

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Abstract

The new research avenues become evident, for example, in the topics that doctoral students choose for their dissertations. This paper surveys the emerging multidisciplinary research by doctoral students in database systems and related areas. The database community is exploring more and more multidisciplinary avenues: Data semantics overlaps with ontology management; reasoning tasks venture into the domain of artificial intelligence; and data stream management and information retrieval shake hands, e.g., when processing Web click-streams. These new research avenues become evident, for example, in the topics that doctoral students choose for their dissertations. Workshop at the International Conference on Information and Knowledge Management (CIKM). The topics addressed include ontology development, data streams, natural language processing, medical databases, green energy, cloud computing, and exploratory search. In addition to core ideas from the workshop, we list some open research questions in these multidisciplinary areas.

Topics for Survey

We conclude with an application-driven domain, data warehouse management. We shed light on new research proposals in each of these domains, as well as on open issues. Our survey groups the topics of the workshop into six research domains. We start with two core areas of database research, data mining and stream processing. We proceed to the sister domain of database management, Information Retrieval, before venturing into Information Extraction and the relatively new area of Privacy and Trust.

Data Mining

Data mining, the science of discovering meaningful knowledge in data, has always been a core area of database research. Nowadays, with the advent of large semantic knowledge bases, the area faces new challenges, for example with the task of integrating and aligning ontologies. The keynote of our workshop, Leveraging Logical and Statistical Inference in Ontology Alignment [9] by Professor Renée J. Miller from the University of Toronto, gave an overview on the work done in this area. It also presented a new approach, "Integrated Learning In Alignment of Data and Schema" (ILIADS), which combines data matching and logical reasoning to achieve better matching of ontologies. Professor Miller ended her talk with advice for graduate students based on her own experience – both as a

student and as a graduate adviser. Another problem in the area of data mining is frequent subgraph mining. Study this problem with techniques available inside a database management system. Three fundamental research problems under a database approach are discussed: efficient graph storage and indexing, searching for frequent subgraphs and finding subgraph isomorphism using SQL. The solutions toward these problems are outlined, together with the preliminary experimental validation, focusing on query optimizations and time complexity. Research the issue of finding statistical correlations among pairs of attribute values in relational database systems.

By extending the Bayesian network models the authors provide a probabilistic ranking function based on a limited assumption of value independence. Experimental results show that the proposed model improves the retrieval effectiveness on real datasets and has a reasonable query processing time compared to previous related work. Discussions with the speakers at the workshop pointed to open research avenues in the area of data mining in general. One such avenue, inspired by the keynote talk, is investigating the usefulness of data mining in the Semantic Web:

Data can be mined from the Semantic Web (for tasks such as summarization or alignment) as well as for the Semantic Web (with the purpose of

adding new knowledge to an ontology). The interplay of these two directions appears still largely unexplored.

Stream Processing

As more and more data (such as sensor data) becomes available in the form of continuous streams, new avenues of research open up.

for example, address the issue of semantic changes (annotations) in the stream data processing of sensor networks. The propagation of annotations through the workflow, as part of the data processing, raises interesting research questions related to how the propagation depends on the structural and temporal contributions, and on the annotation significance. The work shows its practical viability through a case study from a climate forecasting application that processes temperature sensor data. This paper won the best paper award in the PIKM 2010 workshop.

Another problem in stream processing is the adaptation of the system to different utilizations. Farag et al. [4] propose new algorithms for providing good data stream system performance during periods of peak load and periods of delays. The "External Memory Sliding Window Join" (EM-SWJoin) algorithm utilizes external memory data structures to adapt to the variable data arrival rates while keeping disk access latency at minimum. The "ADaptive Execution of DAta Streams" (ADEDAS) algorithm guarantees ordered release of output results to the user/application while controlling the impact of delays over stream processing. Thus, it addresses the problem of releasing output results in an increasing order of timestamp when the input data items arrive out-of order. The authors exemplify their approach through a system that monitors online stocks.

In some scenarios, several data streams come together. Discuss how different data streams can be coordinated, how storage space can be optimized and how the database state can be kept consistent in a distributed scenario. The main application the authors have in mind is sensor-based experiments, for example based on motion sensors.

This last talk brought up the idea to investigate column-oriented data representations in data stream environments. Such a representation will require stronger coordination (horizontally in addition to vertically), but might potentially improve output efficiency and overall system performance.

Information Retrieval

Recent years have seen an opening up of the border between the database research and information retrieval. Storing data and querying data go hand in hand, and this applies to both structured data and unstructured data. In many scenarios, queries can be classified into "lookup searches" and "exploratory searches". In lookup searches, users "look up" details on topics known to them; in exploratory searchers they "explore" new information. Propose to combine these two concepts. They present a Web-based tool called "Lookup Discover Explore" (LED) that improves lookup search by adding exploration capabilities. LED supports a lookup step, an exploratory step and a meta search process. Given a keyword query, their system can display DBpedia resources with a graph explorer, a ranker and a context analyzer. One of the contributions of their work is a novel approach to browsing by exploiting the Semantic web.

Address the related problem of querying a document collection with short textual queries. Newer systems use relevance feedback from different sources of evidence. In this paper, the authors propose a uniform model for these evidence sources.

One area of Information Retrieval that is gaining more and more attention lately is the exploitation of the deep Web. Proposes to address this challenge in a distributed environment. Given the fact that the deep Web is up to two orders of magnitude larger than the surface Web, they argue that distribution might be the key to scalability. This work proposes to automatically convert free-text queries to structured queries for complex web forms in order to make the deep web more easily searchable. Challenges include developing aformal query description syntax, translating queries with correct interpretation, bridging the gap between user expectations and system capabilities, adapting query description for resource selection, ranking top k resources, merging results from resources to maximize precision, recall and suggestion ranking for users with respect to resources. He aims to evaluate this solution with a prototype system and user studies, criteria being

processing time and user satisfaction. Brought up the idea of studying distributed deep web searches in the context of handheld mobile devices. As mobile devices become practically ubiquitous (and reasonably powerful, too), it might become possible to utilize their capacities for distributed query processing.

Information Extraction

Information extraction, in its widest sense, is the extraction of structured data from unstructured data. One domain where large corpora of unstructured text would particularly benefit from information extraction is the medical domain. They are concerned with extracting information from medical reports. A medical report is a natural language description of diagnoses, treatments or medications, together with structured information about the patient. The goal is to extract a chronology of events from the reports. Such chronologies can then be used to review a patient's history or to gather statistical data about the effectiveness or consequences of medical treatments. The task is challenging, because the reports use medical jargon and colloquial temporal expressions ("two days ago"). The paper conducts two initial case studies: In the first, machine learning on medical reports is used to determine whether patients qualify for Leukemia trials. In the second, a bio-specimen repository is augmented with data from medical reports. This additional data facilitates the classification of tissue probes and also information retrieval on the specimen database.

Discusses the problem of noun phrase classification: Given a noun phrase (such as an image caption) and given a set of classes (such as "Nature" or "City"), the task is to assign a class to the noun phrase. This problem is challenging, because the classes are userdefined and the noun phrases do not necessarily have context. The paper proposes to map the noun phrase to a weighted set of related Wikipedia articles (a "bag of articles", BOA). Likewise, each class is mapped to a BOA. Then, the classification problem is reduced to determining the similarity between the noun phrase BOA and the class BOAs.

This last talk [7] has shown us that the possibilities that Wikipedia offers for information extraction are not yet fully exploited. The first talk [15] has pointed us to an area where Information Extraction (and possibly data mining) could find attractive applications: the medical domain.

Privacy and Trust

As more and more data is being produced, stored and made public, issues such as security, trust and privacy gain more and more attention. Consider for example pervasive health care systems. These are systems that monitor medical indicators on the patient and send their data to a medical center. These systems can greatly increase efficiency and safety, but come with the problem of data security. Address the possible security threats in pervasive health care systems. One particular security loophole is the need to exchange encryption keys. The paper proposes a communication scheme that eliminates the need to broadcast encryption keys. Security and trust are even more obvious issues when it comes to sharing data in cloud computing systems. Driven by this insight, Thorpe [16] develops a trust paradigm for the cloud. The paper considers interactions, reputation, knowledge and experience with respect to the cloud. Concepts such as user trust, cloud trust, cloud trust peer and cloud distrust are defined and an algorithm is proposed for a trust cloud context graph. The algorithm takes all the variables into account that are relevant to the cloud, i.e., machines, storage components and connected nodes. This encourages work on a context neutral autonomous cloud monitor agent. Just as [15], the authors of [1] target the medical domain. We take this as an indication that this domain can attract research from different areas of computer science, including security, privacy, data management, information extraction and systems research.

Workflow and Management

Research in databases can also touch quite practical issues such as the management of data centers. As data centers grow larger and larger and ever more powerful, pragmatic concerns such as heat management and environmental compatibility arise. Pawlish et al. [14], for example, are concerned with the environment-friendly management of data centers. The ultimate aim is to provide the data

center manager with a tool that can help decide management questions, such as whether to buy new hardware and what hardware, in order to minimize the environmental impact of the facility. For this purpose, the paper first explains what data is necessary to support such decisions. These include, e.g., data on energy use, humidity, acoustic levels, and the carbon footprint of the center. For proof of concept, the authors have collected such data for one data center. Then, the paper proposes to build decision trees on top of these data and to use case based reasoning in order to determine economically sensible management steps. The paper outlines this framework supported by some real world examples.

Another issue in data warehousing environments is the problem of consistent data quality. As warehousing environments are often dynamically changing the quality of various resources and also the users' quality requirements, there is a need to capture quality changes on-the-fly and also provide automated quality notifications back to end users. Therefore, Li et al. [8] propose an extended data warehousing systems architecture that incorporates and extends the concepts of the "Quality Factory" (QF) and the "Quality Notification Service" (QNS), and adopts the "Data Warehouse Quality" (DWQ) methodology to provide both subjective and objective quality assessments of the end-users' quality requirements.

Apart from quality, efficiency of processes is also almost always an issue. Naseri et al. [11] are concerned with optimizing workflow management. They propose to systematically store, analyze and mine data about successful workflow executions in order to optimize workflow composition, workflow selection and workflow refinement.

Discussions during the workshop were particularly attracted to the concept of managing data warehouses. This area touches not just several domains of computer science (such as storage, querying, and quality estimation), but also other domains such as economics, the environmental sciences and the legal domain. The talks in this session have raised awareness for the practical impacts of our ever-growing amounts of data, their quality and their storage.

Conclusions

From an application point of view, the work is concerned with cloud computing systems, sensor networks, practical aspects of data warehouse management and Web search. The medical domain with its applications has also attracted particular interest. The new research proposals as well as discussions with the students have illuminated some of the new research avenues in the domain of databases and beyond. This paper presents a short survey of emerging research across database systems and related areas. It focused on the work that doctoral students presented at the PIKM workshop in ACM CIKM 2010. From a research point of view, the work is spread over areas as diverse as information extraction and workflow management, stream processing and security.

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META-LEARNING IN SUPERVISED AND UNSUPERVISED LEARNING AND ITS CHALLENGES

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Abstract

Artificial intelligence (AI) that focuses on building models that can learn how to learn is called meta-learning, commonly referred to as "learning to learn",and has dramatically increased over the recent decade. Meta-learning seeks to enhance the learning algorithm by integrating the knowledge gained through numerous learning tasks, in contrast to traditional methods of AI that solve tasks from scratch using a fixed learning algorithm. This research work gives an idea of how meta-learning is implemented in Supervised and Unsupervised Machine Learning Algorithms and its challenges.

Keywords: *Artificial intelligence, supervised learning, unsupervised learning, meta-learning*

Introduction

The new technique of learning to learn is called Meta-learning. It is a type of Artificial Intelligence. The goal of meta-learning algorithms is to build AI systems that can adapt to new tasks and improve their performance over time, without intensive retraining [1].In most meta-learning techniques, a model is trained on various tasks to learn generalizable knowledge that can be applied to other tasks. In contrast to conventional machine learning, in which a model is typically trained on a single task and then used for just that task, this approach is more general [2].

In terms of the degree of adaptation, meta-learning is different from base learning since it focuses on choosing the appropriate bias dynamically as opposed to base learning, which fixes the bias a priori or using user parameters. When a baselearner (such as a decision tree, neural network, or support vector machine) is applied to some data, it typically results in a hypothesis dependent on the fixed bias built into the learner. Because the quality of the hypothesis typically gets better with more examples, learning happens at the fundamental level [3].

However, regardless of performance, the learner's subsequent applications over the same data always result in the same hypothesis; no information is retrieved across domains or tasks.

Modern machine learning models are often trained from scratch using a fixed learning algorithm created by hand for a specific job. Particularly deep learning-based approaches have achieved tremendous success in a number of disciplines [4-6]. There are, however, definite restrictions. Successes, for instance, have generally been found in fields where enormous amounts of data can be gathered or simulated and enormous computing resources are accessible. This precludes a wide range of applications where data is inherently scarce or expensive or when there aren't enough computational resources [7-9].

Supervised and Unsupervised Meta Learning

Unsupervised learning can interact with meta-learning in a number of different ways, depending on whether it is done in the inner loop or the outer loop and whether it is done during meta-train or meta-test.

The assignments can come from any well-specified family of machine learning problems, such as supervised learning, unsupervised learning, Semi-Supervised learning, reinforcement learning, etc.

Unsupervised Learning of a Supervised Learner

A theory and set of algorithms for unsupervised meta-learning, where the task distributions are chosen by the machine learning algorithms. Unsupervised meta-learning could add a new step to this ladder of abstraction by further reducing the amount of human supervision necessary to complete tasks.

Here, the goal is to learn a supervised learning algorithm without needing many source tasks for meta-training style initial conditions for supervised fine-tuning. To this purpose, the meta-objective for meta-training is defined using synthetic source tasks built without supervision using clustering or class-preserving data augmentation[10].

Supervised Learning of an Unsupervised Learner
The goal of this group of techniques is to meta-train an unsupervised learner. By way of supervised learning challenges in the future, the unsupervised algorithm can be trained to perform well. After reusing the unsupervised representation for a supervised task, modifying depending on unlabeled input, or both, one can train unsupervised learning rules or losses such that downstream supervised learning performance is optimised. In contrast, learning-to-learn of "how-to-cluster" on a number of source tasks might result in superior performance on new clustering tasks in the family when unsupervised tasks like clustering exist in a family rather than in isolation [11].

Since they amortise the cost of training a single inference model, which then performs clustering using a single feed-forward pass, the methods in this group that use feed-forward models are also known as amortised clustering. This is because they perform the typically iterative computation of clustering algorithms. By turning the unsupervised learning problem into one with a distinct supervised (meta) aim, these techniques serve to address the problem's vagueness.

Benefits of Meta-Learning
Machine learning solutions are enhanced by meta-learning techniques. The advantages of meta-learning include

- Improved model prediction efficiency
- Enhancing learning algorithms, such as by finding the best hyper parameters. To enable learning algorithms to adapt to changes in conditions and uncover hints to create better learning algorithms, a meta-learning algorithm performs the optimisation work, which is typically performed by a human.
- Quicker and less expensive training

- Supporting the use of fewer examples when learning accelerates learning processes by eliminating the need for experimentation
- Developing more broad-based models
- Learning to address multiple problems rather than just one: Meta-learning does not prioritise developing a single model on a particular dataset [12,13].

Challenges Faced
Distributions of Diverse and Multi-Modal Tasks
The width of the distribution of tasks pT may affect how tough it is to fit a meta-learner. While learning on various task distributions might test established approaches, many significant meta-learning triumphs have occurred within small task families. Conflicting gradients between tasks could contribute to this [14].

Numerous meta-learning systems implicitly assume that the distribution over tasks pT is uni-modal and that a single learning strategy v offers a good answer for all of them [15].

However, task distributions are frequently multi-modal; for example, in computer vision, medical images may differ from satellite photos or regular images, and in robotics, pegs may fit into holes while doors open. Different learning methodologies may be needed for various activities within the distribution, which is challenging to accomplish with current techniques. This phenomenon is well understood in traditional multi-task learning, as evidenced by techniques like task clustering or subspaces. However, meta-learning is only now delving into this [16].

Conclusion
There has been a sharp increase in interest in the topic of meta-learning. Regarding how it connects to related fields, what it can be used for, and how it can be benchmarked, there has been considerable uncertainty about this. By thoroughly reviewing the topic from a methodological point of view—which we divided into a taxonomy of meta-representation, meta-optimizer, and meta-objective-and from an application point of view, we have attempted to elucidate these concerns in this survey. In addition to highlighting areas for future research, we believe this survey will aid newcomers and practitioners in orienting themselves to grow and capitalise in this expanding subject.

However, meta-learning could differ greatly from learning at the fundamental level. For instance, the issue of choosing the appropriate course of action (i.e., the right bias) in accordance with a certain condition of the world (such as the kind of input-output distribution) could be referred to as meta-learning. With the use of this definition, meta-learning may be compared to different types of reinforcement learning. The definition also identifies the mechanism underlying classifier learning systems.

Whether we think of meta-learning as having the same fundamental structure as base-learning or not, it's still important to combine a learning algorithm's capacity to perform better as the number of examples increases with that algorithm's capacity to perform better as the number of tasks increases.

Learning processes are formulas for transforming datasets into approximators of functions. The optimisation of learning processes to complete a distribution of tasks allows for the tuning of the learning processes' various knobs. Since it can be difficult to manually create these task distributions, current research implies that the learning method can use unlabeled data to recommend its own tasks for knob optimisation.

These unsupervised meta-learning algorithms considerably enhance the capacity of machine learning techniques by enabling learning in previously unworkable regimes. It would be extremely beneficial for the field of meta-learning to conduct research on how learning algorithms can enhance their performance over time to accomplish this goal.

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UNLOCKING THE POTENTIAL OF LUNG CANCER RESEARCH WITH AVAILABLE DATASET: A COMPREHENSIVE GUIDE

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Abstract

Computer Aided Diagnosis (CAD) can be used efficiently for early detection of Lung Cancer. To detect and diagnose lung nodule in the early stage, Computed Tomography (CT) is used as the standard medical imaging modality because it improves the survival rate of the patient Computer Aided Detection (CADe) and Computer Aided Diagnosis (CADx), are procedures in medical information that assist doctors in the interpretation of medical images. Computer Tomography (CT) has been considered as the most sensitive imaging technique for early detection of lung cancer. This work seeks to identify and map the vulnerabilities in the present lung cancer treatment approaches by investigation, analysis, and study. The proposed task will assist in finding, downloading, and analyzing lung cancer datasets that are currently available. The knowledge gained from this study about convolution neural networks for lung cancer identification and classification aids in the creation of a practical model.

Keywords: Computer-aided diagnosis, Lung nodule,Computer Aided Detection (CADe) and Computer Aided Diagnosis (CADx).

Introduction

The lung cancer is considered as the notable cancer because it claims more than a million deaths every year. This lead to the requirement of lung nodule detection in chest Computer Tomography (CT) images [1] in advance. Thus the Computer Aided Diagnosis (CAD) [2, 3] system is very essential for early detection of lung cancer. A physician's recommendation is often a patient's best course of action. Typically, a treatment plan includes surgery, chemotherapy, and radiation [5].

In general, two types of lung cancer exist, and these types are as follows [4–7]:
1. Non-small cell lung cancer (NSCLC) is the most common variant, which grows and spreads slowly;
2. Small cell lung cancer (SCLC) is caused by smoking and spreads faster than NSCLC.

Adenocarcinoma, large cell carcinoma (LCC), and squamous cell carcinoma (SCC) are identified as the sub types of NSCLC [8–13]. At the same time, small cell carcinoma and combined small cell carcinoma is classified as the sub types of SCLC. Figure1 depicts types of lung cancer. In this research, NSCLC is considered and studied.
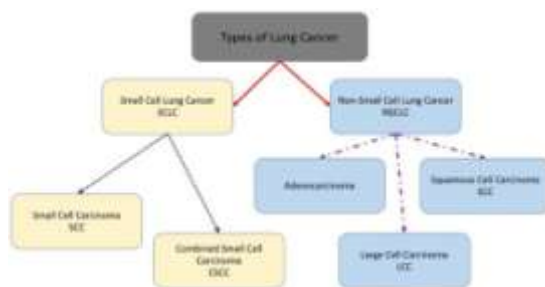
Figure 1 Types of lung cancer

In a recently published paper on lung cancer detection, the authors utilized circles inside the lungs to detect cancer. The circles were indicators of cancerous lungs. Herein, these circles are identified and classified using the proposed system. The CADe system comprises image acquisition, preprocessing (like noise removal, artifacts removal such as labels and marks),

enhancement (for better view of image for easier interpretation), segmentation denotes the identification of focal areas from CT image. The CADx system acquires the knowledge form CADe and identify whether the lung nodules are malignant or benign. Figure 2a, b shows the layout of a CADx and CADe system [14].

Process CADxsytem

Original Image

CAD

Region of interest (ROI)

CADx

Diagnosis Result

Fig 2a: CADxsytem

Process CADesytem

IMAGE ACQUISITION

PREPROCESSING

SEGMENTATION

DETECTION

CAD
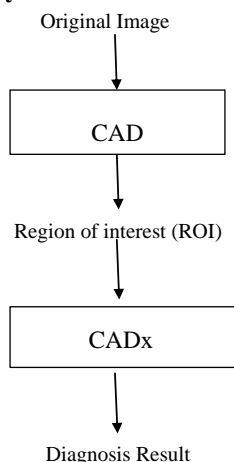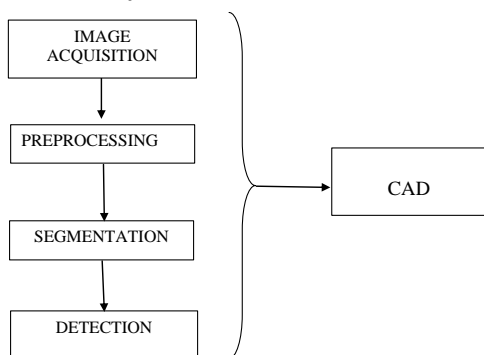
Fig 2b: CADe system

Stages of NSCLC (Non-small-cell lung cancer)

- **Occult stage:** Cancer cells can be picked up in the mucus you cough up. Your tumor can't be seen on imaging scans or a biopsy. It's also called hidden cancer.
- **Stage 0:** Your tumor is very small. Cancer cells haven't spread into your deeper lung tissues or outside your lungs.

- **Stage I:** Cancer is in your lung tissues but not your lymph nodes.

  With early intervention, stage I lung cancer can be highly curable. Usually, your doctor will want to remove the cancer with surgery. You also may need chemo or radiation therapy if traces of cancer remain or are likely to stay.

- **Stage II:** The disease may have spread to your lymph nodes near your lungs.

  Stage II lung cancer is considered an early-stage form of the lung disease and may be curable through surgery or a combination of treatments like chemotherapy and radiation.

- **Stage III:** It has spread further into your lymph nodes and the middle of your chest.

  There is no cure for stage 3 lung cancers, but treatment can often help prolong life and relieve symptoms. In some cases, a person with stage 3 lung cancer may survive another 5 years or longer.

- **Stage IV:** Cancer has spread widely around your body. It may have spread to your brain, bones, or liver.

  Stage 4 cancer is not always terminal. It is usually advanced and requires more aggressive treatment. Terminal cancer refers to cancer that is not curable and eventually results in death. Some may refer to it as end stage cancer. Atezolizumab is approved to treat some people with non-small cell lung cancer after surgery. An immune checkpoint inhibitor is a drug that blocks proteins on immune system cells which then allows them to fight cancer. Several immune checkpoint inhibitors have recently been approved for advanced lung cancer.

  There are two significant reasons why lung cancer screening methods are not used more regularly. One of the issues is accessibility, as the capacity of radiology may not be able to keep up with demand [15]. Another major problem is over diagnosis, which is frequently associated to false positive cases given the need for thorough and effective training for the healthcare professionals evaluating the images [16]. The findings of earlier research [17, 18] that the benign incidence for a diagnostic procedure after nodule discovery can

reach 40% highlight the importance of thorough nodule surveillance prior to any persistent treatments to decrease post - operative risk and prevent unnecessary complexity or destruction of pulmonary function. For the purpose of identifying lung cancer, the ideal CAD would replicate all three stages of a radiologist's examination of a chest CT. Finding an irregularity in the 3D image set that point to the existence among one or perhaps more Regions Of Interest (ROI) is the first stage. An Finding an irregularity in the 3D image set that points to the existence among one or perhaps more regions of interest (ROI) is the first stage. An instance of such an irregularity is a nodular opacity of such an irregularity is a nodular opacity.

The features gathered would be utilized to categorize the ROIs based on how likely they are to develop hate, which is frequently done using validated standards [19].Selecting the next step in patient management is based on the outcomes of the previous stage. Finding the voxels of interest in the ROI requires feature extraction, which is a step that CADs typically need to perform.

Preprocessing

The first important step is image pre-processing where several techniques are used to enhance the image quality. 1. There are different techniques like multi-scale enhancement filters of point and line to the volumetric data [21]. The grey level intensity threshold, adjacency examination, labeling & 3D pre-processing adjacency examination in 26 directions can be used [20].

Several nodes which are connected with each other are detected using active contour filter (ACF) [22].The OTSU adaptive threshold techniques [23] are applied to get initial lung mask after that use of 3D flood filling method produces an initial lung lobe mask. The contrast stretching method (normalization) can be used to make the objects clearer [24].
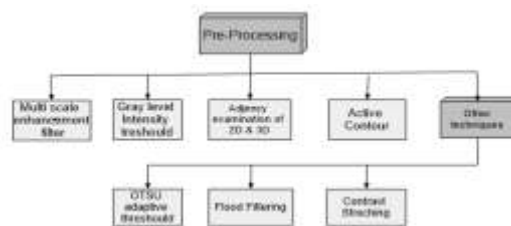
The general scheme of lung nodule detection system

Image Preprocessing

Firstly, in image pre-processing median filter is used on grayscale image of CT scan images. Some noises are embedded on CT Images at the time of image acquisition process which aids in false detection of nodules. Noise may be detected as cancer nodules sometimes. Therefore, these noises have to be removed for accurate detection of cancer. Median filter removes salt and pepper noise from the CT images [25]. After median filter, Gaussian filter is implemented. It smoothes the image and removes speckle noise from image.

The model starts by preprocessing to remove noise, resize the inputs, and convert all inputs intoGray images. Gaborfilters and a discrete wavelet transformation method distinguish lung regions and separate these regions from the original images.
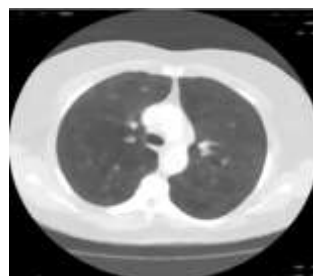
3 Grayscale image
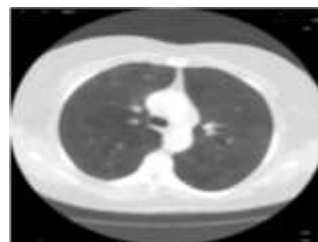
4 Median filtered Image

5 Gaussian filtered Image
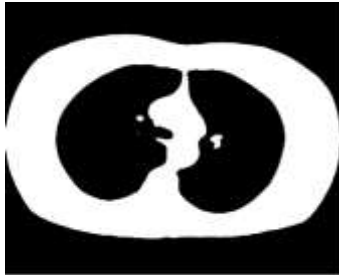
6 Binarized Image
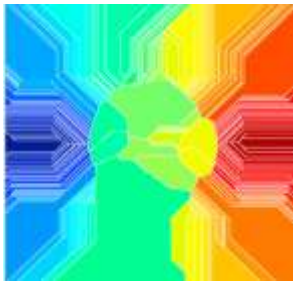
7 Watershed segmented Image
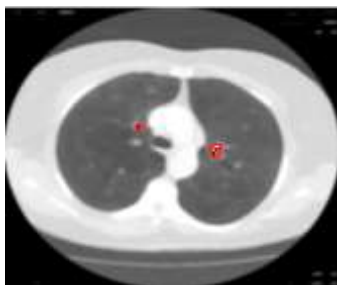
8 Cancer marked image

In above, figure 3, 4, 5, 6, 7, 8 are original grayscale image, median filtered image, Gaussian filtered image, binarized image, watershed segmented image and cancer marked image respectively.

Segmentation

This process locates objects or boundaries which help in acquiring the region of interest in the image [26]. It partitions the image into regions to identify the meaningful information. In lung cancer detection it segments the cancer nodule from the CT scan image. In the proposed model watershed segmentation is implemented. Its main feature is that it can separate and identify the touching objects in the image. This feature helps in proper segmentation of cancer nodules if it is touching to other false nodules.

Feature Extraction

After the segmentation, features of the nodules are extracted. Thirteen different geometric, statistical and texture features are extracted using Principal Component Analysis (PCA). Four optimal features from thirteen are selected on the basis of their best results. These four features are Variance, Entropy, Mean and Size. The description of the different features is described below:
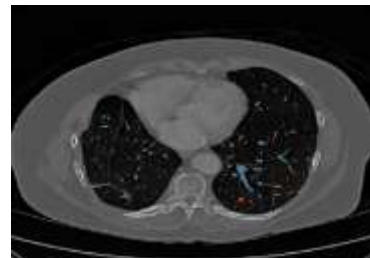
(a) Sample Labeled image on binary level
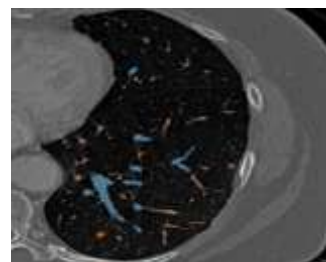
(b) Zoomed image.

Lung Cancer Research: Lung cancer detection Techniques

Methods in lung cancer research involve identifying and pinpointing vulnerabilities. By locating these weaknesses, researchers can develop targeted treatments for more effective results in combating the disease. Identifying specific weaknesses within lung cancer cells is crucial for developing personalized therapies that can disrupt cancer growth and improve patient outcomes[27].

Lung Cancer detection Techniques

Lung Cancer Research: Utilizing Datasets Available Online

In order to understand the complexities of lung cancer and develop effective treatments, researchers need access to large amounts of data. This data can include patient information, genetic data, and treatment outcomes. By utilizing datasets, researchers can analyze this information and identify patterns and trends that can lead to breakthroughs in lung cancer research.

There are several online databases that provide access to lung cancer datasets. One of the most comprehensive is the National Cancer Institute's Genomic Data Commons (GDC). This database contains genomic and clinical data from over 30,000 lung cancer patients, making it a valuable resource for researchers.

Another useful database is the Cancer Genome Atlas (TCGA), which contains genomic data from over 500 lung cancer patients. This dataset also includes information on gene expression, mutations, and copy number variations, providing a more in-depth look at the genetic factors involved in lung cancer.

There are various datasets available online for lung cancer research. These datasets provide valuable information for studying the disease, analyzing treatment outcomes, and developing predictive models. Researchers can download these datasets to conduct studies, identify patterns, and improve patient care strategies. Access to these datasets is crucial for advancing lung cancer research and ultimately improving patient outcomes. Some of them are given below:

Lung - Datasets - PLCO - The Cancer Data Access System

NLST Datasets

http://archive.ics.uci.edu/ml/datasets/Lung+Cancer

HLungDB: an integrated database of human lung cancer research

https://www.mdpi.com/2079-7737/12/3/357
https://bmirds.github.io/LungCancer/

Conclusion

This study presents the better Computer Aided Diagnosing (CAD) system for automatic detection of lung cancer. The most common cause of mortality nowadays is cancer. The primary elements of the intended CAD system are pre-processing and segmentation, with PSNR and MSE being employed for measurement. For various operations on the CT chest image, several algorithms like watershed algorithm, contour detection, SVM and mean shift algorithm are employed. The review led us to the conclusion that there is minimum advancement in the sensitivity, number of false positives, automation level, or capability to identify different types and shapes of nodules during the study period.

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NOISE REDUCING USING MEDIAN, HYBRID FILTERS IN BRAIN

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Abstract

One of the primary assignments of picture handling is to recognize commotion and genuineitems so the un-needed clamor from the picture sign can be eliminated. The mutilation of apicture by commotion is exceptionally normal that gets presented during its obtaining, handling, pressure, transmission, and multiplication. This paper presents a similar investigation of variousdenoising procedures and the outcomes got were inspected and find the best denoising strategyfor clinical picture division. The proposed work utilized a few notable procedures, for example, Middle, Mixture, Scalar and wavelet thresholding for denoising. Middle channel is out flanked channel for salt and pepper commotion and different procedures particularly wavelet thresholding are utilized for Gaussian clamors in existing framework. In the proposed strategy, atfirst a few sorts of commotions, for example, liner, Gaussian, salt and pepper and Rician werepresented in X-ray pictures independently. Then, at that point, the above existing denoising procedures were utilized for commotion evacuation. The exhibitions were dissected by both subjective and quantitative outcomes. For quantitative measure PSNR and SSIM boundaries were utilized. Then the proposed work stretched out upto division to guaranteetheoutperformance of denoising procedures. For division, Fluffy C means (FCM) was pickedinlight of the fact that it is exceptionally delicate in clinical picture examination. It is applied ondenoised X-ray Cerebrum pictures to bunch them into four significant districts like Foundation (BCK), White Matter (WM), Dim Matter (GM) and Cerebro Spinal Liquid (CSF).

The sectioned pictures were contrasted and the physically fragmented pictures. The presentation was quantitatively confirmed by Dice Comparability List.

Digital Image Processing

Digital image processing is a method to convert an image into digital form, perform some operations on it. Image processing allows extracting some information from images. Usually, Image processing system treating images as two dimensional signals. Image processing basically includes the following three steps.

- Importing the image with optical canneror by digital photography.
- Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satel lite photographs.
- Output is the lastst age report that is based on image analysis.

Purpose of Image Processing

The purpose of image processing is divided into 5 groups. They are:

1. Visualization-Observe the objects that are not visible.
2. Image sharpening and restoration - To create a better image.
3. Image retrieval- Searching and retrieving images from a large database.
4. Measurement of pattern- Measures various objects in an image.
5. Image Recognition – Distinguish the objects in an image.

Types of Image Processing

The two types of Image processing are Analog and Digital image processing.

Analog or visual techniques of image processing can be used for the hard copies likeprintouts and photographs. Image analysts use various fundamentals of interpretation while usingthese visual techniques. Association is another important tool in image processing through visualtechniques. So analysts apply a combination of personal knowledge and collateral data to imageprocessing.

Digital image processing has to undergo various phases of processing. The three generalphases that all types of data have to undergo while using digital technique are pre- processing, enhancement and information extraction. The comparison among analog and digital signal isgivenin Table1.

Table1 Difference between Analog and Digital Signals

Comparison Element	Analog Signal	Digital Signal
Analysis	Difficult	Possibleto analyze
Representation	Continuous	Discontinuous
Accuracy	More accurate	Lessaccurate
Storage	Infinite memory	Easily stored
Subject to Noise	Yes	No
Recording Technique	Original signal is preserved	Samples of the signal are taken and served
Examples	Human voice, Thermometer, Analog phones etc.	Computers, Digital Phones, Digital pensetc.

Brain Anatomy

The brain is one of the most complex and magnificent organs in the human body. Ourbrain gives us awareness about how to behave and how to act in our environment belong with the people. It controls our muscle movements and even our breathing and internal temperature.

Every creative thought, feeling, and planis developed by our brain
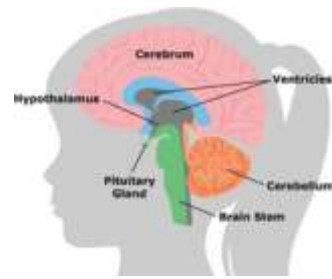
MRI Technique

Magnetic Resonance Imaging (MRI) is a diagnostic scanning technique that uses magnetism, radio waves and a computer to produce images of body structures. MRI is a spectro scopic imaging technique used in medical settings to produce images of the inside of the human body. In 1977 the first MRI exam was performed on a human being. It took 5 hours toproduceoneimage.

MRIs are safe and relatively easy. No health risks are associated with the magnetic field or radiowaves, since thelow-energy radio waves use no radiation. The procedure can be repeated with outside effects.

Components of MRI

- A magnet which produces a very powerful uniform magnetic field.
- Gradient Magnets which are much lower in strength.
- Equipment to transmit Radio Frequency (RF).
- A very powerful computer system, which translates the signals transmitted by the coils.

Usage of MRI Work

- An MRI scan can be used as an extremely accurate method of disease detection throughout the body.
- In the head, trauma to the brain can be seen as bleeding or swelling. Other abnormalitiesoften found include brain aneurysms, stroke, tumors of the brain, as well as tumors or inflammation of the spine.
- It provides valuable information on glands and organs within the abdomen, and accurate information about the structure of the joints, soft

tissues, and bones of the body. Often, surgery can be deferred or more accurately directed after knowing the results of an MRI

Scan MRI Principle

The image acquisition processd one by MRI technique is given in Fig
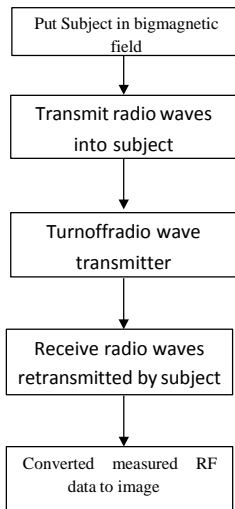

Figure 2.4 Flow chart of MRI principle

A strong magnetic field is created by passing an electric current through the wire loops. While thishappening, other coils in the magnet send and receive radio waves. This triggers protons in thebody to align them. Once aligned, radio waves are absorbed by the proton, which stimulates spinning. Energy is released after "exciting" the molecules, which in turn emits energy signals thatare picked up by the coil. This information is then sent to a computer which processes all thesignals and generates it into an image.
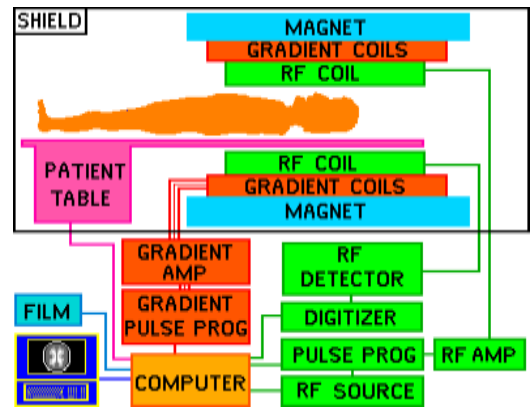
Figure 2.5 MRI Scheme

It will take between 20 and 40 minutes. The result of scan will be analyzed by a consultant radiologist who will provide doctor with a comprehensive written report.

MRI Characteristics of Human Brain

The strength of theMRI signal and the contrast between brain tissues depend primarilyon three parameters, Proton density (PD), T1-weighted time and T2- weighted time. For most"soft" tissues in the body, the proton density is very homogeneous and therefore does notcontribute in amajor way tosignal differences. However, T1 and T2 can be dramatically different for different soft tissues, and these parameters are responsible for major contrast between soft tissues as shown in Fig 2.6(a) and (b).

The time parameters T1 and T2 are strongly influenced by the viscosity or rigidity of tissues. The greater the viscosity and rigidity, the smaller the values for T1 and T2. The relaxation time and image contrast tissues of brain structures are summarized in Table 2 [11].
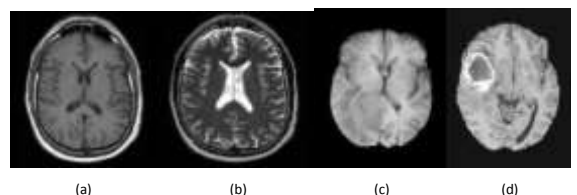
Figure 2.6 MRI images (Modalities) a).T1 b). T2 c). Flaird). T1 Contrast

Table 2 Tissue characteristics of Brain for MRI

Brain Tissues	Relaxation Time		Image Contrast		
	T1	T2	PD	T1	T2
CSF	Long	Long	Gray	Dark	Bright
Gray Matter (GM)	Intermediate	Intermediate	Isointense	Gray	Gray
White Matter (WM)	Short	Short	Bright	Bright	Gray
FAT	Short	Intermediate	Bright	Bright	Gray
Corticalbone	Long	Short	Dark	Dark	Dark
Air	Long	Short	Dark	Dark	Dark
Blood Fast	Long	Short	Dark	Dark	Dark
Edema	Long	Long	Bright/ Gray	Gray/ Dark	Bright
Protein	Short	Long	Bright/ Gray	Bright	Bright

The relaxation times mentioned as long, intermediate and short in Table 2 are approximately equivalent to 2200 – 2400 ms, 900ms, 780ms respectively for T1 images and 500- 1400ms, 100ms, 90ms respectively for T2 images in a steady magnetic field of 1.5 Tesla.

WM appears a light gray in T1 and a dark Gray in T2 images. GM appears gray in bothimages. The CSF appears black in T1 and white in T2 images. The background of the image (air), dense calcification, fibrous tissue and flowing blood in spin echo (SE) sequence typically provide little to no signal on MR images and thus appear dark on both T1 and T2 sequences. T1 images are typically used for an atomic information, as they are also highly sensitive to most pathologic processes. A prolongation of T2, which provides high signal intensities on long TR and long TE images, is seen with ema, infarctio demyelinatio, infection, neoplasm and most fluid collection

(a)   (b)   (c)
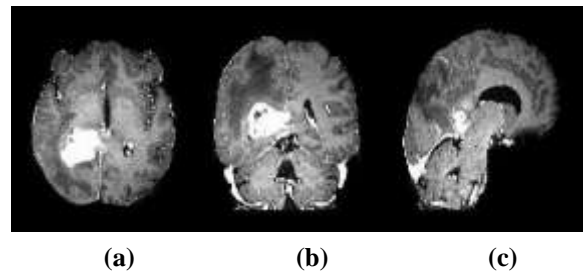
Figure 2.7: MRI images orientation a). Axial b). Coronal c). Sagital

The three orientations of brain for selecting the set of slices are given in Fig 2.7. Axial oftransverse views are generally best for evaluating abnormal signal or morphology in the brain. Coronal and sagittal planes are suitable for evaluating posteriorfoss a and cranio cervical junction. The coronal images allow evaluation of right and left symmetry where as midsagittal views show the midline structures to best advantage [11].

Noise Removal Process
Median Filter
Median Filter is a simple and powerful non-linear filter which is based on order statistics. It is easy to implement images for smoothing. Median filter is used for reducing the amount of intensity variation between one pixel and the other pixel [10]. In this filter, we do not replace thepixel value of image with the mean of all neighboring pixel values, we replaces itwith themedian value. The median is calculated by first sorting all pixel values into ascending order andthen replace the pixel being calculated with the middle pixel value. If the neighboring pixel ofimage which is to be considered an even numbers of pixels, than the average of the two middlepixel values is used to replace. The median filter gives best result when the impulse noisepercentage is less than 0.1 %. When the quantity of impulse noise is increased the median filter cannot give best result. Their processes are demonstrated in Fig.

Original Matrix

Filter Completed
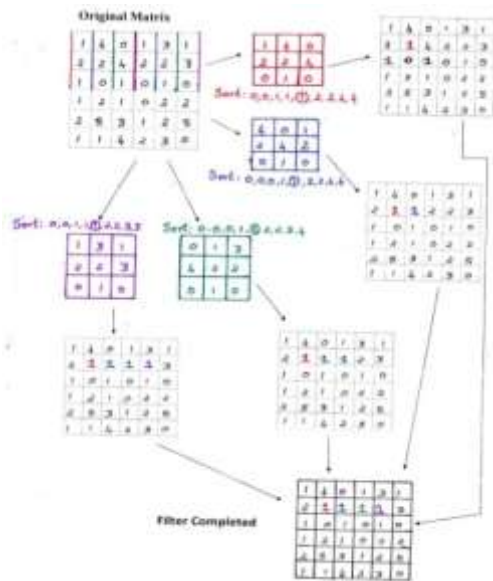
Hybrid Filter

The hybrid technique consists of two filters that process sequently. At first, the neighbour of north, south, east and west of a pixel is choosen. Then replace the pixel by the median intensity of 4 neighbours. The process are demonstrated in Fig
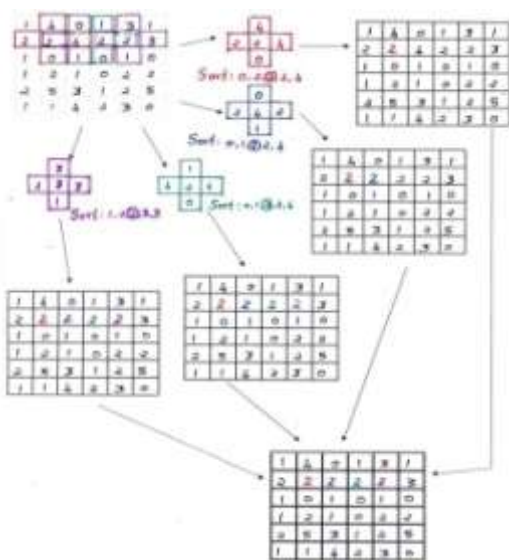
Hybrid Plus Median
Scalar Filter

In scalar technique, the boundary value is chosen as duplicate values and then replace thepixel by the median intensity of 8 neighbours. The processes are demonstrated in Fig. The scalarfilters usually, smoothen the image to reduce the noise, but the main advantage is reducing noiselevelinedges

Original Matrix

Filter Completed
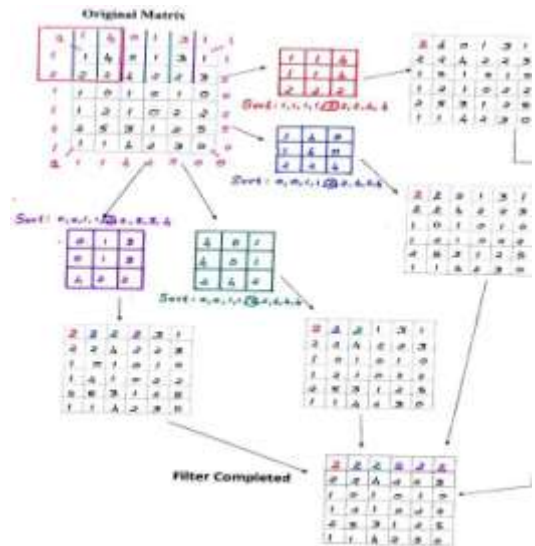
Evaluation Parameters
PSNR (Peak signal-to-noise ratio)

Peak signal-to-noise ratio, often abbreviated PSNR, is an engineering term for the ratio between the maximum possible power of a signal and the power of corrupting noise that affects the fidelity of its representation. Because many signals have a very wide dynamic range, PSNR is usually expressed in terms of the logarithmic decibel scale.

PSNR is most commonly used to measure the quality of reconstruction of lossy compression codecs (e.g., for image compression). The signal in this caseis the original data, and the noise is the error introduced by compression. When comparing compression codecs, PSNR is an *approximation* to human perception of reconstruction quality. Although a higher PSNR generally indicates that the reconstruction is of higher quality, in some cases it may not. One has to be extremely careful with the range of validity of this metric; it is only conclusively valid when it is used to compare results from the same codec (orcodec type) and same content.

PSNR is defined via the mean squared error (*MSE*). Given a noise-free *m×n* mono chrome image *I* and its noisy approximation *K*, *MSE* is defined in the following equation.

$$MSE = \frac{1}{m\,n} \sum_{i=0}^{m-1} \sum_{j=0}^{n-1} [I(i,j) - K(i,j)]^2$$

The PSNR is defined as:

$$PSNR = 10 \cdot \log_{10}\left(\frac{MAX_I^2}{MSE}\right)$$
$$= 20 \cdot \log_{10}\left(\frac{MAX_I}{\sqrt{MSE}}\right)$$
$$= 20 \cdot \log_{10}(MAX_I) - 10 \cdot \log_{10}(MSE)$$

Here, *MAX_I* is the maximum possible pixel value of the image.

SSIM (Structural Similarity Index Metric)

The Structural Similarity (SSIM) index is a method for measuring the similarity betweentwo images. The SSIM index is a full reference metric; in other words, the measuring of imagequality based on an initial uncompressed or distortion-free image as reference. SSIM is designedto improve on traditional methods like PSNR and MSE, which has proven to be in consistent with human eye perception.

The difference with respect to other techniques mentioned previously such as MSE orPSNR is that these approaches estimate perceived errors; on the other hand, SSIM considers image degradation as perceived change instructural information. Structural information is the idea thatthe pixels have strong inter-dependencies especially when they are spatially close. These dependencies carry important information about the structure of the objects in the visual scene.

The SSIM metric is calculated on various windows of an image. The measure between two windows χand γ of common size*N×N*is:

$$SSIM(x,y) = \frac{(2\mu_x\mu_y + c_1)(2\sigma_{xy} + c_2)}{(\mu_x^2 + \mu_y^2 + c_1)(\sigma_x^2 + \sigma_y^2 + c_2)}$$

with
- $\mu\chi$ the average of χ;
- μy the average of γ;
- $\sigma^2 x$ the variance of χ;
- $\sigma^2 y$ the variance of γ;
- σxy the covariance of χ and γ;
- $C_1=(k_1 L)^2$, $C_2=(k_2 L)^2$, two variables are used to stabilize the division with weak denominator;
- *L* the dynamic range of the pixel-values (typically this is $2^{\#bitsperpixel}-1$);
- $k_1=0.01$ and $k_2=0.03$ by default.

The resultant SSIM index is a decimal value between -1 and 1, and value 1 is only reachable in the case of two identical sets of data. Typically it is calculated on window sizes of8×8. The window can be displaced pixel-by-pixel on the image but the authors proposed to use only a sub group of the possible window storeduce the complexity of the calculation.
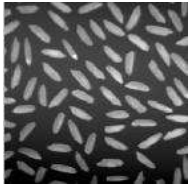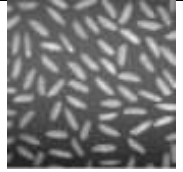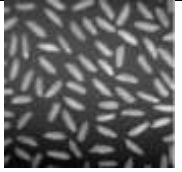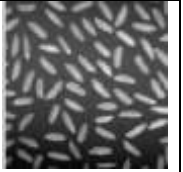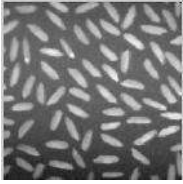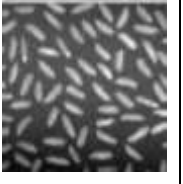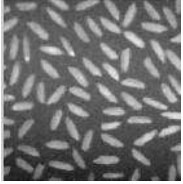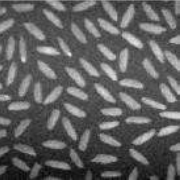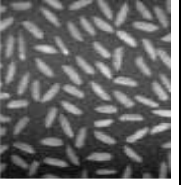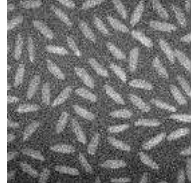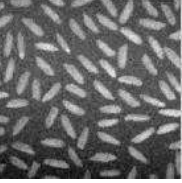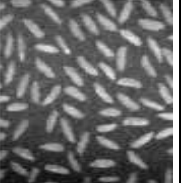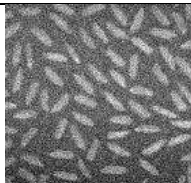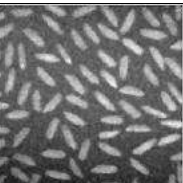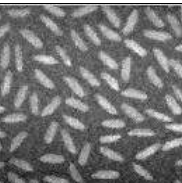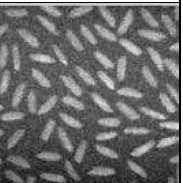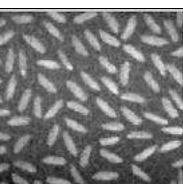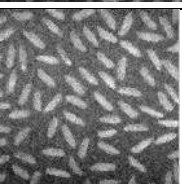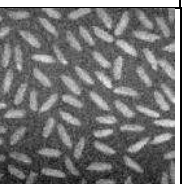
PSNR for General Images

Noise Level	Before Denoising	Median	Hybrid Filter	Scalar Filter
10%	15.2817	28.7395	27.8375	22.5738
15%	13.6429	28.2025	27.1323	21.3107
20%	12.4217	26.6054	25.9000	20.2246
25%	11.4808	24.7101	24.4351	19.3338
30%	10.7091	22.3251	19.2548	17.6352

SSIM for General Image

Noise Level	Before Denoising	Median	Hybrid Filter	Scalar Filter
5%	0.4114	0.8552	0.8421	0.8404
10%	0.2482	0.8470	0.8311	0.8251
15%	0.1750	0.8368	0.8288	0.8151
20%	0.1368	0.8092	0.8157	0.8062
25%	0.1090	0.7618	0.7640	0.7852
30%	0.0881	0.7006	0.7937	0.6826

Result

Original Image	Noise Level	Noise Image	Median Filter	Hybrid Filter	Scalar Filter
	5%				
	10%				
	15%				
	20%				
	25%				
	30%				

DE noising process on General images (Gaussian Noise)

Conclusion

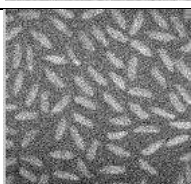- Fields of Applications are complaint with basic characteristics of them. It is very simple technical realization
- It is very useful signal processing, health the care systems.

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IDENTIFICATION OF NUMERICAL ATTRIBUTES FOR PREDICTING THE CHRONIC KIDNEY DISEASE USING SMO CLASSIFICATION

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Abstract

Diagnosis of Chronic Kidney Disease (CKD) has especially significant in medical data mining. The objective of this paper is to predict chronic kidney disease using only numerical attributes which results compared to numerical and both nominal and numerical attributes. The classification and prediction of this paper presents Correlation based Feature Selection (CFS) technique applied to extract important attributes and classifying them into CKD and not CKD. The CFS applied on nominal, numerical and both nominal and numerical attributes. The results of this approach compared to ranker approaches such as Information Gain, Gain Ratio approach for feature selection. The accuracy of CFS-SMO approach achieved 96.5% for numerical, 92.25% for nominal and 88.5% for nominal and numerical. These experimental results declare that the correlation based feature selection (CFS) successfully extracted features from the benchmark own and original chronic kidney disease (CKD) dataset and SMO classified status of kidney disease. Therefore CFS-SMO considered as an optimistic tool to diagnosis kidney disease accurately which supports medical experts to make decision correctly.

Keywords: *Data mining, Ckd classification, Correlation based Feature Selection (Cfs), Nominal and numerical attributes, ranker approaches.*

Introduction

Chronic Kidney Disease plays a significant role in medical field. Chronic kidney disease is progressively developed for permanent kidney disease.The role of the kidney performs a filtration process for blood and eliminates toxins from body. The Kidney carries the toxins to the bladder and later moved from the body during urination. Kidney failure happens when the kidney incapable to filter waste from the blood. There are two issues in the kidney that may be acute or chronic kidney disease. Acute kidney disease is unexpected loss of kidney function. Chronic Kidney disease happened whether the kidney harmed or not worked for few months or longer.

Blood in urine, variations in urinary function, swelling in ankle, diabetes, anemia, coronary artery disease and hypertension are symptoms of kidney disease [1]. CKD is identified as tenth major cause of death in the world. Kidney disease is determined by number of diagnosis methods which are known as tests. Diagnosis methods are urine and blood tests, blood pressure and kidney ultrasound. Medications, dialysis and kidney transplant are treatment for kidney disease. Predicting and diagnosing of the disease is very difficult because it takes more costs and time. Hence, detection of early stage of chronic kidney disease is important and useful for diagnosing patient which is affected by kidney disease. Different decision tree of data mining approaches like Alternating Decision Tree, Best First Decision Tree, LAD Tree, LMT, NB Tree, Random Tree and Simple Cart employed for classifying the disease [2]. Patients must spent more amount and time to diagnose kidney disease. So prediction of early stage of chronic kidney disease is substantial.

Many extraneous attributes may be available in the database. Hence, these attributes are removed in the feature selection stage. Classifier cannot achieve higher accuracy with large number of features. Therefore feature selection approaches required before applying the classification process. The primary purpose of feature selection removed irrelevant attributes and more cost effective model also improves the classification performance quickly [3]. Feature selection methods can be broadly categorized into filter, wrapper and embedded approaches.

Classification is the task of data analysis. It is process of finding function that are defined and differentiate data classes. Classification by decision tree induction, Bayesian classification, support vector machines, classification based on associations, K-nearest neighbour, case based reasoning, and genetic algorithm are possible. Classification, clustering, association rules and neural network are discussed and some of the data mining techniques are compared for chronic kidney disease [4]. Classifier is necessary to predict the class labels. For machine learning, kidney disease is classified into CKD and not CKD in class attribute.

It has two step procedures such as training phase and testing phase. Training phase is the construction of classification model and performance of the mining algorithm. Different algorithms are applied to design classifier which has trained for the prediction of the exact results. The outcome of the training phase is data mining models which are known as classifier. Testing phase is used to test the constructed model on the test data and predict the class labels.

In this research, the machine learning classification methods are created for the medical domain. The primary aim of machine learning is to create techniques which is automatically identify pattern in the given data and later to make utilize the discovered pattern to predict future. In banking domain, machine learning classifier improves the system by observing and concerning the feedback that provided by customers [4].

The rest of this paper is organized as follows: Section 2 describes the literature survey. Section 3 presents the proposed methodology for CKD classification. Section 4 reports the results and discussion. Section 5 concludes with future research.

LiteratureSurvey

The motivation of data mining is employed to mine important and relevant information from massive databases or data warehouse. Data mining approaches applied in many fields such as educational institutions, health care industry, scientific and engineering, business organizations and government sectors. Mainly, data mining is especially utilized for predicting and diagnosing the disease in the health care industry [L1]. Classification, clustering, regression, association rules, artificial intelligence, neural network, decision tree and genetic algorithm are data mining techniques which can be beneficial to employ for medical data.

In data mining, number of feature selection methods offered for identifying prominent features which is classified as filter, wrapper and embedded method. Unwanted features are eliminated therefore it reduce computation time, improve classification performance and understand of the data in the field of machine learning applications [L2].

Bhawna Sharma et al. (2019) [L3] proposed a comparative analysis of seven different machine learning algorithms namely Logistic Regression, Support Vector Machine, K-Nearest Neighbour, Naive Bayes, Stochastic Gradient Descent Classifier, Decision Tree, Random Forest. Logistic Regression (LR), Random Forest (RF) and SGD classifier achieved the highest accuracy.

Zixian Wang et al. (2018) [L4] employed Apriori association algorithm with classification techniques such as ZeroR, OneR, naïve Bayes, J48, IBk for chronic kidney disease. The performance of Apriori association algorithm and IBk achieved 99% accuracy. It can be evaluated with 10-fold-cross validation testing and implemented in WEKA.

M. Praveena, N. Bhavana et al. (2019) [L5] have developed a decision tree model using C4.5 algorithm to identify whether the patient is normal or abnormal. It is established using JAVA Language in Net-Beans platform.

A.Ajeeth, D.Ramya Chitra et al. (2016) [L6] compared eight different classification algorithms namely Naïve Bayes, SMO, Stochastic Gradient Descent (SGD), Random subspace, JRIP rules, Hoeffding tree, Locally weighted learning, oneR. Stochastic gradient descent approaches considered as best algorithm because accuracy is high and error rate is lower on the chronic kidney disease. In Weka

tool, accuracy, Sensitivity, Specificity, F-Score, and Kappa are factors of performance analysis which can be analysed for predicting chronic kidney disease.

Pratibha Devishri.S et al. (2019) [L7] predicted chronic kidney disease with various classifiers. Principal component analysis extracted prominent features and removed extraneous features in the feature selection phase. Among the six classifiers, decision stump and rep tree classifiers revealed better results in terms of recall, f-measure, precision, kappa statistics with less error rate other than the IBK, K-star, SGD and SMO.

L.Jerlin Rubini, Eswaran Perumal (2017) [L8] have proposed the technique of orthogonal locality preserving projection which can be used for feature reduction. To diagnose the chronic kidney disease, optimal classifier is necessary which has implemented by using group search optimiser with Fuzzy min-max neural network in Matlab. This method accomplished best results compared to other methods.

Table I Attribute Information of CKD Dataset

Attributes	Type and its value	Units
age:Age	Numerical	Years
bp:Blood Pressure	Numerical	mm/Hg
sg:Specific Gravity	Nominal (1.005,1.010,1.015, 1.020,1.025)	-
al:Albumin	Nominal (0,1,2,3,4,5)	-
su:Sugar	Nominal (0,1,2,3,4,5)	-
rbc:Red Blood Cells	Nominal (normal,abnormal)	-
pc:Pus Cell	Nominal (normal,abnormal)	-
pcc:Pus Cell Clumps	Nominal (present, not present)	-
ba:Bacteria	Nominal (present,notpresent)	-
bgr:Blood Glucose	Numerical	mgs/dl

Random		
bu:Blood Urea	Numerical	mgs/dl
sc;Serum Creatinine	Numerical	mgs/dl
sod:Sodium	Numerical	mEq/L
pot:Potassium	Numerical	mEq/L
hemo:Hemoglobin	Numerical	Gms
pcv:Packed Cell Volume	Numerical	%
wc:White Blood Cell Count	Numerical	cells/ cumm
rc:red blood cell count	Numerical	millions/ cmm
htn:Hypertension	Nominal(yes,no)	-
dm:diabetes mellitus	Nominal(yes,no)	-
cad:coronary artery disease	Nominal(yes,no)	-
appet: Appetite	Nominal(good,poor)	-
pe: pedal edema	Nominal(yes,no)	-
ane: Anemia	Nominal(yes,no)	-

Proposed Methodlogy

The primary objective of this research is to design a framework to classify medical data. To achieve promising results in chronic kidney disease, this paper proposed to employ CFS for feature selection and SMO classifier for classification.

Dataset

Special medical dataset for CKD, falling in the age group of 2 years to 83 years of age was accepted and published at UCI machine learning repository on July 2015 [13]. This framework developed by using WEKA tool on this dataset. This dataset introduced several attributes for predicting early stage of chronic kidney disease with the minimum cost. The dataset of chronic kidney disease contains 400 instances out of 250 instances marked as CKD and 150 instances marked as not CKD. This dataset included two attributes namely nominal and numerical types of data.

The dataset encompassed 24 attributes out of 11attributes were numeric and 14 attributes were nominal. To classify data, it is examined different approaches for feature selection and identifies classifier for classification. Pre-processing is crucial before applying feature selection. This will implement correlation based feature selection (CFS) to select appropriate attributes. This research suggests that the best suited techniques for nominal, numerical and both nominal and numerical types of data in chronic kidney disease dataset.

Methodology

Many researches have focused on kidney disease for detection of early stage of chronic kidney disease. Features are extracted from CKD dataset that composed of 400 instances. Then, a classification algorithm is employed on dataset for diagnosis of chronic kidney disease. The overall approaches of the proposed framework is separated into three stages:

1. Pre-processing
2. Feature selection using CFS
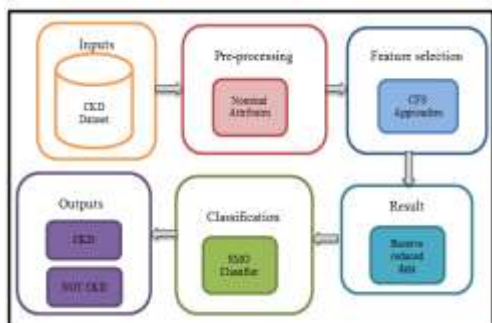3. Classification using SMO

Figure 1 Block diagram of proposed method

Preprocessing

Preprocessing is the first step to process overall methodology. This dataset contains numerical and nominal attributes which selected by using preprocessing stage. In this stage, numerical attributes are chosen and compared with nominal and both numerical and nominal.

Feature Selection

Feature is a specific measurable property of the process. Machine learning algorithm can perform classification by using set of features. Several techniques established to solve the problem of irrelevant attributes. Understanding of data, reducing the computational requirement and the effect of curse of dimensionality and improve the classification performance are benefits of feature selection[14]. Correlation based Feature Selection (CFS) technique applied to extract important attributes. In the CFS approach, 11 out of 14 attributes for numerical, 9 out of 12 attributes for nominal,17 out of 24 attributes for both numerical and nominal are selected in feature selection. Moreover, some valuable information of attributes which has ignored by previous researches that can be identified and extracted for guiding the utilization of nominal attributes.

Classification

After obtained the reduced data from the feature selection which is applied into SMO classifier. In the classification process, the outputs may be CKD and not CKD. The sequential minimal optimization algorithm is the most well-known and commonly used algorithm [38, 39].

Table II Nominal Types of CFS and Ranker Approach

Sl. No.	Attributes	CFS Approach	Ranker Approach			
			GR-R IG-R RF-R	Ranking		
				GR-R	IG-R	RF-R
1	sg	✓	✓	3	1	1
2	al	✓	✓	5	2	5
3	su	✗	✓	13	9	12
4	rbc	✓	✓	9	8	4
5	pc	✗	✓	7	6	8
6	pcc	✗	✓	10	11	11
7	ba	✗	✓	12	13	13
8	htn	✓	✓	1	3	2
9	dm	✓	✓	2	4	3
10	cad	✗	✓	11	12	10
11	appet	✓	✓	4	5	6
12	pe	✓	✓	6	7	7
13	ane	✓	✓	8	10	9

Table III: Numerical Types of CFS and Ranker Approach

Sl. No.	Attributes	CFS Approach	GR-R, IG-R, RF-R	GR-R	IG-R	RF-R
				Ranking		
1	age	✓	✓	11	10	8
2	bp	✓	✓	6	8	9
3	bgr	✓	✓	5	6	3
4	bu	✓	✓	4	5	5
5	sc	✓	✓	1	2	7
6	sod	✓	✓	8	7	10
7	pot	✓	✓	10	9	11

8	hemo	✓	✓	2	1	2
9	pcv	✓	✓	3	3	1
10	wbcc	✓	✓	9	11	6
11	Rbcc	✘	✓	7	4	4

Evaluation Metrics

Confusion Matrix is a performance measurement for machine learning. The output of class can be two things in classification. In Table, Confusion Matrix is a table that contains four different combinations of predicted and actual values namely True Positive, True Negative, False Positive and False Negative.

Table IV Comparison of Various Types Selected Features

Methods	Numerical		Nominal		Numerical and Nominal	
	Total Number of Features	Total Number of Selected Features	Total Number of Features	Total Number of Selected Features	Total Number of Features	Total Number of Selected Features
CFS Approach	14	11	15	12	24	21
Ranker Approach	14	14	15	15	24	24

Table V Confusion Matrix

	Predicted Positive	Predicted Negative
Actual Positive	TP	FN
Actual Negative	FP	TN

Sensitivity, Specificity, Accuracy, Positive Predictive value, Negative Predictive Value, False Positive Rate, False Negative Rate are evaluation metrics which are calculated by using confusion matrix. The evaluation of proposed approach is performed by medical data classification technique for chronic kidney disease dataset using the following equations:

$$Sensitivity\,(S_t) = \frac{TP}{TP+FN} \qquad (1)$$

$$Specificity\,(S_p) = \frac{TN}{TN+FP} \qquad (2)$$

$$Accuracy\,(A) = \frac{TP+TN}{TP+FP+TN+FN} \qquad (3)$$

$$Positive\ Predictive\ Value\,(PPV) = \frac{TP}{(TP+FP)} \qquad (4)$$

$$Negative\ Predictive\ Value\,(NPV) = \frac{TN}{(TN+FN)} \qquad (5)$$

$$False\ Positive\ Rate\,(FPR) = \frac{FP}{(FP+TN)} \qquad (6)$$

$$False\ Negative\ Rate\,(FNR) = \frac{FN}{(TP+FN)} \qquad (7)$$

TP (True Positive) = unhealthy people correctly identified as unhealthy

TN (True Negative) = healthy people correctly identified as healthy

FP (False Positive) = unhealthy people incorrectly identified as unhealthy

FN (False Negative) = healthy people incorrectly identified as healthy

Table VI Confusion Matrices of Different Types of the Ckd Dataset

Type of the Dataset	CFS-SMO	
Numerical Type	242 (TP)	8 (FN)
	0(FP)	150 (TN)
Numerical Type	238(TP)	12(FN)
	7(FP)	143(TN)
Nominal and Numerical Type	243(TP)	7(FN)
	0(FP)	150(TN)

Table VII: Numerical and Nominal type of Selected Features Using CFS Approach

Sl. No.	Attributes	CFS Approach	Ranker Approach			
			GR-R IG-R RF-R	Ranking		
				GR-R	IG-R	RF-R
1	age	✗	✓	12	15	3
2	bp	✓	✓	15	12	20
3	sg	✓	✓	19	16	19
4	al	✓	✓	20	3	4
5	su	✗	✓	16	4	6
6	rbc	✓	✓	11	19	15
7	pc	✗	✓	10	20	16
8	pcc	✗	✓	3	18	7
9	ba	✗	✓	22	11	23
10	bgr	✓	✓	4	10	22
11	bu	✓	✓	23	13	24
12	sc	✓	✓	2	2	18
13	sod	✗	✓	7	22	17
14	pot	✓	✓	24	7	8
15	hemo	✓	✓	18	23	21
16	pcv	✓	✓	6	14	12
17	wc	✓	✓	8	6	1
18	rc	✗	✓	21	5	11
19	htn	✓	✓	13	1	10
20	dm	✓	✓	17	24	2
21	cad	✓	✓	9	17	5
22	appet	✓	✓	5	8	13
23	pe	✓	✓	14	21	9
24	ane	✓	✓	1	9	14

Results and Discussion

Dataset of chronic kidney disease prepared and examined by the proposed method of SMO algorithm and are compared based on the evaluation metrics. The numerical attributes of SMO algorithm achieved the highest accuracy 98.50% with minimum number of attributes compared to nominal and both nominal and numerical. In accuracy, to compare all the attributes, nominal attributes can do better performance with minimized attributes. The performance of highest accuracy and minimum execution time are considered as best algorithm. In classification, SMO has the maximum classification accuracy and it is determined as best classification algorithm for numerical attributes.

Table VIII Comparative Results of CFS-SMO Classification Performance on CKD Dataset

Sequential Minimal Optimization (SMO) Algorithm			
Results	Numeical	Nominal	Nominal and Numerical
Accuracy	98.5%	95.25%	98.5%
Sensitivity	100	97	100
Specificity	94	92	95
PPV	96	95	100
NPV	100	95	100

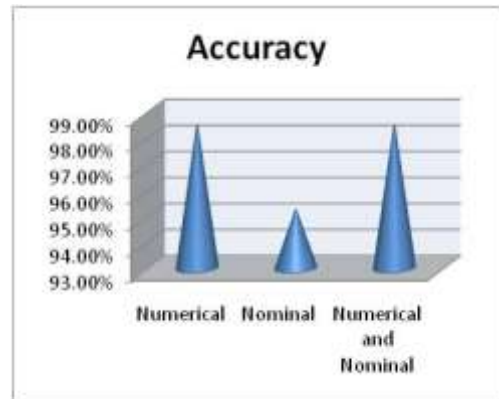PPV=Positive Predictive value, NPV=Negative Predictive Value

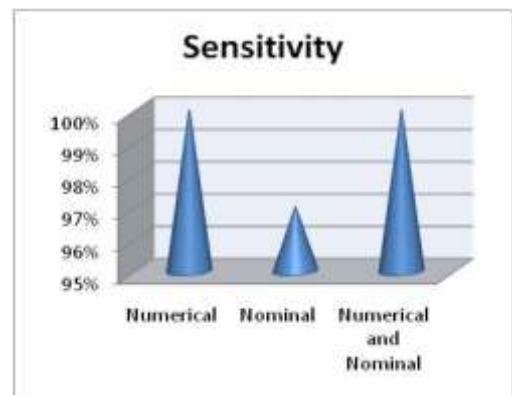**Fig.2 Accuracy of CKD with SMO**

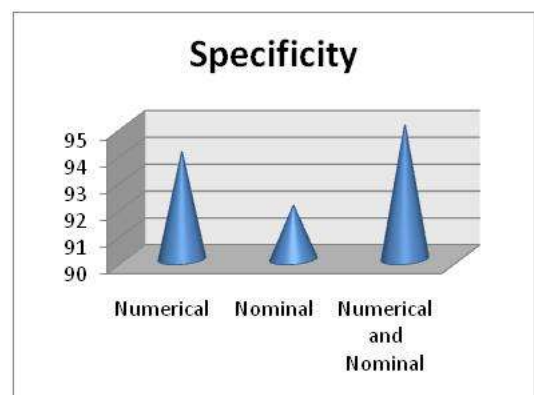**Fig. 3 Sensitivity of CKD with SMO**
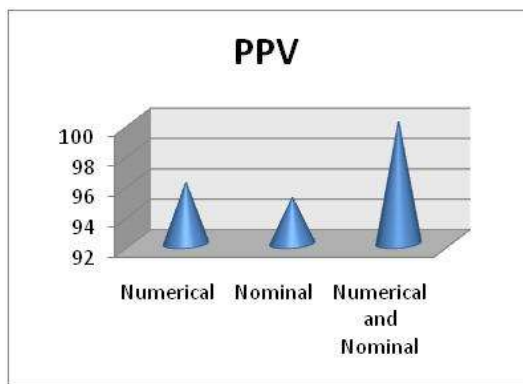

Fig. 4 Specificity of CKD with SMO

Fig. 5 PPV of CKD with SMO

Figure 2 represents the accuracy of classification. Figure 3 and 4 represent sensitivity and specificity of chronic kidney disease with SMO. Figure 5 and 6 represent the positive and negative predictive value of Chronic Kidney Disease with SMO. From the experimental result, SMO performs best in classification process for numerical attributes other than nominal attributes.
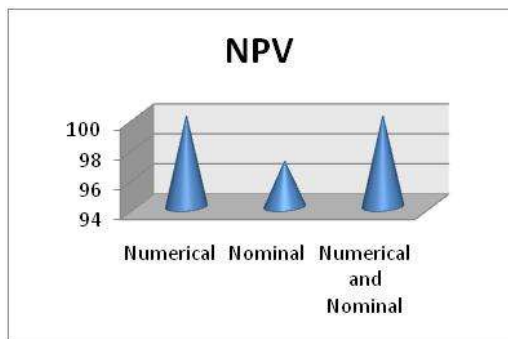

Fig.6 NPV of CKD with SMO

Conclusion

A CFS-SMO and Ranker-SMO developed for relative comparison of numerical and nominal attributes of chronic kidney disease. The CFS-SMO yields better results than other Ranker-SMO. Numerical attributes aim to produce better classification with CFS-SMO. Most of the researchers used only nominal attributes to give higher accuracy other than numerical attributes which can be solved correlation based feature selection with sequential minimal optimization.

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DEMOCRATIZING PORTABLE APPLICATION IMPROVEMENT FOR CALAMITY ON THE BOARD (DISASTER MANAGEMENT)

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Abstract

Smartphones are being used for a wide range of activities including messaging, social networking, calendar and contact management as well as loca-tion and context-aware applications. The ubiquity of handheld computing technology has been found to be especially useful in disaster management and relief operations. Our focus is to enable developers to quickly deploy applications that take advantage of key sources that are fundamental for today's net- worked citizens, including Twitter feeds, Facebook posts, current news releases, and government data. These applications will also have the capability of empowering citizens involved in crisis situations to contribute via crowd sourcing, and to communicate up-to-date information to others. We will lever- age several technologies to develop this application framework, namely (i) Linked Data principles for structured data, (ii) existing data sources and on- tologies for disaster management, and (iii) App In- ventor, which is a mobile application development framework for non-programmers. In this paper, we describe our motivating use cases, our architecture, and our prototype implementation.

Introduction

Cell phones are rapidly turning into the essential figuring and correspondence stage for individuals' everyday undertakings. With the ascent of informal communities, "netizens" are presently OK with habitually refreshing their social profiles with their mongrel lease exercises or potentially areas. This new wellspring of informa-tion, social signs from microblog stages, has been viewed as particularly helpful in calamity the board and alleviation operation erations [Fajardo and Oppus, 2010]. For instance, during the Beijing streak floods in July 2012, individuals took to Joke ter to give data about the overflowed regions and col-laboratively fostered a live emergency guide of the floods influence utilizing Google Guides 1. By incorporating publicly supported infor-mation with Geographic Data Frameworks (GIS) information or other open datasets delivered by the nearby government, a few specialized volunteers have created valuable portable applica-tions for catastrophe reliefs. Nonetheless, every association for the most part has own application makes or consumes information put away in independent data sets, or much more dreadful, in bookkeeping sheets. This implies a large portion of

these applications are inherent storehouses without ex-ploiting the capability of being "interlinked" with different information gathered from different associations, or even the public authority. The absence of ability and the expense for building versatile appli-cations make help laborers go to additional manual strides for combining different reports from volunteers. Thusly, the undeniably chaotic and dispersed data become commotion in the framework and can in some cases stoppage the deci-sion making process. We imagine a system that empowers non-specialized application engineers to rapidly fabricate and de-ploy applications that effectively reuse existing and publicly supported organized data sources.

One significant test in the up to referenced model is the manner by which to actually coordinate information created by various standard ties, including the "swarm", help associations, and administer ment organizations. We address this test by utilizing Connected Information principles 2 to empower the reuse, augmentation and mix of heterogeneous organized information from circulated sources. Connected Information is a bunch of plan standards proposed by the Internet Consortium

(W3C) for involving Web tech-nologies to help the circulated improvement of organized data to such an extent that it tends to be effectively and automat-ically joined. In any case, consuming and producing Connected Information is troublesome as called attention to in [Scharffe et al., 2012], es-pecially on cell phones. This infers that we really want to likewise zero in on decreasing the hindrance to the reception of Connected Information advancements on cell phones.

This paper depicts our continuous work of expanding the Application Inventor3 stage with Connected Information advancements. Application Innovator is an open-source project that gives a block-based connection point to outwardly make Android applications [Wolber et al., 2011]. We are creating "Connected Information" parts for Application Creator that will permit application engineers to effortlessly fabricate ap-plications that investigate and consume Connected Information datasets as well as distribute organized information straightforwardly to remote Connected Information archives. Our Application Creator parts will zero in on (I) inserting semantic ideas straightforwardly into the course of versatile application working while at the same time stowing away the majority of the functional subtleties from amateur designers, and (ii) the joining of organized data from microblog stages, publicly supported and ex-isting open information
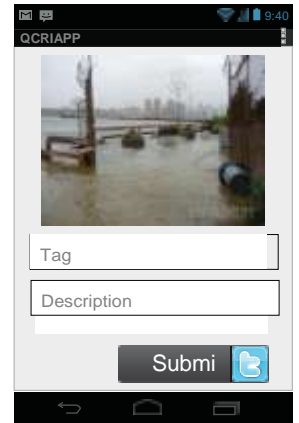

(a)   (b)
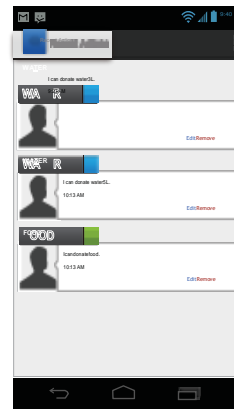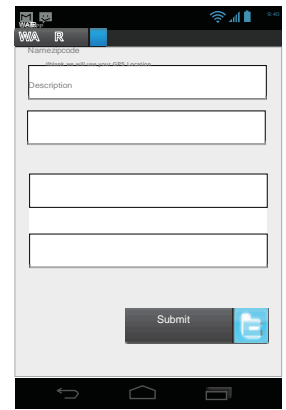
(c)   (d)

(e)   (f)

Figure 1 Two Semantic Web enabled mobile apps for disaster response situations

Motivating Scenarios

We depict two applications that might possibly be utilized by individuals during an emergency circumstance: (1) Application Give N-Solicitation will be utilized to match solicitations and gifts during a calamity situation, and (2) Application WeReport will be utilized to report scenes and data connected with the catastrophe. These applications will can be incorporated with various public datasets utilizing connected information.

Donate-N-Solicitation Application

This application is motivated by MatchApp4, where demands for re-sources are met with the accessibility of those assets.

Consider this asset match-production situation: Alice lives in New York City. After Tropical storm

Sandy hits, Alice needs to assist with peopling out of luck. Weave has been impacted by the emergency. Both Sway, the requestor, and Alice, the donator, can put the gift and solicitation for things inside our application as displayed in Figure 1(a) and (b). They can likewise see/alter/eliminate late rundown of their exercises as displayed in Figure 1(c). Alice decides to give water, so she looks up every one individuals inside a 3 miles span of her area who are needing water on a guide as displayed in Figure 1(e). Sway had recently mentioned water by utilizing our application (Figure 1(d)). Alice chooses Sway from the rundown of individuals out of luck. Alice and Sway can message straightforwardly with one another to organize the trade.

WeReport Application

While heading to the supermarket, after an extreme storm, Joe saw many parts around his local area are in terrible condi-tions. For instance, fallen trees are impeding the street and some can be perilous for the walkers. With our WeRe-port application, he could take either an image or a video of the scene. He chooses to snap a photo of the street, by adding a "tag" and a "depiction" to the picture as displayed in Figure 1(f)
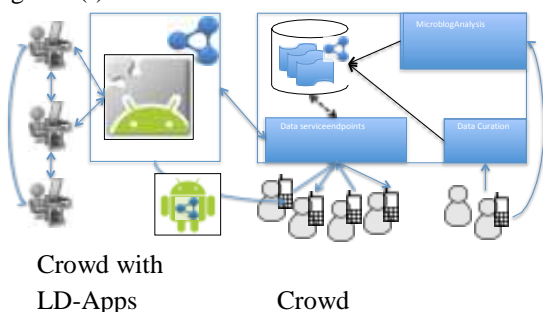

Crowd with
LD-Apps   Crowd

Figure 2: Architecture of Linked Data enabled crowd sourcing and application development platform

Prototype Execution

To execute the applications depicted in Area 2, and accumulate the essential information things, we investigated the utilization of exist-ing connected information vocabularies and integrated them with Application Designer as shown in Figure 2.

Linked Information

Calamity the board exercises such co-ordinating help operation erations, setting up covers, detailing underlying harms, and supervising volunteers create a ton of information. These should be coordinated and be interoperable with information given by vari-ous associations to be helpful in dynamic cycles during calamities. Past examination [Babitski et al., 2011] has shown the way that the utilization of ontologies and Semantic tech-nologies can be profitable in creating applications for catastrophe the executives situations. We distinguished two vocabu-laries that are valuable in displaying such information as Connected Information.

They have fluctuating levels of help for a portion of the calamity ideas, and we involved terms from both the vocabularies in our execution. We talk about certain deficiencies of these ontologies in Segment 4.

Humanitarian eXchange Language Situation and Response Standard (HXL)

HXL5 was created through a drive by the Unified Na-tions High Chief for Evacuees (UNHCR) after in-specting an expansive scope of frameworks being used with various hu-manitarian associations. The pattern is accessible in five fundamental segments, specifically: geolocation (data on the locations impacted), compassionate profile (data on the populaces impacted), metadata (who is gathering the information, date/time the information was gathered, and so on), reaction (data on the association answering), and circumstance (data connected with the crisis).

Management of a Crisis Vocabulary (MOAC)

MOAC6 was made after the seismic tremor in Haiti in 2010. A large part of the concentration in fostering this jargon was to miti-door the irregularities between collected information and require-ments of help associations. This was the primary Connected Information jargon that had the target of working with non-specialists to give information in Connected Information designs through publicly supporting systems, for example, Google Guide Creator, Open Road Guide, Twitter and Ushahidi. MOAC

characterizes three primary segments that connect with alleviation office principles.

App Inventor

App Inventor gives an Online improvement stage for beginners with no earlier programming experience to handily make versatile applications. A client can move chart ical objects on the connection point manager (Figure 3(a)) to plan an application or execute ways of behaving with blocks as displayed in Figure 3(b). Application Creator additionally gives some significant level compo-nents for utilizing cell phone assets as well as communicat-ing with outside web assets. For instance, it has com-ponents for perusing the GPS area sensor, taking photographs with the camera, getting SMS messages, and sending Twitter messages. By stowing away the majority of the specialized subtleties, Application In-ventor gives its clients the advantages to zero in on planning application ways of behaving as opposed to bring down level troubleshooting. Nonetheless, Application Innovator as of now has little help for coordinating application information with backend information stores, for instance, to save applica-tion information as Connected Information or incorporate with other Connected Information assets.Linked Data Extension of App Inventor

In order to enable developers using the App Inventor platform to interact with Linked Data sources, we provide an extended version of App Inventor with additional components and user interface elements powered by a modified version of the Jena framework [Carroll *et al.*, 2004]. In this section we outline how we expose Linked Data concepts to application develop- ers in the App Inventor the new components that can be used by developers to consume and generate Linked Data.
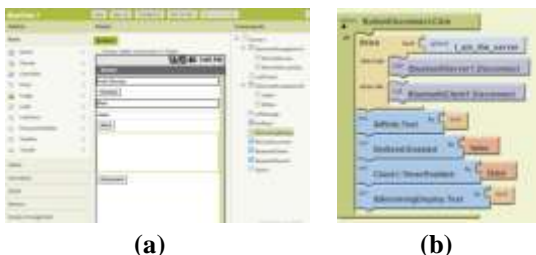
(a) **(b)**

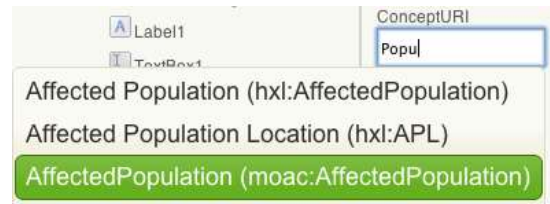**Figure 3Interface of the App Inventor platform**

Figure 4 App Inventor autocompletion of concepts and prop-erties powered by SPARQL queries over cached semantic web ontologies

Investigating Connected Information

One test of utilizing Connected Information is finding subtleties of a metaphysics that portrays a dataset. Application engineers ought not be troubled with knowing every one of the subtleties of a metaphysics. For instance, while building an emergency reaction application, an engineer might start with an overall idea, for example, Safe house and let the framework give more pertinent data. Our augmentation gives an autocompletion ability in the fashioner between face to help designers in choosing the suitable ontolog-ical term (see Figure 4). We offer an assistance inside the Application Designer that heaps ontologies, files marks for classes and properties, and answers questions to help this autocomple-tion gadget.

Consuming Connected Information with Semantic Web Part

The Semantic Web Part changes over semantic structures into RDF charts, executes and process aftereffects of SPARQL questions, and saves and loads the substance of ontologies. For instance, the application designer can execute a SPARQL inquiry to bring data about neighboring havens in view of the client's ongoing GPS area and show the outcomes on a guide.

Distributing Connected Information with Semantic Structure

The Semantic Structure is a design part that can be utilized by engineers to recognize an assortment of fields that ought to be applied to a specific ontological idea. Structures can likewise relegate an auto-produced subject URI in light of at least one fields to make new Connected Information occurrences.

For instance, a de-veloper can have two textfields for the name and the descrip-tion of a sanctuary. Semantic Structure will consequently create Connected Information significantly increases assuming those fields are labeled with ontological terms like the properties shelterName and shelterDescription from the MOAC philosophy.

Discussion

Existing calamity the board vocabularies have support for some fiasco the executives situations. Yet, there are a few deficiencies in current vocabularies. HXL characterizes administrator istrative units that might acknowledge the gifts, and the af-fected populaces that would get those gifts. How-ever there is no help to indicate what the gift is, for example whether it is cash, garments, food, and so on, as well as who is do-nating it and other coordinated operations connected with the gift. Likewise, MOAC has support for determining the necessities of a particular shel-ter and who is taking care of what in the WhoWhatWhere (W3) segment of the jargon. In any case, there isn't anything to de-copyist information connecting with gifts. One more inadequacy of these two vocabularies is the absence of help for situational mindfulness information. For instance, assuming somebody is detailing struc-tural harm to a scaffold that may be influencing a populace, it is basically impossible to connect the extension information to MOAC as well as HXL. We are currently figuring out a jargon that will connect these catastrophe vocabularies to other related connected information vocabularies, for example Geonames, Semantically Interlinked On-line Networks (SIOC)7, and so on. Geonames can be utilized to show geo-area data, and the connected populace data. SIOC can be utilized to tie in data accessible in microblog posts from tweets and Facebook posts after a calamity, for example, zones that individuals need to clear from, new improvements in a debacle (for example the expected locating of a plundering), gift promises alongside demands for gifts, and so on.

With the multiplication of connected datasets, designers us-ing Application Creator might need to utilize these information straightforwardly by means of Application Innovator parts without composing SPARQL questions themselves. To work with this element, we are currently creating "information covering" parts. These parts have implicit SPARQL questions to get to often gotten to information, with stretched out usefulness to module custom SPARQL inquiries to get at additional particular information things. With this usefulness, we would like to think not to mess the Application Inven-peak part communicate with information things that a greater part of application innovator engineers may not use while giving the flexibil-ity to recover any sort of information the designer wants. For instance, consider an information covering part for the New York City socioeconomics measurements datasets8. This dataset incorporates all the populace measurements, for example, number of guys and females as well as number of individuals in light of their ethnic categoriza-tion in a given postal district region. This ethnic order in-cludes conventional classifications like white, dark, hispanic, asian notwithstanding unmistakable classes like pacific islander, asian non-hispanic, white non-hispanic, white hispanic, dark non-hispanic, dark hispanic, and so forth. The information covering would uncover the orientation based data and the general ethnici-connects the point of interaction to worked in SPARQL questions that could simply be moved on to the point of interaction, while quite certain inquiries to get data about a specific eth-nicity (for example dark hispanic) could be composed by the application designer engineer and connected to the part.

Utilizing connected information inside a versatile climate has demonstrated helpful and testing in other exploration. David et al. [2010] propose an overall structure to present Connected Information sources as gadget content in the Android stage; D'Aquin et al. [2010] consume chosen information sources and make new friendly connection between individuals in the creator's univer-sity; Razzak et al. [2010] use government information to sup-port the travel industry inside the creator's city. Anyway in this multitude of approaches the application is space explicit and can't be stretched out to be utilized with various information sources. Expanding the Application

Creator system with Connected information can permit de-velopers to reuse accessible connected information sources and to tailor and stretch out applications to different situations.

Summary

In this paper we have shown the successful utilization of Connected Information inside versatile applications with a unique spotlight on catastrophe the executives. As associations keep on uncovering their information as Connected Open Information, our foundation will actually want to help engineers utilizing the Connected Information Application Creator plat-structure to concoct valuable applications rapidly and absent a lot of work to help those deprived during fiascos.

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METHODS OF CLUSTERING IN DATA MINING

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Abstract

Clustering data mining is the most common way of assembling importance full or use-full comparative article into one gathering. It is a typical procedure for measurable information, AI, and software engineering examination. Clustering is a sort of solo data mining method which depicts general working way of behaving, design extraction and concentrates valuable data from power cost time series. In this paper we have concentrated on the different clustering procedures. An even correlation of work done by different creators is introduced. This paper audits five sorts of clustering data mining strategies - Partitioning Clustering, Hierarchical Clustering, Grid based clustering, Model based clustering, and Density based clustering.

Introduction

Cluster analysis, also known as clustering, is a method of data mining that groups similar data points together. The goal of cluster analysis is to divide a dataset into groups (or clusters) such that the data points within each group are more similar to each other than to data points in other groups. This process is often used for exploratory data analysis and can help identify patterns or relationships within the data that may not be immediately obvious. There are many different algorithms used for cluster analysis, such as k-means, hierarchical clustering, and density-based clustering. The choice of algorithm will depend on the specific requirements of the analysis and the nature of the data being analyzed. Cluster Analysis is the process to find similar groups of objects in order to form clusters. It is an unsupervised machine learning-based algorithm that acts on unlabelled data. A group of data points would comprise together to form a cluster in which all the objects would belong to the same group.

The given data is divided into different groups by combining similar objects into a group. This group is nothing but a cluster. A cluster is nothing but a collection of similar data which is grouped together.

Data Mining Applications

Types of Clustering

- **Hard Clustering:** In this, each input data point either belongs to a cluster completely or not. For example, in the above example, each customer is put into one group out of the 10 groups.
- **Soft Clustering**: In this, instead of putting each input data point into a separate cluster, a probability or likelihood of that data point being in those clusters is assigned. For example, from the above scenario, each customer is assigned a probability to be in either of the 10 clusters of the retail store.

Different Types of Clustering Algorithms

- Since the task of clustering is subjective, the means that can be used for achieving this goal are plenty. Every methodology follows a different set of rules for defining the '*similarity'* among data points. In fact, there are more than 100 clustering algorithms known. But few of the algorithms are used popularly. Let's look at them in detail:

- **Connectivity Models:** As the name suggests, these models are based on the notion that the data points closer in data space exhibit more similarity to each other than the data points lying farther away. These models can follow two approaches. In the first approach, they start by classifying all data points into separate clusters & then aggregating them as the distance decreases. In the second approach, all data points are classified as a single cluster and then partitioned as the distance increases. Also, the choice of distance function is subjective. These models are very easy to interpret but lack scalability for handling big datasets. Examples of these models are the hierarchical clustering algorithms and their variants.

- **Centroid Models:** These are iterative clustering algorithms in which the notion of similarity is derived by the closeness of a data point to the centroid or cluster center of the clusters. The k-Means clustering algorithm is a popular algorithm that falls into this category. In these models, the no. of cluster parameters required at the end has to be mentioned beforehand, which makes it important to have prior knowledge of the dataset. These models run iteratively to find the local optima.

- **Distribution Models:** These clustering models are based on the notion of how probable it is that all data points in the cluster belong to the same distribution (For example: Normal, Gaussian). These models often suffer from overfitting. A popular example of these models is the Expectation-maximization algorithm which uses multivariate normal distributions.

- **Density Models**: These models search the data space for areas of the varied density of data points in the data space. They isolate different dense regions and assign the data points within these regions to the same cluster. Popular examples of density models are DBSCAN and OPTICS. These models are particularly useful for identifying clusters of arbitrary shape and detecting outliers, as they can detect and separate points that are located in sparse regions of the data space, as well as points that belong to dense regions.

Clustering Methods

- Model-Based Method
- Hierarchical Method
- Constraint-Based Method
- Grid-Based Method
- Partitioning Method
- Density-Based Method

Two of the most popular clustering algorithms in detail – K Means and Hierarchical

K Means Clustering

K means is an iterative clustering algorithm that aims to find local maxima in each iteration. This algorithm works in these 5 steps:

1. Specify the desired number of clusters K: Let us choose k=2 for these 5 data points in 2-D space.

2. Randomly assign each data point to a cluster: Let's assign three points in cluster 1, shown using red color, and two points in cluster 2, shown using grey color.

3. Compute cluster centroids: The centroid of data points in the red cluster is shown using the red cross, and those in the grey cluster using a grey cross.

4. Re-assign each point to the closest cluster centroid: Note that only the data point at the bottom is assigned to the red cluster, even though it's closer to the centroid of the grey cluster. Thus, we assign that data point to the grey cluster.

5. Re-compute cluster centroids: Now, re-computing the centroids for both clusters.

Repeat steps 4 and 5 until no improvements are possible: Similarly, we'll repeat the 4th and 5th steps until we'll reach global optima, i.e., when there is no further switching of data points between two clusters for two successive repeats. It will mark the termination of the algorithm if not explicitly mentioned.

Hierarchical Clustering

Hierarchical clustering, as the name suggests, is an algorithm that builds a hierarchy of clusters. This algorithm starts with all the data points assigned to a cluster of their own. Then two nearest clusters are merged into the same cluster. In the end, this algorithm terminates when there is only a single cluster left.

The results of hierarchical clustering can be shown using a dendrogram. The dendrogram can be interpreted as:
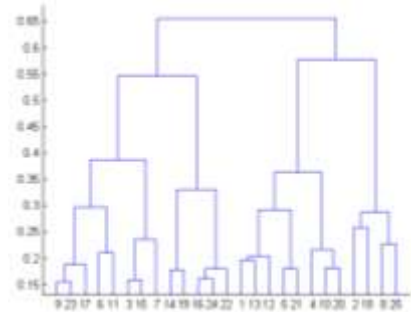
At the bottom, we start with 25 data points, each assigned to separate clusters. The two closest clusters are then merged till we have just one cluster at the top. The height in the dendrogram at which two clusters are merged represents the distance between two clusters in the data space.

The decision of the no. of clusters that can best depict different groups can be chosen by observing the dendrogram. The best choice of the no. of clusters is the no. of vertical lines in the dendrogram cut by a horizontal line that can transverse the maximum distance vertically without intersecting a cluster.

In the above example, the best choice of no. of clusters will be 4 as the red horizontal line in the dendrogram below covers the maximum vertical distance AB.
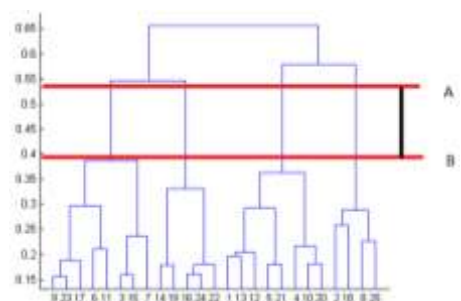
Improving Supervised Learning Algorithms with Clustering

Clustering is an unsupervised machine learning approach, but can it be used to improve the accuracy of supervised machine learning algorithms as well by clustering the data points into similar groups and using these cluster labels as independent variables in the supervised machine learning algorithm? Let's find out.

Let's check out the impact of clustering on the accuracy of our model for the classification problem using 3000 observations with 100 predictors of stock data to predict whether the stock will go up or down using R. This dataset contains 100 independent variables from X1 to X100 representing the profile of a stock and one outcome variable Y with two levels: 1 for the rise in stock price and -1 for drop in stock price.

Conclusion

In this article, we have discussed the various ways of performing clustering. We came across applications for unsupervised learning in a large no. of domains and also saw how to improve the accuracy of a supervised machine learning algorithm using clustering.Although clustering is easy to implement, you need to take care of some important aspects, like treating outliers in your data and making sure each cluster has a sufficient population. These aspects of clustering are dealt with in great detail in this article.

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