



Society for Computer Technology and Research's  
**Pune Institute of Computer Technology**



2<sup>nd</sup> International Conference on  
**Emerging trends and Innovations in ICT (ICEI-2022)**

10<sup>th</sup> To 12<sup>th</sup> MARCH 2022

*Sponsored by:*



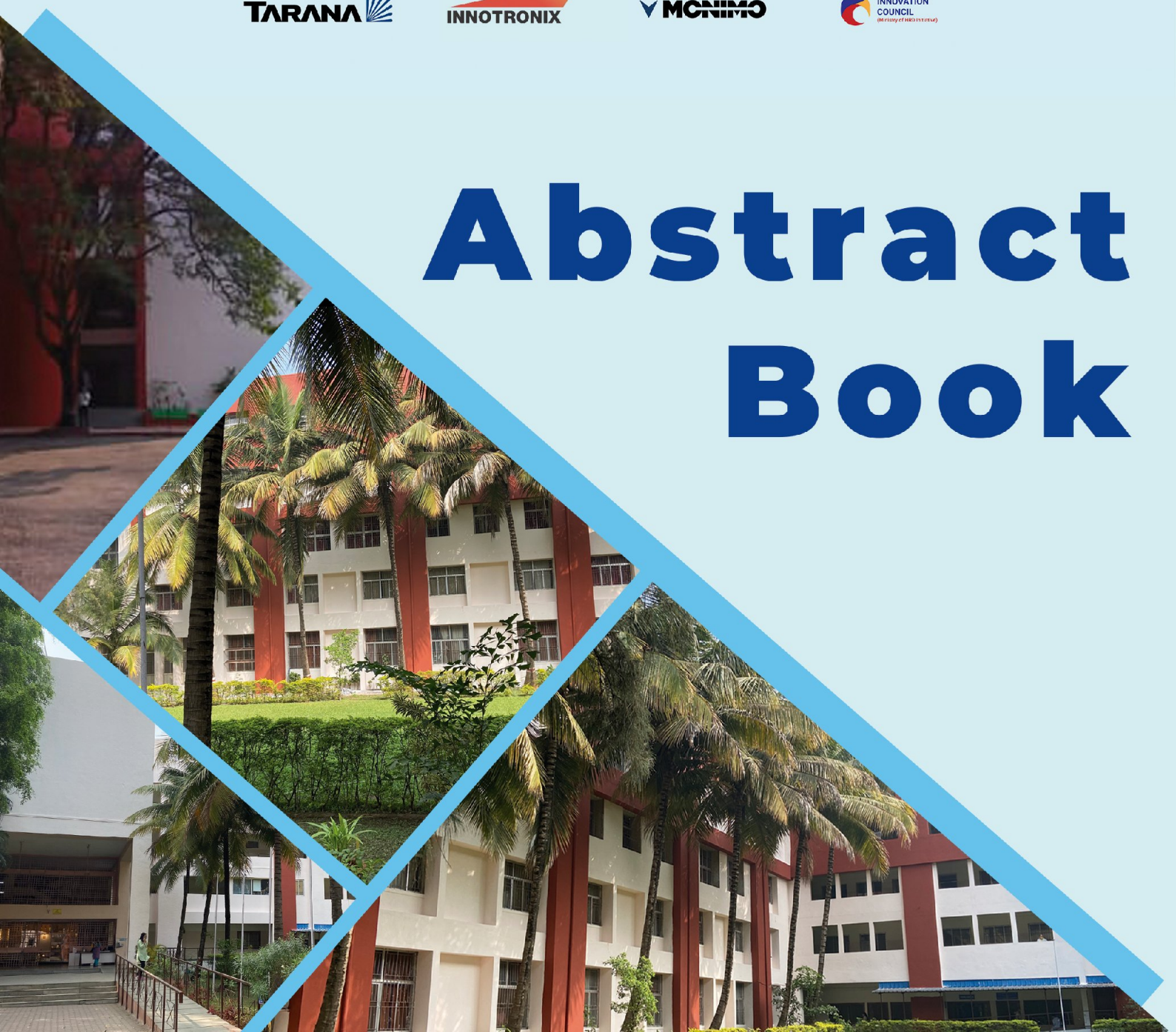
AlphaSense



CakeSoft Technologies



# Abstract Book





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## General Chair's Message

### Prof. Prahlad T. Kulkarni

On behalf of the Organizing Committee, I feel privileged & honored to welcome you all to the three-day 2nd International Conference on Emerging Trends & Innovations in ICT (ICEI-2022), jointly organized by SCTR's **Pune Institute of Computer Technology (PICT)**, Pune, and our industry partners Sarvatra Technologies, AlphaSense Inc., E2OPEN, imocha, CakeSoft Technologies, Tarana - Wireless Inc. and Innotronix, from 10th March to 12th March 2022, in a blended mode.

ICEI-2022 intends to bring together researchers, academicians, professionals, and students to provide an amazing platform to share their knowledge in the form of high-quality original research papers proposing novel solutions, innovations, and case studies. Topics covered this year include seven domain tracks, viz. Big Data Storage and Analytics, Artificial Intelligence and Machine Learning, Cognitive Systems (Vision and Perception), Embedded Systems and Internet of Things, Soft Computing, Computational Intelligence, and Advanced Communication Technologies. This year's conference received 220+ manuscripts from different parts of the world, out of which 50+ papers were selected for the presentations, after a thorough anonymous review process (3 or more reviews per manuscripts) by the experts.

I express my sincere thanks to our beloved Management Trustee, Shri. R. S. Kothavale and our Secretary, Shri. S. M. Sirsikar for their perpetual encouragement and support. I would like to thank everyone who have dedicated their time, energy, and ideas to assist in organizing this event, including the members of the organizing committee, the TPC Chairs, TPC members, and all the reviewers. We are highly delighted to have great personalities like Prof. L. M. Patnaik and Prof. R. Gangopadhyay as our chief guests and Mr. Raj Neervannan and Mr. Mandar Agashe as our guests of honor. The conference also includes keynote addresses by our distinguished keynote speakers, Vishal Chahal, Mr. Shyam Sundar Ramaswami, and Dr. Lipika Dey. In addition, 25+ experts from industry, research and academia are associated as a resource person in conducting expert talks, workshops, tutorials and panel discussions.

With a deep sense of gratitude, I would like to thank ICEI-2022 publishing partners Bentham Science and Springer. I also take this opportunity to thank all our partners. Last but not the least, I profoundly thank all the organizing committee members and student volunteers who as an amazing team, left no stone unturned in making this event a huge success. Through the collective efforts of these individuals and organizations that we are able to bring you a great event! I am confident that the brainstorming sessions and the networking opportunities will bring innovative solutions for the current societal issues globally and in particular for the Indian scenario.



With best wishes,

**Prof. Prahlad T. Kulkarni,  
General Chair, ICEI-2022 and  
Director, PICT, Pune-43**





## Conveners and TPC Chair Message

It is our great pleasure and privilege to welcome you all to the three-day 2nd Conference on Emerging Trends and Innovations in ICT (ICEI-2022).

ICEI-2022 addresses major domains of Information and Communication Technology (ICT) with high-impact research applications that benefit society, industry, and education. Big Data Storage and Analytics, Artificial Intelligence and Machine Learning, Cognitive Systems, Vision and Perception, Embedded Systems and Internet of Things, Soft Computing, Computational Intelligence, and Advanced Communication Technologies are among the major tracks covered by ICEI-2022.

ICEI-2022 provides a common platform for scientists, technologists, engineers, academicians, and researchers from various research centers, academic institutions, and industries around the world to showcase and discuss their ideas, innovations, and research experiences.

We would like to express our sincere gratitude to honorable Shri. R. S. Kothavale, Management Trustee, SCTR, and honorable Shri. Swastik Sirsikar, Secretary, SCTR, for being an inspiration and providing assistance in making this conference a success. We profoundly thank Dr. P. T. Kulkarni, General Chair, ICEI-2022 and Director, PICT, for his ceaseless guidance and timely aid for the successful culmination of the conference.

We gratefully acknowledge Dr. R. Sreemathy, Incharge Principal, PICT, Dr. M.S. Takalikar, Head of Computer Engineering department, Dr. S. V. Gaikwad, Head of E&TC department, Dr. A. M. Bagade, Head of Information Technology department and Dr. A. M. Deshmukh, Head of First Year Engineering department, for their outstanding suggestions and support in shaping the conference. We would like to thank the organizing committee, and the staff members of the PICT for their untiring efforts. We would like to express our gratitude to our publishing partners, Bentham Science and Springer. We'd also like to thank ICEI-2022 sponsors Sarvatra Technologies, AlphaSense Inc., E2OPEN, imocha, CakeSoft Technologies, and TARANA-Wireless Inc.

With best wishes,



**Dr. G. V. Kale**



**Dr. K. A. Sultanpure**



**Dr. P. S. Varade**



## Dignitaries

### **Prof. L. M. Patnaik**

Chief Guest for Inauguration



Prof. L. M. Patnaik is working as an INSA Senior Scientist and Adjunct Faculty at the National Institute of Advanced Studies. He has completed his BSc. (Engg.) in Electrical Engineering, M.E. in Electrical Engineering, PhD/DSc from Sambalpur University, Orissa (secured first rank) and IISc, Bangalore, respectively. He has served as a Vice-Chancellor, at Defence Institute of Advanced Technology Deemed University, Pune. His most recent research interest since 2015 has been in the areas of Computation, Cognition and Machine Consciousness. He has to his credit more than 1100 publications and 27 students have completed their PhD under his guidance till date. He has received several awards including “Life Time Achievement Award, Computer Society of India”, “M N Saha Memorial Award for Best Application Oriented Paper, IETE”, “Outstanding Contribution to Soft Computing Award of the International Neural Network Society India Chapter”, etc. He is invited as a keynote speaker for various reputed conferences and events.

### **Mr. Raj Neervannan**

Guest of Honor for Inauguration



Raj Neervannan is the CTO and co-founder of AlphaSense, a groundbreaking AI-based market intelligence and search platform used by over 2,000 corporations and financial institutions, globally. A visionary technologist and entrepreneur of multiple venture-backed firms, Raj has previously led the development of financial software products used across numerous Fortune 500 companies. Before AlphaSense, Raj served as CTO of Epolicy Solutions, CTO of MajescoMastek, and CTO of Choicepoint and has held senior executive positions at several software technology firms. He holds a Wharton MBA with a major in finance, a Master’s degree in Mathematics, a Bachelor’s degree in Computer Science from BITS, Pilani, India, and Masters in Operations Research and Computer Science from Bowling Green University, OH

## Dignitaries

### **Prof. Ranjan Gangopadhyay**

Chief Guest for Valedictory



Prof. Ranjan Gangopadhyay, currently working as a Distinguished Research Professor in the Department of Electronics and Communication Engineering, as well as the Centre Lead of one of the most vibrant research centres, LNMIIT, the Centre of Excellence for Next Generation Communication and Networking (C-NGCN). He completed his PhD from IIT Kharagpur in the year 1978. He has vast industrial experience across the globe. He was Visiting Professor in the University of Parma, Italy; Chonbuk National University, South Korea and Scuola Superiore Sant'Anna, Pisa, Italy. He also received the European Commission Senior Post-Doctoral Fellowship, INSA-Royal Society Fellowship (x2); JSPS (Japan) Senior Fellowship and CIDA (Canada) Fellowship.

### **Mr. Mandar Agashe**

Guest of Honor for Valedictory



Mandar Agashe comes from a business family that has been closely associated with the co-operative sectors of Maharashtra, for three generations.

Mandar has taken his Bachelor's degree in Computer engineering in 1990 from PICT, Pune. He started Sarvatra technologies on 22 June, 2000. He wanted to bring the best of banking, to the underbanked people in semi-urban and rural areas.

He raised funding from strategic partners, who not only gave the capital but brought with them technology and domain expertise too. Overall, Sarvatra have raised a total equity of more than \$20 million from strategic investors over 10 years.

The banks digitally enabled by Sarvatra on NPCI's RuPay Payment Platform currently process over 3,00,000 transactions per day and the number is growing exponentially. Sarvatra EFT Switch is already deployed in more than 450 co-operative banks across 27 states and 3 union territories in India, but an equal number of banks are yet to come on the National Financial Switch (NFS) platform.



## Keynote Speakers

### Vishal Chahal



Director IBM Automation & AP Cloud Pak Labs, IBM Software Labs at IBM. Vishal Chahal is Director for IBM Automation engineering and development at IBM Software Labs. He also leads the Cloud Pak Labs for Asia Pacific covering Data & AI, Automation, Integration and Security platforms. He has over 21 years of experience leading several technical and leadership roles across product development, pre-sales, cross BU collaborations and Global System Integrators. Vishal has been a certified specialist on Data and AI with experience across various industry verticals. He specializes in Watson Cognitive Products, Advanced Analytics, Advanced Visualization, Data Warehouse and Data Integration technologies. He has architected Cognitive and Analytics solutions for multiple customers across Telco, Banking, Insurance, Aviation and Healthcare Industries. He has a rich background of product architecture and development experience on portfolio across Watson, SPSS, Cognos, DB2 and Websphere.

### Shyam Sundar Ramaswami



Shyam Sundar Ramaswami is a Senior Research Scientist with Cisco's Research and Efficacy team. Shyam is a two-time TEDx speaker, co-author of the book titled "It's your Digital Life" and a teacher of cyber security. Shyam has delivered talks in top notch international cybersecurity conferences like Blackhat, Qubit, Nullcon, Deepsec and Hackfest. Shyam has also taught "Advanced malware attacks and defences" class at Stanford University's cybersecurity program and runs a mentoring program called "Being Robin" where he mentors students all over the globe on cybersecurity. Interviews with him have been published on leading websites like ZDNet and CISO MAG. His twitter tag is @hackerbat

### Lipika Day



Lipika is a chief scientist at TCS Research and Innovation and heads analytics and insights practices. Lipika holds a PhD in computer science and engineering from IIT Kharagpur. Her research interests are in the areas of NLP, text and data mining, machine learning, and semantic search.

## Industry Experts

### Dr. Rabin Patra



Rabin is Tarana's chief software architect and leads the system integration team. He is applying more than 10 years of wireless network research and product development experience at Intel Research Labs and UC Berkeley, focused on 802.11-based low-cost, long distance wireless technologies, successfully validated through realworld deployments. Rabin has published more than 10 technical papers related to wireless networks and speech recognition.

### Ramkumar Ramalingam



Ramkumar Ramalingam is a Lead Architect in the Application Integration portfolio, part of IBM Software, with responsibility for driving Connectors and Artificial Intelligence strategy for IBM App Connect. With more than 20 years of experience in the software industry, in his prior roles, he has been involved in design, development, and architecting a wide variety of middleware products like WebSphere Liberty, JCA Adapters, SCA Containers, and Smart Analytics Platform.

### Kavitha Yogaraj



Kavitha has completed her PhD from IIT, Patna, MSc Comp Sci. from the University of Washington, and BE – Telecommunication Engineering from Visvesvaraya Technological University. Currently, she is working as a Quantum Computational Scientist at the IBM Quantum Services team. Major domains she has worked on are Travel & Transport, Shipping and logistics, Hotel and Hospitality, and Telecom Sectors. She is also a Technical Quantum Ambassador and has delivered 20 sessions on Quantum 101. She is a Qiskit advocate and her eminence in Qiskit coding has been recognized for a Qiskit mentorship program. She was a mentor at IBM Quantum Challenge 2021 and Qiskit Global Summer School 2021. Previously, she has also served as a Data Scientist and Data Engineer. She has several publications in her name and has filed 4 patents to date.

### Peng Wang



Peng Wang is the Director of AI Research at AlphaSense. He leads the company-wide efforts to develop and deploy advanced AI algorithms for AlphaSense products. He received his Ph.D. from Rensselaer Polytech Institute. He has 15+ years of experience of working in various machine learning domains, and authored 30+ academic publications and holds 10+ industrial patents. His current focus is deep learning and NLP. Before AlphaSense, he worked at Google as an engineer and tech lead, building large scale machine-learning models for products such as AdWords and Android Messages.



## Industry Experts

### Prashant Budania



Prashant Budania is a Senior AI Research Engineer at AlphaSense where he works to solve interpretability, language modelling, and sequence classification problems. He holds degrees from Indian Institute of Technology, Delhi in Electrical Engineering and Carnegie Mellon University in Computer Engineering.

### Tanvi Sahay



Tanvi Sahay is a Senior AI Research Engineer at AlphaSense, where she works on designing user interpretable solutions for document understanding and information extraction problems. She did her Master's in Computer Science with a focus on NLP and Deep Learning from University of Massachusetts, Amherst and has been a part of AlphaSense for 4 years.

### Chandan Gangwar



Chandan Gangwar is an AI Research Engineer at AlphaSense, where he works on information extraction and sequence classification problems. He is a graduate of Indian Institute of Technology, Guwahati and has been a part of AlphaSense for 2 years.

### Krishnkant Swarnkar



Krishnkant Swarnkar is an AI Research Engineer at AlphaSense, where he works on KPI centered knowledge extraction from business documents. He did his Bachelor's and Master's in Computer Science from University of Massachusetts, Amherst and Indian Institute of Technology (BHU), Varanasi, respectively.

### Joe DeRose



Joe DeRose is an AI Researcher Engineer at AlphaSense, where he works on language modelling, document summarization, and search engine autocomplete. He did his undergrad at Vanderbilt University, with degrees in Mathematics and Computer Science, and received his Master's in Computer Science with a focus on NLP from Columbia University. His research areas of expertise are in pre-training and visualizing language models as well as solving general sequence classification problems.

## Industry Experts

### Swapnil Pingle



Swapnil Pingle is the QA Lead in AlphaSense with vast experience in automation QA, where he works to automate trivial business scenarios that involve manual intervention. He is a fellow alumnus of PICT batch 2011.

### Vaibhav Sarje



Vaibhav Sarje is a Software Engineer in AlphaSense with experience in backend technologies. He primarily works on technical services which mainly focuses on the content of AlphaSense. He is a fellow alumnus of PICT batch 2011.

### Manasi Amale



Manasi Amale is a Software Engineer in AlphaSense with experience in backend technologies. She works on technical services which mainly focuses on the Web content of AlphaSense. She is a fellow alumnus of PICT batch 2016.

### Dr. Maruti Khaire



Dr. Maruti Khaire is a blend of Engineering and Management professions. He is currently working as Head – Electrification and Special Projects at SKF India Ltd. He is a Mechanical Engineer educated from College of Engineering Pune (COEP), MBA from Symbiosis Institute of Business Management (SIBM, Pune) and PhD in Innovation Management. Dr. Khaire is having 20+ years of Industrial experience with leading automotive MNC OEMs and auto component organizations. He possesses diverse experience in the field of R&D, technology roadmap, new products development, business development, strategic management, and emerging market. He has published 9 international journal papers and filed 12 patents.

### Mohammed Ameer



A highly skilled and experienced tech professional in the field of Internet of Things and Artificial Intelligence. Ameer is an innovative professional with many years of experience in tech solution development, content curation and content delivery around IoT and AI. He has delivered enormous number of tech sessions, webinars, and workshops to a varied set of audience. He has mentored various projects around IoT, computer vision, automation, and AI. He is also certified in RPA with UiPath Associate level certification.





## ICEI - 2022 Committees

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Mr. Kiran Kale

Dr. Bhavana Vyas

Prof. V. R. Jaiswal

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Prof. Snehal Shintre (ACM)

Prof. Ashwini Bundeale (CSI)

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Prof. Ashwini Bundeale

Prof. Nilesh Gawade

Prof. Rushikesh Joshi

Prof. Nilesh Shirude

Prof. Ajinkya Rasal

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Prof. Harsh S Thakar

Prof. Mayur Chavan

Prof. Abhijit Balaso Wagh

Prof. Anil Bodhe

Prof. Rushikesh Khatri

Prof. Pankaj Sumersing Patil

### Registration, Memento, Certificates, Awards

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Prof. Anagha Kulkarni

Prof. A. V. Yenikar

Prof. Sakshi M.Hosamani

Prof. Hrushikesh Joshi

Prof. Sneha H Pisey

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## ICEI - 2022 Committees

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Prof. Siddhesh Narendra Upasani

Prof. S. L. Dhende

Prof. Mandar Nitin Kakade

### **Inaugural, valedictory, and program**

Prof. Radhika Kulkarni

Prof. Anuradha V. Yenikar

Prof. Sakshi M.Hosamani

Prof. Urmila Pawar

Prof. Abhijeet C. Karve

Prof. Pankaj Patil

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Prof. Shreesudha Kembhavi

Prof. Laxmi Pawar

Prof. Swapnil Shendge

Prof. Prajakta Khadkikar

Prof. Madhuri Mane

### **Student Volunteers**

Sharayu Hiwarkhedkar

Rohin Bhat

Sakshi Harode

Om Shinde

Prutha Rinke

Aditya Kangune

Akash Kulkarni

Anupam Patil

Rohan Doshi

Sharvi Endait

Devansh Mundada

Pinak Mapari

Ashutosh Shaha

Vimal Galani

Siddhi Wakchaure

Yash Pawar

Vedant Kulkarni

Ved Patwardhan

Jash Shah

Chaitralee Datar

Falguni Jawalkar

Tejaswini Jadhav

Shivani Gaikwad



## Session Chairs

### Track 1 - Big Data Storage and Analytics

<b>Yogesh Murumkar</b> Director, Bharat Soft Solutions, Kothrud, Pune	<b>Dr. Aradhana Deshmukh</b> Associate Professor, MMMCoE Pune.
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### Track 2 - Artificial Intelligence and Machine Learning

<b>Dr. Hemant Palivela</b> Ph.D. Senior Research Scientist, Accenture AI labs.	<b>Prof. Manesh Kokare</b> Professor, SGGS Institute of Engineering and Technology, Nanded	<b>Nilesh Pethani</b> Application Architect, iMocha
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### Track 3 - Cognitive Systems, Vision and Perception

<b>Dr. Sudeep Thepade</b> Professor and Dean, PCCoE, Pune	<b>Dr. Bhushan Garware</b> Senior Architect, Growth & Solutions, Data Practice. Persistent Systems Ltd, Pune, India.
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### Track 4 - Embedded Systems and Internet of Things

<b>Dr. Nilesh Bahadure</b> Associate Professor, Sanjay Ghodawat University, Kolhapur	<b>Dr. Aarti Amod Agarkar</b> Associate Professor, MMMCoE Pune.
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## Session Chairs

### Track 5 - Soft Computing

<b>Dr. Jude Hemanth D</b> Associate Professor, Karunya University, India	<b>Dr. Aniruddha Pant</b> Founder and CEO (AlgoAnalytics)
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### Track 6 - Computational Intelligence

<b>Dr. D. G. Bhalke</b> Professor & Head, Department of E&TC Engineering, AISSMS College of Engineering, Pune	<b>Dr. Amol Kalgaonkar</b> BU Head & Global Head, ICT India Pvt. Ltd. Pune
--	--

### Track 7 - Advanced Communication Technologies

<b>Dr. Prasanna Palsodkar</b> Assistant Professor, YCCE, Nagpur	<b>Dr. A. K. Mukhopadhyay</b> Professor Emeritus, IET, Bundelkhand University, Jhansi
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## Program Schedule

### 10<sup>th</sup> March 2022

Time	Event Details		
10 AM to 12 Noon	<p align="center"><b>Inauguration</b></p> <p align="center">Address by dignitaries from SCTR's PICT</p> <p align="center">Chief Guest: Prof. L. M. Patnaik, Adjunct Professor and NASI Senior Scientist, National Institute of Advanced Studies, Indian Institute of Science Campus, Bangalore</p> <p align="center">Guest of Honour: Raj Neervannan, CTO and co-founder of AlphaSense California, USA</p> <p align="center">Keynote: Vishal Chahal, Director IBM Automation &amp; AP Cloud Pak Labs, IBM Software Labs "Artificial Intelligence and Automation"</p>		
12 Noon to 1.00 PM	Break		
1 PM to 3 PM	Workshop on "Research Trends in Optical Technologies and wireless communication (5G and Beyond)" - Session-I	Paper Presentation in parallel tracks	"Accelerating AI adoption with IBM Technologies" – Session-I by Nagarjuna Surabathina, Kapish Malhotra and Ramkumar Ramalingam from IBM Software
3 PM to 4 PM	Workshop on "Research Trends in Optical Technologies and wireless communication (5G and Beyond)" - Session-II		"Fixed Wireless for Broadband: Challenges and Approaches" by Dr. Rabin Patra, Co-founder at Tarana Wireless, Berkeley, California, United States
4 PM to 5:30 PM	Workshop on "Research Trends in Optical Technologies and wireless communication (5G and Beyond)" - Session-III		Panel discussion on "Rethinking Cybersecurity: How secure is your digital world?" Panelists: Dr. Sachin Lodha, Mr. Amar Kalvikatte, Dr. Shravani Shahapure, Mr. Sameer Ahirrao Moderator: Mr. Ameya Deshpande
6 PM to 8 PM	Workshop on "Containerization & Cloud Deployment of Application", by Manasi Amale, Software Engineer, AlphaSense, Vaibhav Sarje, Software Engineer, AlphaSense and Swapnil Pingle, QA Lead, AlphaSense		

### 11<sup>th</sup> March 2022

10 AM to 11 AM	Keynote: Mr. Shyam Sunder Ramaswami, Senior Research Scientist, Cisco "Threat landscape: The Lazarus pit for cyber criminals"		
10 AM to 11 AM	Workshop on "Research Trends in Optical Technologies and wireless communication (5G and Beyond)" - Session-IV		



11 AM to 12 Noon	Expert talk on “AI/ML” by Mr. Ameer, Vodafone		
12 Noon to 1 PM	Break		
1 PM to 3 PM	Workshop on “Research Trends in Optical Technologies and wireless communication (5G and Beyond)” – Session-V	Paper Presentation in parallel tracks	Accelerating AI adoption with IBM Technologies – Session-II by Nagarjuna Surabathina, Kapish Malhotra and Ramkumar Ramalingam, IBM Software
3 PM to 4 PM	Break		
4 PM to 5 PM	Expert talk on “Building robust business which is sustainable as well as growing” by Dr. Maruti Khaire, SKF India Ltd.		
6 PM to 8 PM	Workshop on “Advanced NLP Applications in FinTech” - Session-I, by Peng Wang, Prashant Budania, Tanvi Sahay, Chandan Gangwar, Krishnkant Swarnkar, Joe DeRose from AlphaSense		

### 12<sup>th</sup> March 2022

10 AM to 11.00 AM	Keynote: Dr. Lipika Day (TCS Research) “Analyzing Clinical Narratives – augmented intelligence for Decision Making in Health Care”	10.00 AM to 5.00 PM  Workshop on “Developing IOT applications using embedded devices” by Thirukumaran R, New Horizon, CoE, Bangalore and Nilesh Gawade, SCTR’s PICT, Pune
11:30 AM to 1 PM	Expert talk on “The art of AI engineering” by Ramkumar Ramalingam, IBM Software	
1 PM to 3 PM	Expert talk on “Quantum 101 - Rajesh Jeyapaul”, IBM India and “Deep dive into Quantum Machine Learning” by Kavitha Yogaraj, IBM India	
6 PM to 8 PM	Workshop on “Advanced NLP Applications in FinTech” - Session-II by Peng Wang, Prashant Budania, Tanvi Sahay, Chandan Gangwar, Krishnkant Swarnkar, Joe DeRose from AlphaSense	
8 PM to 9 PM	<b>Valedictory of ICEI-2022</b> Chief Guest: Prof. Ranjan Gangopadhyay, Distinguished Professor, The LNM Institute of Information Technology, Jaipur, India Guest of Honour: Mr. Mandar Agashe, Founder and CEO, Sarvatra Technologies	



Track 1

# Big Data Storage and Analytics



## Track 1 - Big Data Storage and Analytics

Paper-ID: 49

### ArmorFS: A user-space cryptographic Filesystem

Yash Patil, Ajinkya Kulkarni, Sahil Naphade, Yash Kulkarni, Kaushik Lathiya, Sachin Pande

Filesystems define how the data-at-rest is stored, organized and retrieved. Without a filesystem, data on a storage medium is stored as just a huge chunk of bits with no way to distinguish between application-specific data and determine the start and end of related data. Traditional filesystems, however, are easy to exploit since the data is not protected.

A safe way to store this data-at-rest is to encrypt it. However, creating a filesystem, which is able to encrypt and decrypt the data, in the kernel of the operating system comes with its own set of issues. Additionally, not every kind of data requires protection. Thus, in this paper, we propose a filesystem residing in user space, on top of the kernel filesystem, which can be used to store all kind of data that needs protection. Additionally, considering an increase in use of multi-tenant systems, this filesystem allows the use by each independent user.

**Keywords-** FUSE · Cryptography · user-space · ArmorFS · Encryption · Security · Storage.

Paper-ID: 99

### Impulsive Transaction Prediction for People with Bipolar Disorder using Supervised Learning Algorithms

Parth Kulkarni

Predictive Analytics have been widely used in Payment and Banking applications for transaction processing. Companies are using various algorithms to determine the credit limit and spending capacity for an individual. With the rise in data collection and data analytics advancements, this process needs to be more inclusive for people with mental disorders such as Bipolar Disorder, which can help them get control over their finances. A real-world dataset (anonymized) with few synthetic fields have been used to conduct this analysis. Dimensionality Reduction methods have been used to improve the metrics. Dimensionality has been reduced using Feature Selection method of Recursive Feature Elimination and Cross Validation (RFECV) and Feature Extraction method of Principal Component Analysis (PCA). Machine Learning algorithms such as Logistic Regression, Decision Tree, Support Vector Machine, Random Forest, K Nearest Neighbor, Gaussian Naïve Bayes and Artificial Neural Network have been implemented to determine the accuracy. Findings revealed that Random Forest had the highest accuracy of 0.951 using the RFCEV method, while the Artificial Neural Network showed the best performance with PCA, with the highest accuracy score of 0.938 as compared to other models. By deploying the solution on public cloud, it can be best used as Mobile first application to help users with mental disorders monitor, analyze and control their spending. This will help in making banking and payment industry more inclusive and improve accessibility.

**Keywords-** Impulsive Spending Behavior, Bipolar Disorder, Machine Learning

## Track 1 - Big Data Storage and Analytics

Paper-ID: 84

### DevOpsChain: A Framework to strengthen DevOps using Blockchain

Sandip Bankar, Deven Shah

DevOps is a software development culture, places a premium on inter-departmental interaction and automation of software stakeholders. While they are producing useful software for clients, the development and operations teams frequently clash. Additionally, it has resulted in security issues and privacy problems. In the heterogeneous context of rapid software development and deployment, this research project, proposed system DevOpsChain, tries to instill trust in untrustworthy and stubborn stakeholders of software development following the adoption of DevOps with audit limits on business and technology. For safe and secure transactions, blockchain technology and smart contracts can be utilized to manage the flow and visibility of project artifacts. Proposed DevOpsChain system has been observed to operate more effectively when optimized for block size, endorsement policies blockchain factors.

- **Background:** Software industries are trying to increase the number of releases. DevOps stakeholders are facing issues of collaboration and communication gaps while using DevOps. At the same time, security of documents is being ignored. The literature contains studies on solving these issues, but their adoption has been facing challenges in practice.

- **Objective:** The objective of this work is to enhance the potential of DevOps by bridging communication and collaboration gaps to create trust among stakeholders and to improve the security of project documents to create trust among stakeholders.

- **Method:** We studied and analyzed the selected articles qualitatively, extracting problems, causes, and solutions to improve the potential of DevOps by including decentralization of documents in all DevOps stages. We identified the project documents generated by all DevOps stages and created a decentralized framework with Blockchain to tackle identified issues.

- **Results:** The proposed framework is designed and built using the Hyperledger Fabric Blockchain. All DevOps stakeholders are brought together on a single platform so that every document and its updates can be tracked on immutable storage. System makes all DevOps documents available to all stakeholders to improve the efficiency of software development. The performance of the proposed framework is found to be better than the existing system after optimization with BatchSize and Endorsement Policies.

**Conclusion:** The proposed system applies the suitability of Blockchain in DevOps and Blockchain network performance is seen to outperform in terms of transaction throughput and latency.

**Keywords-** Blockchain, Software Development Cycle, DevOps, Agile Development.



## Track 1 - Big Data Storage and Analytics

Paper-ID: 101

### Standardization and Context-Specific Named Entity Linking of Electronic Medical Records

Pranita Mahajan, Dipti P. Rana

There is a high need for standardizing digital healthcare information. Annotation and classification processes influence data retrieval from discharge summaries. Automating the process of annotation can reduce manual efforts. Storing the extracted knowledge in the form of a Knowledge Base can help future research. The paper addresses automating the Clinical Named Entity Recognition (NER) classification result on i2b2 2009 dataset to the standard BIO (Beginning-Inside-Outside) format. Literature proves the efficacy of word embedding to improve entity mention and link and reviewing word embedding methods for the healthcare domain and constructing a Knowledge Base (KB) using Problem – Treatment NER tags. Each patient is represented in the form of a node, and properties of the node are stored as the Problem tag and Treatment tag.

**Keywords-** Electronic Clinical Records, Named Entity Recognition, Knowledge Graph,

Paper-ID: 135

### Secure Multiparty Computation in Heterogeneous Environment: Survey and challenges

Amitesh Kumar Pandit, Kakali Chatterjee

Sharing of personal data in distributed environment which raises the individual privacy concerns. However analysis of these data may solve various real life problems, for example, analysis of medical data, e-auction, secure voting etc. Secure Multi-party Computation (MPC) provides a platform where a group of parties jointly compute a function without any interaction and every party's secret personal data is input of this function. They do not trust anyone. They are highly interested to know the output of the function but they will never suppose to reveal, their secret. To compute such function there exists, lots of different variant of MPC protocol. Present paper reviewed some of MPC protocols based on different parameters; like: security, privacy, feasibility, efficiency and their applications.

**Keywords-** Multiparty Computation, MPC, Garbled Circuit, Oblivious Transformation, secure voting, Distributed computation.

## Track 1 - Big Data Storage and Analytics

Paper-ID: 161

### Question Answering System for Legal Documents using Transfer Learning

Manas Joshi, Atharva Lohangade, Atharva Mundada and Yashodhara Haribhakta

Question Answering Systems (QAS) have become more popular than the traditional search engines by providing relevant and concise answers to domain-specific questions. Moreover, the Legal Domain comprising of long and difficult-to-comprehend Legal Acts, benefit significantly from such answer-ing systems. Therefore, we intend to present a closed domain QAS for Legal Documents, particularly the Indian Legal Acts, using the Transfer Learning ap-proach. The proposed system is designed to pre-process the overlong Legal Acts into small yet significant contexts, for answering the posed questions using the state-of-the-art BERT Model, fine-tuned on an Indian Legal Dataset that consists of human-generated and system-generated questions, containing around 2250 questions. Additionally, the Question Generation (QG), which is an auxiliary component of the system, developed using Google's T5 model, demonstrates the automatic generation of system-generated questions based on the Indian Acts for the Legal dataset. The Legal QAS produces reliable results by answering the questions from the Legal test set, containing human generated questions, with an Exact Match (EM) of 77.38 and a F1-score of 76.26.

**Keywords-** QAS, Transfer Learning, Legal Documents, BERT.

Paper-ID: 174

### Detection of duplicate questions using Universal Sentence Encoder with learning

Kimaya Urane, Dr. Arati.R. Deshpande

Today's era is of asking questions Why, What, and How. There are many such application like Google, Quora, Stack overflow where we ask a variety of questions to find out satisfying answers. But due to huge collection of records in database data will become inconsistent to find out relevant output. This also leads to problem of duplication. Paraphrasing techniques are emerging methods in natural language processing (NLP). These paraphrasing techniques are used in a variety of applications. One such application is the question answering system. In this application many people ask same type of questions again and again. Sometimes we already have an answer stored into database for the asked question. But system cannot detect it and creates a new answer instead of searching in the database. So, to perform such activity it consumes a lot of time. To overcome this problem, we have proposed a system that will predict whether the asked question is duplicate or not using deep neural network and Universal Sentence Encoder (USE) embedding technique in natural language processing (NLP). The model is evaluated by considering specific epochs and the accuracy of the model implemented is 91.12% which is improvement over the existing systems.

**Keywords-** Paraphrasing techniques, Natural Language Processing, Question and Answering, Duplicate question, Deep Learning, Neural network.



## Track 1 - Big Data Storage and Analytics

Paper-ID: 202

### Stock Market Movement Prediction using News Analytics

Pratyaksh Agarwal, Deep Sheth, Tanishka Shah, Nikhil Bhutani, Yash Toshniwal, Nitin Sakhare

The price of a stock is very erratic and predicting it accurately has always been awarded lucratively. The stock market volatility has given rise to a gambling den for the rich and poor alike, who use various methods to forecast the price of a stock and understand the general trend of a sector. One such method of prediction is achieved through deploying machine learning algorithms to speculate the direction of movement of a stock. There are two main factors that affect the price of a stock- the news around the sector and company, and the company financials. Both these aforementioned factors can be studied and used to predict a company's stock price, and hence have become subject to extensive studies and exploration. In the proposed decision support system, we have employed natural language processing, neural networks, and supervised machine learning algorithms to analyze the news about the sector, company, and the country which results in a unique ensemble method to generate a 5-bit pattern, which are then mapped to 5 calls that range from a high chance of increase to a high chance of decrease. This ensemble approach eliminates the drawbacks of using these techniques exclusively and assembles the advantages in one system. Calls generated by this system can be used to aid our decisions while investing in the stock market, as we can construe the direction of the movement of the market.

**Keywords-** Sentiment Analysis, Stock Market, Decision Support System, Neural Networks, Ensemble Approach, Machine Learning.



Track 2

# Artificial Intelligence and Machine Learning



## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 7

### Suggesting Relevant Questions for A Query Using Statistical Natural Language Processing Technique

Shriniwas Nayak, Anuj Kanetkar, Hrushabh Hirudkar, Archana Ghotkar, Sheetal Sonawane, Onkar Litake

Suggesting similar questions for a user query has many applications ranging from reducing search time of users on e-commerce websites, training of employees in companies to holistic learning for students. Use of Natural Language Processing techniques for suggesting similar questions is prevalent over the existing architecture. Mainly two approaches are studied for finding text similarity namely syntactic and semantic, however each has its drawbacks and fail to provide the desired outcome. In this article, a self-learning combined approach is proposed for determining textual similarity that introduces a robust weighted syntactic and semantic similarity index for determining similar questions from a predetermined database, this approach learns the optimal combination of the mentioned approaches for a database under consideration. Comprehensive analysis has been carried out to justify the efficiency and efficacy of the proposed approach over the existing literature.

**Keywords-** Syntactic Similarity, Semantic Similarity, Information Retrieval, Weighted

Paper-ID: 60

### Machine Learning Models for Prediction of Nutritional Psychology, Fast-Food Consumption Rate and its Impact on Student's Physical and Mental Health

Parth P. Rainchwar, Rishikesh S. Mate, Soham M. Wattamwar, Varsha Naik, Dency R. Pambhar

The intake of fast food is rapidly accelerating due to the factors specifically the cost-effectiveness and being tasty, but not all individuals are aware of its harmful long-term effects on physical and mental health. On the issue of nutrition and fast-food intake this is an unexplored field of research so far. In this paper, we have profoundly analyzed the relationship using Machine Learning models, which is a new approach for nutrition-based analysis. A general questionnaire is prepared dealing with all the factors of nutrition and the immune system. The survey was hosted on an online platform and participants were college students from MIT-WPU School of Engineering. Responses are then analyzed implying onto the food-habits and eating behavior using Random Forest, Naive Bayes and Extremely Randomized trees

According to our understanding and knowledge, this is the earliest research to include all these factors along with Machine Learning algorithms especially on college students as target audience. The primary objective is to apply association, classification, and regression algorithms in order to predict BMI, sickness, pre covid and post covid eating schedule and the experiments conducted during this research reveal that this method significantly improves the analysis of real-world data as compared to the traditional statistical approach with a commendable accuracy of 98%

**Keywords-** Machine learning, BMI, Random Forest, Naive Bayes, Fast Food Intake, Nutrition, Classification, Prediction



## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 74

### Content-based Linear and Nonlinear Dynamic Texture Synthesis using Time Series Approach

Premanand Pralhad Ghadekar.

Capturing the nonlinear aspects of a dynamic texture is both challenging and tough. The proposed innovative algorithms focus on capturing the linear and nonlinear motion of dynamic texture. The innovative part of the proposed model is computing a seasonal matrix using simple mathematical calculations to predict a new frame as well as insert a predicted frame for reconstructing a dynamic texture from the original ones. The main advantage over the other widely available methods is that there is no need for transform coding since the algorithm directly applies to the raw video thereby, reducing the model size, model parameters, computational, and time complexity. The proposed algorithm is used for dynamic texture synthesis with a very less amount of model coefficients and very high visual quality. It is useful to generate a huge number of frames with a compression ratio of 33% and 90% and PSNR values between 45dB to 65dB.

**Keywords-** SVD; HOSVD; YCbCr; linear; nonlinear; time series; seasonal matrix.

Paper-ID: 79

### Machine Learning Algorithms Design pertaining to cancer dependent categorization on information of RNA Sequencing

Mr.Pravin V.Shinde, Dr.Rajesh Deshmukh, Dr.Preeti S.Patil

Due to delay in proper treatment and diagnosis, Cancer move toward one of major character that is accountable for fatalities globally. This happened due to uncontrolled and abnormal cell growth in human body, that can get transferred to different parts of human flesh. Sequence of Ribonucleic acid (RNA) checks variation that takes place in cells and assist in analyzing transcriptome in pattern of gene expression inside RNA fluids. In an early stages of cancer schemes of Machine learning contributes in cancerous cell prediction, if concerned information is made easily accessible. Main aim of this research is in building prototypes and group various kind of cancer. Hence, we deployed many machine learning schemes such as support vector machine (SVM), random forest (RF), multilayer perceptron (MLP), & k-nearest neighbors ( KNN ) for classifying samples as per their labeling. Out of Genotype-Tissue Expression (GTEx) & cancer genome Atlas (TCGA), for this thesis datasets were accumulated. On independent dataset (GTEx) machine learning techniques were tested and trained on TCGA data. Data representation thus received by applying stacked denoising autoencoders are utilized in training and testing prototypes. These models were not having very high performance; but, comparatively to others MLP exhibited better performance. Best characteristics that were chosen by applying SelectKBest, were utilized too for performance comparison. Outcome showed that K-nearest neighbor classifier provided good results, having precision of 85.12 percent whereas verified with self-sufficient information, with 98.4%. as accuracy of training.

**Keywords-** RNA, Cancer, KNN, SVM, Classification and ANN.



## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 97

### **Empirical comparison of Machine Learning algorithms to identify duplicate questions on various social media forums.**

Kartik Sridhar, Pranita Mahajan.

Multiple questions with the same intent can cause a lot of wastage of time to the active readers because they will have to spend a lot of time trying to find information to their questions and the best possible answer to that question, this also creates confusion to the reader since there are multiple versions of the same answer. This paper provides a solution to this problem by identifying the duplicate questions on social media. The paper is an empirical comparison of a random model, Logistic Regression, Linear Support Vector Machine (SVM) and XGBoost Machine Learning (ML) algorithms. The experiment shows improved accuracy using Matthew's Correlation Score (MCC) metric with the XGBoost algorithm.

**Keywords-** Duplicate Questions, Regression, Support Vector Machine, XGBoost, Accuracy, Mathew's Correlation Coefficient (MCC)..

Paper-ID: 104

### **Crater and Boulder Classification using Convolutional Neural Networks**

Ruchi S. Agarwal, Neha B. Bomble, Gayatri K. Deshmane, Dipti D. Patil

A simple deep learning-based CNN approach is used to apply the image classification technique to classify craters and boulders. This paper proposes the categorization of boulders and craters so that the UAVs can have a safe landing without crashing or colliding with any of these hazards. Data Augmentation technique is used to increase the dataset. The results give great accuracy considering the number of classes and size of dataset per class. Future Scope of using semantic segmentation on image or video for hazard detection is motivated.

**Keywords-** Image classification, image processing, machine learning (ML), deep learning (DL), Convolutional Neural Network (CNN), data augmentation, crater and boulder classification, lunar.

## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 140

### Detecting Alzheimer's using various Machine Learning Methodologies

Sakshi, Komal Gaikwad, Asma Nehal, Sukanya Pawal, Poonam Gupta .

Dementia is considered to be a syndrome where the cognitive functionalities of the human brain decline beyond the expected consequences of ageing. As stated by the World Health Organization(WHO) currently there are nearly about 55 million people who are affected by Dementia. It has been found that not much has been discovered about the consequences of Dementia in India but there are currently nearly 4 million people who are affected with different forms of Dementia in India whereas nearly 44 million people are living with this condition worldwide. In 2019 it became the 9th leading cause of deaths amongst all diseases worldwide leaving behind strokes. Almost 60-70% cases of Dementia are caused by Alzheimer's alone which makes it one of the leading causes of Dementia. With no cure currently available Alzheimer's surely needs to be addressed.

Along with the clinical aspects that are related to the detection of Alzheimer's, the psychological and socio-economic impacts are also studied that the disease might have on the affected people with the help of various shallow learning methods in Machine Learning. The dataset used is consists of 372 patient's records. This dataset is accessed through the Open Access Series of Imaging Studies which is also known as OASIS, is also available on Kaggle.

From a combination of linear, distance and tree-based algorithms we have used 12 such algorithms with four clinical features i.e. Mini Mental State Examination also known as MMSE, Atlas Scaling Factor (ASF), Normalized Whole Brain Volume also known as nWRV, and Estimated Total Intracranial Volume (eTIV). The analysis has been performed to find certain patterns and correlations in the dataset on the data fields such as age, education, social status, mmse, eTIV, nWRV and ASF.

**Keywords-** Alzheimer's Disease, ASF, Bagging Classifier, eTIV, Feature Selection, Dementia, Machine Learning, MMSE, nWR, SVM Linear, XGBoost.



## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 155

### Advanced Intelligent Tutoring Systems: Featuring the Learning Management Systems of the Future

Trishna Paull, Mukesh Kumar Rohil

An Intelligent Tutoring System (ITS) is employed with two goals in mind: 1) to deliver one-on-one smart teaching guidance that is superior to standard computer-assisted education and a skilled human instructor, and 2) to establish appropriate guidelines for designing and evaluating models of the academic process. The 'intelligence' of an ITS is derived from the use of artificial intelligence techniques in four interacting components, namely 1) the knowledge base (to represent and manipulate domain knowledge), 2) the student's model (to represent student's current academic state), 3) Pedagogical Model (to incorporate and use the teaching strategies), and 4) User Interface Model (to make the system usable, and to establish effective communication between the user and the system). On the other hand, a Learning Management System (LMS), an online (may be web-based) integrated software, is used for creating, delivering, tracking, and reporting educational courses or training resources, and also helps in assessing their outcomes. In this paper, we discuss various existing Intelligent Tutoring Systems, and systematically present the comparison of an ITS with a LMS. We emphasize that the ITS usage should be encouraged because of number of advantages, including improving both the learning curve and the learning experience, associated with an ITS over an LMS.

**Keywords-** Intelligent Tutoring System, Computer-Aided Instruction, Learning Management Systems.

Paper-ID: 156

### Image Classification Using CNN

Vandana Jagtap, Shridevi Karande, Aditya Rao, Yash Rathore, Muskan Gupta

One of the most powerful and compelling types of Artificial Intelligence is computer vision, which is one of the branches of computer science. It is like the human vision system, as it enables computers to recognize and process objects in pictures and videos in the same way as humans do. In computer vision, image categorization is a fundamental problem. Convolutional Neural Networks (CNNs) are highly accurate in a variety of disciplines, including computer vision, where picture categorization is one of the most researched and commercialized applications. In this research paper CIFAR 10 dataset is used and performed image classification using CNN, and it had an accuracy of approximately 93.2%.

**Keywords-** Computer vision, Convolutional Neural Networks, Artificial neural network, Image classification

## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 173

### Fake News Detection using Machine Learning

Pavitha N, Anuja Dargode, Amit Jaisinghani, Jayesh Deshmukh, Madhuri Jadhav, Aditya Nimbalkar.

In our current day scenario, when the internet is pervasive, everyone relies on a variety of online resources for news. As the number of individuals utilizing Facebook, Twitter, and others has grown, news has quickly traveled across millions of people in a short period of time. The propagation of fake-news has far reaching repercussions, from altering election outcomes in favor of specific politicians to creating prejudiced viewpoints. Furthermore, spammers utilize appealing news headlines to make cash through click-bait adverts. In this study, the paper depicts Natural Language, Artificial Intelligence, Processing, and Machine Learning (ML) techniques to conduct binary categorization of diverse news items available online. This study wants to give users the ability and surety to classify news as fake or real, as well as verify the legitimacy of the website that published it. It uses various methods to classify the news such as fake or real using Naive Bayes, Decision Tree classifier.

**Keywords-** fake news, machine learning, algorithms, artificial intelligence.

Paper-ID: 186

### Stock Prediction using Machine learning and Sentiment Analysis

Dr. Preeti Bailke, Onkar Kunte, Sayali Bitke and Pulkit Karwa

Predicting stock market behavior has been an area of interest to many researchers, especially in the field of Statistics and Data Analysis. The ability to analyze the stock market that appears to lack consistency, but also appears to be impacted by historical events is still a challenge. Long Short-Term Memory (LSTM) network model, Linear Regression model, Autoregressive Integrated Moving Average (ARIMA), and the stock market prediction using Sentiment Analysis are included in the proposed model. The dataset used is based on real-time stock market data from Yahoo Finance Website. The calculated Root mean square value predicts how much the data is concentrated near the best equity line. Emotional/Sentiment analysis is done using twitter API and Natural language processing. The results obtained proves that the proposed model can be used to predict future stock market behavior.

**Keywords-** LSTM, NLP, Stock Market, Data Analysis, Prediction, Machine Learning, Deep Learning.



## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 194

### Parkinson Disease Screening Using UNET Neural Network and BWO Based on Hand Drawn Pattern

Pooja Gautam Waware, P S Game

The majority of diseases may be detected without the assistance of a trained medical professional or verified using artificial intelligence. Parkinson's disease has become one of such diseases; as among the telltale signs of Parkinson's disease, the patient starts to lose his or her ability to write precisely. This implies that whenever a patient is requested to draw certain patterns, such as waves or spirals, the patient lacks precision and produces a disoriented drawing. Some approaches have tried their participation in the study by using these initial signs as the push to diagnose Parkinson disease. However, a randomized trial found that the quality of the Parkinson's disease diagnosis procedure still has to be improved. As a result, the dataset of sine wave and spiral drawing samples of non-patients and patients are used in this research paper to obtain relatively high precision. This dataset is utilized to discover writing patterns by the UNET deep learning model, which is subsequently employed by the black widow optimization method. Finally, using the decision tree approach, the collected patterns are evaluated to produce the optimized solution for Parkinson's disease identification. The experimental evaluation has resulted in achieving 94.37% precision, 94.37% recall and 94.37% of Accuracy for the proposed model.

**Keywords-** Parkinson disease, UNET, Black widow optimization, Decision Tree, Deep learning.

Paper-ID: 196

### Intrusion Detection System using Machine Learning

Shruti Wadhwa, Dr. Monika Singh

Intrusion Detection System (IDS) has increasingly become a crucial issue for computer and network systems. Optimizing the performance of IDS is an important open problem that receives more and more attention from the research community. The threat from spammers, attackers, and criminals has grown with the expansion of the Internet. Intrusion detection systems (IDS) have become a core component of computer networks due to the prevalence of such threats. Most of the previous IDS have focused on the classification of attacks as normal or intrusion. We present a layered framework integrated with a neural network to build an effective intrusion detection system. The proposed system is able to classify the type of attacks. We have used three types of classifier models viz. Support Vector Machine (SVM), Stochastic Gradient Decent (SGD), and Adaptive Boost with a different set of features. This system has been evaluated with Knowledge Discovery & Data Mining (KDDcup99) dataset. The results show that the proposed system has high attack detection accuracy and less false alarm rate.

**Keywords-** IDS, Machine learning, KDDcup99 Dataset, Feature Extraction, Feature Selection.

## Track 2 - Artificial Intelligence and Machine Learning

Paper-ID: 210

### **An Efficient Framework for Multi-Level Lung Cancer Prediction Using Support Vector Machine Classifier**

Ashok K Patil, Dr. Siddanagouda S. Patil, Dr. M. Prabhakar , Vineet Kumar

This work mainly focuses on the need for collaborative learning framework that allows for early prediction of disease detection in patients. Principal component analysis comes out as a very effective approach for classifying the target classes. PCA successfully combines related qualities and creates a dispersed exhibition of its constituents. The number of principle components to be retained is determined by examining the screen plot. With a small amount of data, Support Vector Machines (SVM) beats other classification algorithms. The components obtained will be sent to the SVM which classifies the cancer based on Multi-Level and helps in prediction of malignancy of cancer, the early dangerous stage will urge clinical specialists to offer those patients extra attention. The results obtained through the proposed framework have achieved accurate results in terms of various performance parameters like accuracy. Precision, recall and F-measure and then confusion matrix is drawn to validate the proposed model and helps in detecting various stages of malignancy at an early stage.

**Keywords-** Multi-Level-Lung Cancer, PCA, SVM, Machine Learning, Prediction Model

Paper-ID: 220

### **Depth Estimation and Optical-Flow Based Object Tracking for Assisting Mobility of Visually Challenged**

Shripad Bhatlawande, Manas Baviskar, Awadhesh Bansode, Atharva Bhatkar, Swati Shilaskar

Visual impairment is one of the most serious problems. Electronic travel aids can help visually impaired people to perform their mobility and navigation related activities. This paper presents an electronic travel aid that interprets the surrounding environment and conveys its audio representation to the user. It uses optical flow for tracking of obstacles. It computes the flow vectors of all the pixels in the frame by monitoring the current frame and the previous frame. The proposed solution implements dense optical flow which is based on Farneback's algorithm. This aid is implemented in the form of smart clothing. The weight of this wearable and portable system is 440 grams. This aid accurately detects the obstacle, its position, and the distance from the user. It shortlists the priority details of the surrounding environment and translate them into simplified audio feedback. It conveys these priority details to the user via an earphone. This aid was subjected to ten usability experiments to assess its relevance as an electronic travel aid. It consistently helped the user to understand the surrounding environment and provided an average accuracy of 81.84% for overall obstacle detection.

**Keywords-** Aid for Visually Impaired, Electronic Travel Aid, Computer Vision, Machine Learning, Optical Flow





Track 3

# Cognitive Systems, Vision and Perception

## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 72

### Automatic Text Recognition from Image Dataset Using Optical Character Recognition and Deep Learning Techniques

Ishan Rao, Prathmesh Shirgire, Sanket Sanganwar, Kedar Vyawahare & Prof.S.R.Vispute

Optical Character Recognition (OCR) has become quite well known in the last few years because it has applications in many sectors. In this paper, we look at the basics of OCR and discuss a few popular datasets that can help one get started with OCR. We aim to present a detailed analysis of different research work done on OCR with a variety of algorithms. We also look at some popular machine learning models that are used in building OCR systems. These machine learning models include Support vector machines (SVM), Convolutional neural networks(CNN). They have been explained briefly. We use the tesseract tool to extract data. This paper serves as a basic guide to getting started with OCR. Using the datasets and algorithms described, one can start their journey in OCR. We provide our own analysis on handwritten digit dataset using different machine learning models and then compare their accuracy. We show the use of the popular OCR tool Tesseract by extracting data from a report. The data extracted from the report is stored in a database. This is a useful application that can be extended in the future to store details of different reports in medical, transportation, banking, and many other fields to create a paperless environment.

**Keywords-** Optical Character Recognition, Machine learning (ML), Deep learning(DL), Support vector machines(SVM), Convolutional neural networks(CNN), Mnist, Tesseract

Paper-ID: 75

### Performance Evaluation of the Tracker on the Basis of Gray Level Co-Occurrence Matrix Parameters

Sampada P. Thigale, Dandawate Yogesh and Abhyankar Aditya

The overall performance of any surveillance system is influenced by the success of data association technique used. Appearance matching is one of the techniques used for data association. The targets are matched on the basis of appearance features like color, shape, size, texture to list a few. Texture is one of the popular techniques in appearance modeling. In this paper, gray level co-occurrence matrix (GLCM) is used to derive texture parameters of the moving objects. The texture features derived from GLCM contribute to the appearance model of the object under track. The effect of offset angles and the dimensions of the GLCM on the tracking performance of the tracker is discussed in this paper. The tracker is tested on CAVIAR dataset. The performance of the tracker is evaluated on the basis of Multiple Object Tracking (MOT) parameters. Comparison on the basis of identity switch (IDSW), MOT precision (MOTP), MOT accuracy (MOTA) shows that 8 bits GLCM with 45 degrees offset angle performs better than its counterparts.terms, i.e. 150-250 words.

**Keywords-** Multiple object tracking, appearance modeling, GLCM, data association, identity switch, texture parameter



## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 103

### Deep Learning Framework for detecting Covid-19 using Chest X-rays

Makarand Upkare, Uttara Ketkar, Arin Mishra, Ayush Kohade, Pranav Khadilkar, Utakarsha Mahajan

The exponential increase in the number of Covid-19 cases has been very overwhelming for the hospitals creating shortage of radiologists, doctors and also the testing kits. The world faced very tough and uncertain times. During this span, technologies like artificial intelligence proved to be a useful weapon in this battle against coronavirus. In this project a model trained with deep neural networks is proposed which requires only X-RAY images for diagnosis and which gives a training accuracy of 98.44%. This model gives instant results so that the patient can be immediately isolated and treated accordingly. It works very well on unseen data, giving an accuracy of 94.51%. As this model does not require skilled radiologists and is cost effective, tests in rural areas can be easily carried out.

**Keywords-** COVID-19, Pandemic, Data science, Artificial Intelligence, Deep learning, Neural Network.

Paper-ID: 115

### A Comprehensive Review for Optical Character Recognition of Handwritten Devanagari Script

Pragati Hirugade, Rutwija Phadke, Radhika Bhagwat, Smita Rajput, Nidhi Suryavanshi

Devanagari is a popular script in the Indian continent and is utilized for languages like Hindi, Marathi, Konkani, etc. A substantial part of the Indian population is unfamiliar to the English dialect and still uses Devanagari Script to note the major documents even now. Recognition and digitization of this script will aid in various fields like banking and government departments. Thus, there is a demand to have a dependable application to recognize handwritten Devnagari script. Handwritten Character Recognition deals with identifying

human written characters to convert them into digital text. Recognition of Devnagari Handwritten Characters is challenging in contrast to the Roman or English characters recognition because of the existence of a header line

shirorekha. It is used to link the Devanagari characters in the formation of a word. Besides, the huge difference in the form of writing increases the intricacy. A lot of research has been done in this field however; there is still a

scope for enhancing the performance. This paper provides an extensive review of the various techniques used for the recognition of Devanagari Handwritten Character Recognition. It systematically analyzes various traditional machine learning techniques and deep learning approaches used in this domain. The paper also studies the advantages and disadvantages of each technique as well as discusses the challenges to be resolved for an effective and precise Devanagari handwritten character recognition method.

**Keywords-** Optical Character Recognition, Handwritten Character Recognition, Devanagari script, Machine Learning, Deep Learning.



## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 118

### A Survey of Human Emotion Recognition based on EEG Signals

Abhishek Chunawale and Dr. Mangesh Bedekar

Electroencephalography (EEG) is used to record brain signals and it has received major attention in the Affective Computing domain, since it is a simple solution for human emotion recognition. EEG is preferred to study the brain's response to emotional stimuli. EEG has influenced the field of affective computing research, indicating that it can represent human emotions more precisely than with facial gestures, text, body gestures or speech signals. Human brain generates signals during emotional activities that can be recorded and analyzed to understand the state of mind. Emotion classification with machine learning includes the selection and extraction of various emotion related features extracted from EEG signals. Feature selection and extraction can be classified into three domains namely time domain, frequency domain and time-frequency domain. Out of these, the frequency domain features are significant and appear in the majority of the studies related to human emotion. Feature extraction from EEG signals includes transformation from one domain to other. Classification of these extracted features is done by using various machine learning models. This paper mainly focuses on detailed survey of human emotion recognition using EEG signals based on various parameters such as emotion models, EEG devices or datasets, number of electrodes or channels used, features, methods of feature extraction and classifiers along with their accuracy.

**Keywords-** Human Emotions, Affective Computing, Emotion Recognition, Electroencephalography, Feature Extraction.

Paper-ID: 128

### Classification of Breast Cancer Histology Images Using Patch and Whole Image Based Long Short-Term Memory Approach

Jyoti Kundale and Sudhir Dhage

Automatic detection and classification of breast cancer are crucial task. In case of medical imaging, some of the existing deep learning models has shown great performance in case of feature extraction and classification task. But those approaches are not giving better results for huge dataset having different classes. In this research, we have used BrekHis dataset having eight different classes for Benign and Malignant. Basically in the training phase Long Short Term Memory approach (LSTM) is applied on whole image and patches also. The patches are generated from input image, by dividing into equal size. In the testing phase, feature vector of patches are generated. These feature vectors are given to Whole image LSTM model to get final classification output. The LSTM approach which is variant of Recurrent Neural Network. The performance of the model is evaluated on Whole image-based LSTM also. We have compared the model with other existing methods to validate the performance. The proposed model gives better 97.69% accuracy for 200X zooming factor.

**Keywords:** Computer Aided Diagnosis, Convolutional Neural Network, Histopathology Images, Long Short-Term Memory (LSTM), Patch based LSTM, Whole Image based LSTM.



## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 146

### A Comparative Study of Various Techniques for Vehicle License Plate Detection and Recognition

Vandana Jagtap, Shridevi Karande, Aditya Rao, Yash Rathore, Muskan Gupta

Many aspects of human life are being changed by technologies and services aimed at smart automobiles and Intelligent Transportation Systems (ITS). Automatic Vehicle License Plate Detection (LPD) and License Plate Recognition (LPR) system can be used in many applications such as discovering a stolen vehicle, monitoring the flow of traffic, automatic car parking systems, surveillance solicitations, toll systems, etc. This paper presents a comprehensive performance comparison of many Automatic Number Plate Recognition (ANPR) algorithms, including that incorporating computer vision, as well as a comprehensive analysis of current methodologies and advancements in ANPR. With the improvement of sophisticated machine learning algorithms, numerous techniques have been developed by researchers in the past decades for efficient LPD and LPR. Even with the best algorithms, a successful ANPR system deployment may require the integration of different techniques to achieve maximum accuracy. However, the detection of License Plate (LP) is a more challenging task concerning the nature of the number plate, camera quality, non-standard formats, scene complexity, contrast problems, indoor/outdoor or day/night images, distortion tolerance, camera mount position, software tools or other hardware-based constraints may affect its effectiveness. This paper not only describes the numerous strategies used for LPD and LPR but also compares their performance and gives suggestions to help researchers choose the optimal technique for their work.

**Keywords-** Intelligent Transportation Systems, License Plate Detection, Automatic Number Plate Recognition, License Plate Recognition, License Plate, Machine Learning

Paper-ID: 147

### Emotion Detection Using Machine Learning Algorithms: A Multiclass Sentiment Analysis Approach

Sumit Shinde and Archana Ghotkar

Due to the availability of internet technology and social media platforms people are well connected with the world. People express their feelings on social media platforms such as Facebook, twitter, reddit, Instagram. Feelings can be expressed with text, images or videos. Due to widespread usage of social media platforms on the internet, a large amount of unstructured data is being generated. To understand the human psychology and emotion state, this data needs to be processed to identify text polarity with the sentiment analysis and emotion detection respectively. This paper gives a brief introduction about sentiment analysis, emotion detection and machine learning algorithms performing well for this task. We used naïve bayes, logistic regression, XGBoost and linear support vector classifiers for the model building. Out of these classifiers linear Support vector classifier gave high accuracy of 72.80% and performed well to predict the emotion of Marathi or English-speaking user at runtime.

**Keywords-** Sentiment Analysis, Multiclass Classification, Machine Learning, Emotion Detection

## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 159

### Parallel and Edge Computing Technique for Computer Vision Models on Embedded Devices

Aniket Dhole, Mohit Gandhi and Shrishail Kumbhar

Nowadays, running computer vision models on embedded devices like Raspberry Pi and Nvidia Jetson has become ubiquitous. But the main issue is the limited performance on these devices due to smaller CPUs and power

factors. To solve this, we have proposed research on various parallel processing techniques to get complete optimal performance of computer vision models like Densenets, VGG16, MtCNN-p GoogleNet, Squeezenet, and Mobilenet on a Raspberry Pi using OpenVino Toolkit. We tested and compared these models' interpretation on factors like CPU, RAM Utilization, and Inference Time using Two Neural Compute Sticks and analyzed it on different Intel Processors. The results using Two Neural Sticks were significant than typical processors and increased by a factor of 2 to 3 for all models. So using these results, we can directly use the technique for the suitable model.

Keywords- Parallel Computing, Raspberry Pi, Neural Compute Stick, Edge Computing, Computer Vision, OpenVINO.

Paper-ID: 177

### Single Image Dehazing using CNN

Samarth Bhadane, Ranjeet Bidwe, and Bhushan Zope

Haze is an atmospheric phenomenon in which particulate matter in the atmosphere obscures the visibility of the atmosphere. Other natural phenomena like mist, fog and dust also obscure the vision this is because of scattering of light which attenuates the light intensity. All these instances are responsible for the degradation of image quality. Hazy images are problematic because these images cannot be used for computer

vision and image processing applications like pattern and object recognition. Dehazing images improve the clarity and contrast of the images making them more suitable for computer vision and image processing. This paper presents a method of dehazing images using CNN. The proposed model is trained on D-HAZY [1] and SOTS [11] datasets which contains a mix of natural and synthesized hazy images. We use PSNR and SSIM to evaluate the performance of the model.

Keywords- Dehazing Images · Convolutional Neural Network



## Track 3 - Cognitive Systems, Vision and Perception

Paper-ID: 188

### Deep Learning-Based Methods for Automatic License Plate Recognition: A Survey

Rutuja Chintalwar, Dipmala Salunke, Ishwari Kulkarni, Neha Awhad, Abhishek Patil

The increasing need of a car to travel for our chores or as an essential mode of travel backup has become a kind of exigency. The large integration of information and technologies, underneath totally different aspects of the world, has led to the identification of cars as abstract resources in systems. With this, the need for a robust model that monitors the management systems, crime prevention has emerged. This can be often achieved by us or by special intelligent equipment which will enable the recognition of a car by its number plates in real environments. Various deep learning algorithms have proved to be useful for this cause. In this survey, we observe different methods of preprocessing, segmentation, detection, classification for vehicle number plate detection using various machine learning and deep learning algorithms. We studied the different pre-trained models, with the layers and filters that help us efficiently identify the number plates in cars. This structured survey paper gives assistance for researchers who want to study and implement in this domain to understand the perspectives as well as issues. Future scope of this research paper can help us in designing an efficient algorithm with maximum accuracy as previous accuracies range up to 89% to 96%. With detailed analysis and application, we aim to increase precision.

**Keywords-** Deep learning, Localization, Pre-processing, Segmentation, Feature extraction, Classification, Performance measures.

Paper-ID: 130

### A Review On Recent Developments For Diabetic Retinopathy Detection And Grading In Fundus Images

Rajesh U. Yawle, Dr. Pradeep B. Mane.

Diabetic Retinopathy (DR) is the most common eye disease in the world. The number of persons who have gone blind or have damaged vision as a result of diabetic retinopathy has grown during the last 20 years. Diabetes affects the retina, the heart, the nerves, and the kidneys. Diabetic Retinopathy is a condition in which the blood vessels of the retina swell and leak fluid and blood. Vision loss may occur if DR progresses to an advanced degree. DR is the primary cause of blindness in the globe, accounting for 2.6 percent of all cases. Diabetics should have regular retinal examinations to detect and treat diabetic retinopathy (DR) early enough to avert blindness. In this post, we looked at the various approaches for diagnosing diabetic retinopathy. Diabetic retinopathy is a group of lesions that appear in the retina of persons who have had diabetes for a long time. Early detection of exudates may aid in the prevention of vision loss. This article discusses the approaches, algorithms, and methodologies used for preprocessing, segmentation, and detection of diabetic retinopathy retinal images. Accuracy of various deep learning method is compared such as CNN, ResNet, DNN, Alexnet, InceptionNet, and VggNet.

**Keywords-** Diabetic Retinopathy, Screening, Grading.



Track 4

# Embedded Systems and Internet of Things



## Track 4 - Embedded Systems and Internet of Things

Paper-ID: 15

### A Security Framework Design For Generating Abnormal Activities Report Of Bring Your Own Devices (BYODs)

Gaikwad Sarita Sushil, Dr. Rajesh K Deshmuk, Dr. Aparna A. Junnarkar

BYOD (Bring Your Own Device) is an idea which many organizations have lately implemented on personal cell phones that are utilized at working places. As a result, MDM and NAC infrastructures are being used in protecting leakage about corporate data, limited accessing, handling people effectively. Despite fact that NAC and MDM's access control policies are consistently implemented to users, security concerns persist owing to frequent device loss or theft and a poor level of protection. Due to which BYOD had still to be fully implemented. By gathering individual condition of data and controlling/detecting aberrant clients, a flexible policy is required. The possible weak areas of the BYOD environment are categorized in this study, and by stereotyping data usage current conditions of clients, a performance based checking approach on anomalous behaviors was presented.

**Keywords-** BYOD, Security, BYOD Attacks, Malwares, Security Framework and Abnormal activities.

Paper-ID: 166

### IoT Enabled LoRa based Patrolling Robot

Miriyala Sridhar, P. Kanakaraja, L Yaswanth, Sk. Yakub Pasha, P Sailesh Chowdary

The major goal of this study is to create a robot that can undertake surveillance in household settings. Nowadays, robots play an important role in your daily operations, decreasing human labor and error. They can be controlled physically, depending upon the situation. This robot's goal is to collect pictures from the surroundings before talking with the user. The user can control the robot using an Internet of Things (IoT) device such as a smartphone using the Blink app and the LoRa module during the day and receive live video streaming from the robot's wireless camera. The robot may be controlled manually using an Arduino microcontroller. The ESP32 CAM module collects information and sends that to the Arduino uno microcontroller, which gives instructions to the robot's operations. Along with the output of the picture that was collected by the robot. As a result, surveillance can be carried out. With further progress in our project, we may be able to provide surveillance even in defense regions.

**Keywords-** Internet of Things (IoT), ESP32 Camera, L293 Motor Driver, Blynk App, LoRa Module.

## Track 4 - Embedded Systems and Internet of Things

Paper-ID: 26

### Securing IoT Networks Using Machine Learning, Deep Learning Solutions: A Review

Vivek Nikam 1 and Renuka Devi S

Internet of Things (IoT) is the next big thing not only in our personal lives, but also in the commercial, economical, and social aspects of the world. IoT networks usually have resource-limiting nodes due to which they become easy targets for online attacks. The data scientists and experts are looking for the ways to make extensive solutions to meet privacy and security needs in IoT. However, traditional approaches are not sufficient to monitor the whole network as it is very complex and requires great computation power. This way, there is a strong need for advanced Deep Learning and Machine Learning solutions to make IoT devices robust with embedded intelligence. IoT applications have come a long way over the years but they still need to develop further.

In this paper, we deeply discuss and review the existing security requirements and solutions to deal with various problems for IoT networks. The comparative analysis of security solutions based on machine learning and deep learning techniques is discussed. We also review the complexity and distinctiveness of IoT and its security measures.

Despite having a lot of advanced solutions, peculiarities of IoT are still prevalent, such as resource-limiting devices with limited energy, memory, and computational power. These issues are still a barrier to wide-scale adoption. Future work is still needed to deal with the limitations of IoT and ML and DL methods. This study might serve as a research path for future works in this direction.

**Keywords-** IoT networks, IoT devices, Internet of Things, Machine Learning, Deep Learning.



## Track 4 - Embedded Systems and Internet of Things

Paper-ID: 85

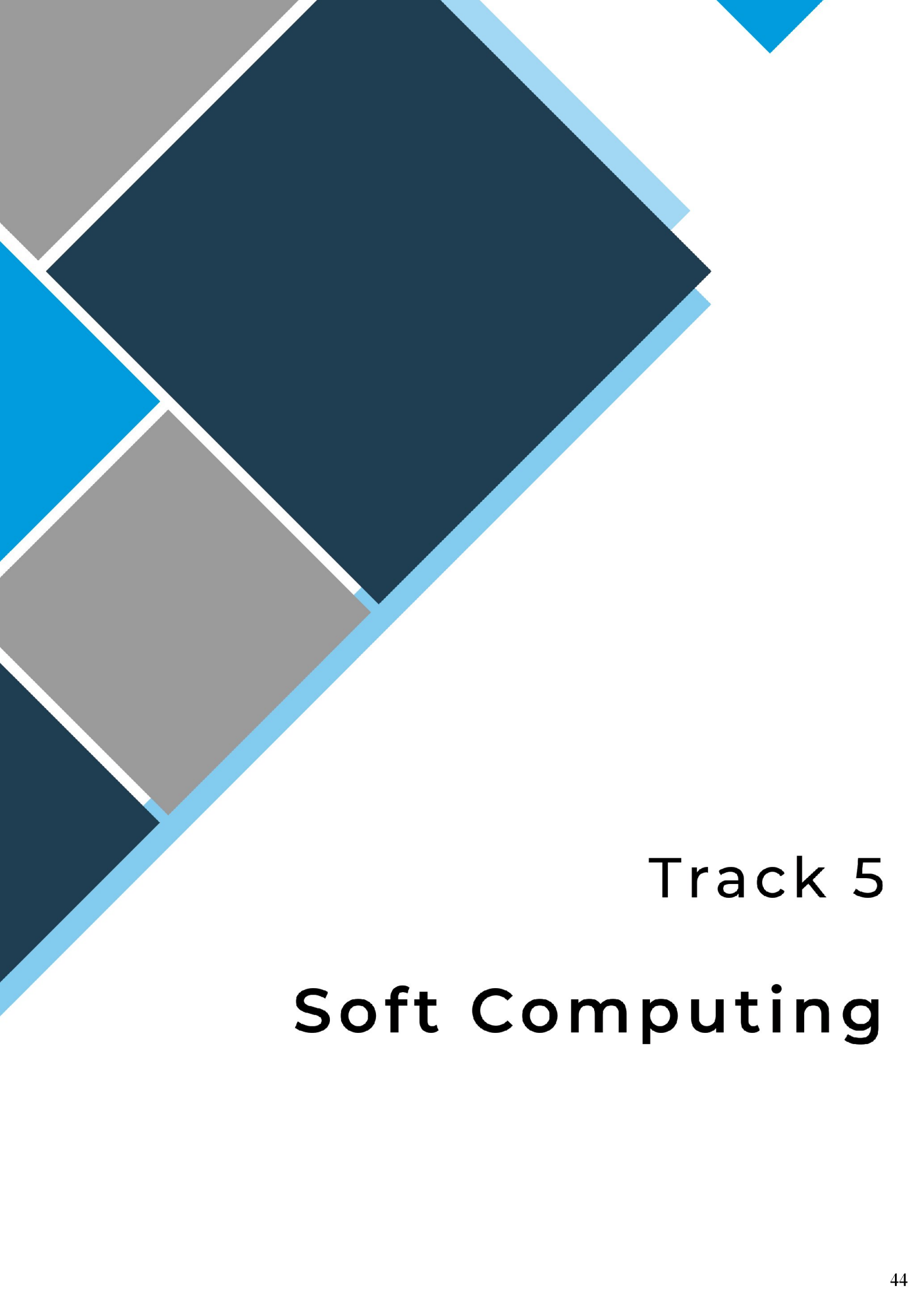
### An Optimal Path Recommendation Algorithm for Waste Carrier Vehicle using IoT based Smart Bins

Neha Kapadia , Dr. Rupa Mehta

The explosion in population, fast urbanization, and economic development has resulted in the bulk density of municipal solid waste. Efficient waste management has been a major problem for the municipalities in urban communities. One of the major tasks in the system is to find the optimum route for the waste collection vehicle to meet the need of collecting waste in time with the optimum cost of transportation. The Smart Waste Management System (SWMS) needs a central server to process data received from the bins and vehicles of the system, smart bins having sensors and microcontrollers embedded in, the network services to transfer the data to the centralized server and the navigation system using GPS to locate the position of bins and vehicles. The waste is required to be loaded from the bin to the vehicle before the bins get overflowed. The smart bin is embedded with sensors that measure the level of garbage in the bin. On reaching the overflow threshold limit, the dustbins become active in the network and send signals to the server through the cloud network. The server will analyze data periodically and the vehicle drivers will be notified to reach the bins suggesting the optimal route. The proposed approach considers various parameters like distance of the vehicles from various bins, traffic congestion and cost of the path in terms of fuel consumption and time to reach the destination, road quality, predicted overflow time for the bin, loading capacity of the vehicle, type of waste, etc. The vehicle routing problem belongs to the NP-hard problem family as it is impossible to derive optimal solution always and it demands Artificial Intelligence-based heuristic and metaheuristic algorithms like A\* Algorithm. In this paper heuristic-based, OpA\* algorithm is introduced with other heuristics like traffic, vehicle capacity, road quality, and overflow time of the garbage container. The proposed algorithm finds the optimal dynamic path for waste collection vehicles based on different heuristics and constraints in the SWMS.

- **Background:** Traditional waste management works without analyzing the demand and route of the vehicles. A smart waste management system is required to generate the optimal path for the collection of waste to save fuel and time.
- **Objective:** To propose the dynamic optimal route for the waste carrier vehicle. A heuristics-based approach is required to solve the vehicle routing problem.
- **Method:** Artificial intelligence-based A\* algorithm is a heuristic optimal route-finding algorithm suitable for the given system. Traditional A star algorithm uses only distance as a heuristic, but the current system needs other heuristics to find the dynamic optimal solutions.
- **Results:** Different routes are generated using the proposed A\* heuristic-based algorithm. Various existing heuristics-based algorithms are compared to measure the performance.
- **Conclusion:** The proposed heuristic-based A\* algorithm gives the optimal route with the less optimal index value.

**Keywords-** Internet of Thing, A\* algorithm, Cloud Computing, Heuristic-based algorithms, IoT, RFID, Vehicle Routing Problem, Smart Waste Management, Dynamic Route Optimization



Track 5

# Soft Computing



## Track 5 - Soft Computing

Paper-ID: 106

### Modern predictive modelling of energy consumption and nitrogen content in waste water management

Makarand Upkare, Jeni Mathew, Aneesh Panse, Archis Mahore and Vedanti Gohokar.

Water and energy resources play a vital role in daily life, resulting in increased wastewater production, emphasizing the relevance of wastewater treatment plants, as well as the need to control the plant's energy consumption. The objective of this study was to analyze and predict the total energy consumption in wastewater management followed up with a detailed analysis and prediction of total nitrogen content that can be extracted from it for various applications. We had considered data from the Eastern Wastewater Treatment Plant in Melbourne. To obtain quantified relationships of wastewater parameters with energy consumption and total nitrogen, multiple predictive machine learning algorithms such as Regression, Support vector regression and Ensemble model had been implemented. Data pre-processing and feature selection methods based on principle component analysis were used to curate four input parameters in the prediction of total nitrogen and six parameters in the prediction of total energy consumption. A correlation matrix was plotted and analyzed, which resulted in the selection of a three-input parameter model for predicting energy consumption and two input parameters for predicting total nitrogen. The predictive models were evaluated based on Root mean square error, Mean square error and Mean absolute error. It was discovered that the Support vector regression model with Radial basis function kernel provided significant performance for both energy consumption and total nitrogen prediction. Polynomial regression models, in addition to the Support vector regression model with the Radial basis function kernel, would be a good choice for energy consumption prediction.

**Keywords-** Support vector regression, Wastewater treatment, Principle component analysis, multiple linear regression, Correlation matrix

Paper-ID: 111

### Particle Swarm Optimized QoS in Self Organizing Heterogeneous Network with Machine Learning

Gajanan Uttam Patil and Dr. Girish Ashok Kulkarni

Autonomous wireless network (AWNs) has to deal with severe interference because of its heterogeneity and density. Machine learning is power solution for data driven solution approach, it can be promising solutions for automatic power configuration and other settings. In this paper, a denser network is modeled with femto or Pico cells. Power optimization problem in the network is taken care by proposed reward function in distributed network. Further, particle swarm optimization used for optimal parameter selection in reward function. Which ensures, the essential QoS of a microcell user for minimum power requirements. Proposed distributed power allocation method based on Q-learning is evaluated along Markov decision states and PSO optimized solutions gives better results as compared to greedy algorithm.

**Keywords:** PSO, AWNs, Markov Decision Process, Q-learning, Greedy



## Track 5 - Soft Computing

Paper-ID: 165

### Smart Warehouse Management System

Aswin Kumer S V, Nirbhay Jha, Karishma Begum, Kodali Brahmani

Everywhere on the planet stored items are affected by various components like temperature, pressure, moisture, and some with light. This manual arrangement with these issues concerning misfortunes of stored items. A decent warehouse building is a certain something, great safety measures are another. Great warehouse joined with great cleanliness, satisfactory drying, and any remaining safety estimates won't generally be viable in forestalling warehouse misfortunes. To forestall spoiled to put away items it is required that intensive clean practices are utilized. In this setup, we are installing a gas sensor and a temperature to screen the grains and a signal to alarm us when something turns out badly. Furthermore, an entryway opening framework to go into the room where the grains are put away. Among the dangers that the changing environment patterns posture to different areas, the impact of environmental change on grain warehouse is an ignored idea. As a general rule, the food and grains should be kept and stored in the proper place which has the temperature and humidity should be up to the mark. High temperature and high measure of moisture noticeable all around prompted the development of microorganisms which prompted the decaying of food grains. There, comes our system into action where all the suitable conditions data are predefined and operates accordingly. Moreover, temperature and humidity are significant variables that influence the existence of food materials.

**Keywords-** Luminance, Pressure, Moisture, Temperature, Humidity, Gas

Paper-ID: 169

### Automatic Text Document Classification by using Semantic Analysis and Lion Optimization Algorithm

Nihar M. Ranjan, Rajesh S. Prasad, Deepak T. Mane

Text mining is a popular research area in the field of computer science and engineering that enables the processing of natural language which has applications in the area of aerospace, biomedical, and so on. Text mining unsheathes the unknown information present in the data such that the extraction of the data seems to be effective. Text Classification is a sub domain of the text mining that plays a major role in labeling the documents based on their semantic meaning and context. Different machine learning algorithms are available to classify the available text documents. The main contribution of this paper is use of semantic analysis with Lion optimization algorithm and Neural Network architecture. The semantic analysis technique is used for the text classification through semantic keywords rather than using independent features of keywords in the documents. Lion optimization algorithm is used to adjust the weight of the Neural Network to maximize the efficiency of the classifier. Two well-known open source data set namely 20 Newsgroups and Reuters-21578 is used for the experimentation and evaluate the performance of the classification algorithms. Significant improvement in all three performance parameters in terms of accuracy, specificity and sensitivity is observed. The maximum values observed with our proposed algorithm are 91.86, 95.54, and 84.96 for accuracy, sensitivity and specificity respectively.

**Keywords-** Text classification, Machine Learning, Neural Network





Track 6

# Computational Intelligence

## Track 6 - Computational Intelligence

Paper-ID: 16

### CovidBot: COVID19 assistance chatbot

Riddhi Hakani and Sindhu Nair

Chatbots offer ease of operation and provide necessary assistance in various domains. Chatbots can be classified as open domain, rule based, and domain specific. Our aim in creating CovidBot is providing a reliable, quick, and easy method to access information relating to COVID19. Our chatbot is a rule based chatbot and hence provides detailed and accurate information about any question related to COVID19 like the public or private hospitals in a particular area, vaccination centers, COVID19 symptoms, ideal oxygen level, number of hospital beds, emergency contact numbers, list of counsellors, etc. Most papers until now focus on a generalized use and try to cover the entire medical spectrum thus affecting the overall quality and precision of answers and solutions. Very few chatbots have focused on COVID19 specific help. We have tried to overcome this research gap by trying to cover as many aspects of COVID19 as possible with efficiency. To develop CovidBot, we have used Feed Forward Neural Networks, Naïve Bayes Classifier, and Support Vector Machine. We have also employed different word embedding techniques like the Bag of Words, the Continuous Bag of Words, and the Skip-Gram model to ensure highest possible efficiency. Out of all these algorithms the combination of Skip-Gram model and the Feed Forward Neural Network give the highest accuracy of 75%. Chatbots, undoubtedly prove to be highly beneficial and are a great advancement in automation technology. In the future, we aim to improve the accuracy and integrate voice assistance in the chatbot.

**Keywords-** COVID19 Chatbot · Natural Language Processing · Deep Learning

Paper-ID: 185

### Single Document Extractive Summarization using Domination in Hypergraph.

Aamir Miyajiwala, Aabha Pingle, Sheetal Sonawane, and Surajit Kr. Nath

Automatic Text Summarization (ATS) in Natural Language Processing has been an important task in Information Retrieval. It compresses a document to create a summary that captures all the relevant and important information conveyed in the document. ATS is implemented by creating an extractive summary of the documents. An extractive summary is formed by selecting specific sentences from the document to form a non-redundant and coherent summary whereas. Our work aims to generate an extractive summary by creating a sentence hypergraph where each sentence represents a node and the edge is a keyword or a named entity that contains the sentences in which it occurs. Once the hypergraph is created, we formulate the sentence extraction as a dominating set problem. We have evaluated the performance of our approach against human summaries on benchmark datasets using the ROUGE toolkit.

**Keywords-** Extractive Summarization · Hypergraph · Dominating Set.



## Track 6 - Computational Intelligence

Paper-ID: 82

### A Novel JBO-SMOTE for Efficient IoT based Water-related Diseases Prediction System

Bhushankumar Nemade and Deven Shah

Autonomous wireless network (AWNs) has to deal with severe interference because of its heterogeneity and density. Machine learning is power solution for data driven solution approach, it can be promising solutions for automatic power configuration and other settings. In this paper, a denser network is modeled with femto or Pico cells. Power optimization problem in the network is taken care by proposed reward function in distributed network. Further, particle swarm optimization used for optimal parameter selection in reward function. Which ensures, the essential QoS of a microcell user for minimum power requirements. Proposed distributed power allocation method based on Q-learning is evaluated along Markov decision states and PSO optimized solutions gives better results as compared to greedy algorithm. Polluted water is the leading cause of water-related chronic diseases, causing the yearly deaths of nearly 4.9 million people worldwide. Our research study presents an intelligent IoT-based system for water-related disease prediction. At first, the proposed method employs Internet of Things sensors to sense the water quality parameters. A data cleaning procedure is carried out to handle the missing data and outliers. Then, the feature selection (FS) technique is utilized to select the appropriate attributes. Our research proposed a novel Jay's Bird optimization algorithm (JBOA) inspired by Jay's bird intelligence to find the class imbalance problem, known as JBO-SMOTE. The proposed method utilizes the dataset of West Bengal's state pollution control Board (WBPCCB) for training the model. The proposed method then uses the state of art classifiers, namely Gradient Boosting (GB), Random Forest (RF), CatBoost, Decision Tree (DT), and Ada Boost (ADB) classifiers, to accomplish multi-model classification tasks. The voting criterion utilizes an optimum prediction mechanism to analyze the efficiency of the classifiers. The efficient models are obtained using optimum prediction based on a voting principle that utilizes the benchmark metrics like Kappa, F-score, accuracy, and computational time. Out of six classifiers, the most efficient are Gradient Boosting (GB) and Random Forest (RF), both of which have achieved an accuracy of 98.13 and 99.42 percent, respectively. Also, we have deployed the disease prediction model as a cloud-based service. The results of disease prediction are made available to users via e-mail and WhatsApp service.

**Background:** Internet of things sensors have facilitated automation in various application areas. The use of water quality sensors can be helpful for water quality monitoring and assessment.

**Objective:** This research study aims to perform the water related disease prediction.

**Method:** The proposed system utilizes novel data augmentation method to address the imbalanced dataset problem, optimal prediction based on voting principle using six classifiers to obtain the efficient model. The proposed system is tested for real time water quality parameters using IoT module.

**Results:** For the gradient boosting classifier, the proposed model achieved a higher accuracy of 98.13 percent than the previous system of 95 percent.

**Conclusion:** The proposed disease prediction outperformed the prior disease prediction system with respect to accuracy and execution time.

**Keywords-** Water-related diseases, Waterborne diseases, JBO-SMOTE, West Bengal state pollution control Board (WBPCCB), Gradient Boosting, Random Forest, CatBoost, Decision Tree, and Ada Boost, Optimal prediction based on voting, JayBird Optimization algorithm, cloud-based service, Internet of things (IoT).



## Track 6 - Computational Intelligence

Paper-ID: 191

### TEXT-BASED EMOTION RECOGNITION: A REVIEW

Heer Shah, Heli Shah and Prof. Madhuri Chopade

As the world is becoming more modern and digital, the interaction of humans with computers is a very intriguing and well-known subject of research. Computer interfaces must correctly detect users' emotions to develop highly intelligent behavior. In recent years, emotion recognition through text has been studied in various disciplines like machine learning (ML) and natural language processing (NLP). The main objective of the study is to provide a comprehensive analysis through a thorough discussion and overview of various research trends in text-based emotion recognition and prediction systems. Various methodologies were tested on various datasets in the reviewed papers under the domains of ML and NLP. We analyzed that the majority of research is conducted using machine-learning techniques like hybrid method (keyword-based + learning-based), lexical affinity, Nave Bayes, Support Vector Machine (SVM), Long Short-Term Memory (LSTM), etc. The results of this study highlight the continuous growth in this research area. Moreover, from a comprehensive study of highly cited publications, we retrieved those algorithms like Multinomial Naive Bayes, LSTM, and K-means significantly provided high accuracy irrespective of the complexity of the text.

- **Background** This survey is about detecting emotions such as happy, sad, angry and so on, just by the text provided. Surveying different algorithms used on single dataset, the best working algorithm is concluded.
- **Objective** The main objective is to review the papers related to detection or recognition of the emotion based on Text or tweets and conclude the best results with explanation.
- **Method** Various methods were used in different selected papers such as Naïve Bayes, K-Nearest Neighbors, Support Vector Machine, Random Forest, some proposed models and so on.
- **Results** Comparative result of various ML algorithm is provided where Generalized Linear model is giving better accuracy 90% among all other algorithms.
- **Conclusion** Generalized Linear model performed well out of all approaches when compared on single dataset of tweets.

**Keywords-** Machine learning approaches, Emotions, Text-based detection, Natural Language Processing, Human-Computer Interactions, Recognition.



## Track 6 - Computational Intelligence

Paper-ID: 86

### Low Rank Sparse Coefficient Based Nuchal Translucency Image Denoising

Kalyani Chaudhari a, Shruti Oza

The process of eliminating distortion or noise from an image is known as image denoising. Random noise is introduced to ultrasonic imaging, resulting in reduced contrast in the images. For Nuchal translucency (NT) detection, image denoising is a crucial stage. Although deep-learning methods have been extensively studied for this problem and have shown compelling results, most networks may result in disappearing or inflating gradients and need more memory and time to attain a spectacular performance. To achieve better overall framework optimization, Novel Methodology of anisotropic filtering followed by a compressed sensing based on Low Rank Sparse Coefficient(LRSC) for ultrasound image denoising is proposed. To achieve better overall framework optimization, this article proposes anisotropic filtering followed by a compressed sensing based on Low Rank Sparse Coefficient(LRSC) for ultrasound image denoising. This hybrid technique is quite effective at reducing noise while yet retaining fine image details. Real-time hospital images are utilized to assess the efficacy of the proposed model, taking into account clinical accessibility and imaging features. The peak signal-to-noise ratio (PSNR), mean square error (MSE), and structural similarity index (SSIM) were used to evaluate the proposed method's performance. Average SSIM, PSNR, MSE values are 0.98, 42.28 and 49 for CNN, GAN and Proposed method respectively. Proposed method have average mse of 2.6 , CNN have 14 and GAN have 371

**Keywords-** Nuchal Translucency(NT), Low Rank Sparse Coefficient (LRSC), Anisotropic filtering, Denoising, Compressed sensing



Track 7

**Advanced  
Communication  
Technologies**



## Track 7 - Advanced Communication Technologies

Paper-ID: 134

### Performance Evaluation of Illuminance and Received Power for Indoor Visible Light Communication

Mrinmoyee Mukherjee, Kevin Noronha

In recent times the need for ubiquitous and assisted wireless integration has increased in improvident proportions due to inconceivable surge in the amount of wirelessly connected devices and nodes. In past few years, visible light communication has become immensely popular with the researchers around the world due to its enormous freely available bandwidth and the varied applications that can be evolved with it. This article provides detailed analysis of illumination and received power for a visible light based configuration using light emitting diodes and photodetector. The system implementation tool is MATLAB® and analysis tool is Microsoft Excel®. The simulation are performed for mode number 1, 4 and 6 at varied distances between transmitter and receiver to evaluate the illumination in terms of lux and received power at the photodetector in terms of milliwatt. A summary table has been constructed to effectively evaluate the modes that can be used for communication after detailed analysis of illumination.

**Keywords-** Channel Modeling, Illuminance, LEDs, Optical Wireless Network, Visible Light Communication, VLC application.

Paper-ID: 208

### AURA - Your Virtual Assistant, at Your Service

Janhvi Pawar, Disha Shetty, Aparna Ajith and Prof. Rohini Patil

As the world is moving towards computing paradise, people have been more attracted to the virtual world. A virtual assistant is an assistant which is not a human assistant but a machine that acts and speaks like a human and helps other people fulfill their daily needs. This project is not only created with the intention of advancement of technology in Artificial Intelligence but also to help people to get things handy. The proposed virtual assistant can emit electromagnetic energy that surrounds our users at all times and reacts to the user's thoughts, moods, and general spiritual health. Hence it is named Aura. The creation of Aura was influenced by Google Assistant, Cortana from Microsoft, and Jarvis from the film Iron Man. To connect with Aura, Python and related libraries were utilized. The user will have to utter the orders, which will then be processed and responded to by Aura, resulting in the intended effect. Aura assists the user with daily activities such as common human conversation, searching queries in Google, taking screenshots, taking images, telling jokes, surfing for videos, providing daily weather conditions, fetching images, playing songs, informing us about covid19 counts, and informing the user about the latest news.

**Keywords-** Artificial Intelligence, Python, Virtual Assistant

## Track 7 - Advanced Communication Technologies

Paper-ID: 195

### **An Efficient River Water Quality Prediction and Classification Model using Metaheuristics based Kernel Extreme Learning Machine**

Dr. R. Thanga Selvi, Dr. T.C. Subbu Lakshmi, Dr. R. Anto Arockia Rosaline

In the previous years, water quality has been susceptible to different pollutants. Also the various environmental conditions like vegetation, climate and basin lithology affects the quality of the river water naturally. So, the prediction of water quality (WQ) becomes a major process to control and basin lithology affects the quality of the river water naturally pollution. The rise of artificial intelligence (AI) manners can be utilized for designing predictive methods for water quality index (WQI) and classification. This study focuses on the design of metaheuristics based kernel extreme learning machine (MBKELM) for river water quality prediction and classification. The proposed MBKELM model aims to predict and classify the quality of river water into different classes. In addition, a prediction and classification model using KELM is derived to appropriately determine the water quality. Moreover, the parameter tuning of the KELM model takes place by pigeon optimization algorithm (POA). A wide range of experimental analyses was performed on benchmark datasets and the experimental outcomes reported the supremacy of the MBKELM technique over the recent techniques. The results stated that the proposed MBKELM model has accomplished minimal MSE and RMSE values. On examining the results in terms of MSE on training set, the MBKELM model has accomplished a lower MSE of 0.00257 whereas the existing model has gained a higher MSE of 0.00336. Also, on examining the results in terms of RMSE on testing set, the MBKELM manner has accomplished a lesser RMSE of 0.05070 whereas the existing model algorithm has gained a higher RMSE of 0.05800.

**Keywords-** Water quality prediction, Optimization, Data classification, KELM model, Parameter tuning, Neural Network.



## Track 7 - Advanced Communication Technologies

Paper-ID: 209

### Performance Analysis of DSR, AODV, AOMDV and DSDV protocols for WSN in TCP and UDP Environments

Mahesh.D and Dr A.R.Aswatha

In Wireless Sensor Network(WSN), the life span of network nodes is restricted with respect to the energy, limited computational capacity and communication bandwidth. WSN is a composite set of applications, link technologies, communication protocols, traffic flows and routing. To extend the life span of these sensor nodes, designing efficient routing protocols is critical. The Routing protocols for WSNs are liable for maintaining the routes in the network which ensures consistent multi-hop communication. It is critical to study the behavior of the WSN energy efficient protocols and measure their performance in different environments like UDP and TCP. This paper presents a performance analysis of four well-known WSN routing protocols namely : (a) Distance Source Routing (DSR) protocol (b) Destination Sequenced Distance Vector (DSDV) protocol, (c) Adhoc On Demand Distance Vector (AODV) protocol, and (d) Ad-hoc on Demand Multipath Distance Vector (AOMDV) protocol. We have measured and analyzed the performance of all the protocols using NS2 simulator through the performance metrics like throughput, Delay, Packet delivery ratio and residual energy, in both TCP and UDP Environments. For UDP Environment, DSR and AOMDV are found to be not suitable and only DSDV protocol is recommended for UDP, however for Delay, AODV is found to perform better in UDP Environment than TCP Environment, also, DSDV exhibits better energy performance is found to give in both UDP and TCP Environment DSDV.

**Keywords-** First Keyword, Second Keyword, Third Keyword.



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