

14th International Conference on

Computing, Communication and Sensor Networks



Abstract Proceedings of

CCSN2025

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12th to 13th of September, 2025



Organizer and Venue:

**Indira Gandhi Delhi Technical University For Women,
Kashmere Gate, New Delhi, India.**

Joint-Organizer:

**Applied Computer Technology,
Kolkata, West Bengal, India.**

In Association with:

International Association of Science, Technology and Management



CCSN 2025

14th International Conference on
Computing Communication and Sensor Networks

Date: 12th and 13th September 2025

Venue: Indira Gandhi Delhi Technical University for Women,
Kashmere Gate, New Delhi, India.

Website of Conference: actsoft.org/ccsn2025



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Inaugural Song:

Prayer

Translated in English

By

Hillol Ray

<http://www.iwvpa.net/rayh>

<http://www.iwvpa.net/rayh/index-hra.php>

Desires are all yours, you
are the universal star-
You do your own works, God,
People say, I do them from a far!!

You stuck elephant into clay,
And push a handicap to ascend hill-
To some, you offer “Brahmo” feet,
And make others descend
downhill!!

I am a machine, you are the machinist, I
am the home, you are the homemaker-

I am the chariot, you are the charioteer, You
drive as you like, and I am a happy taker!!

“Milestone”

June 25,

2019

Garland, Texas, USA

Editorial

This abstract proceedings book contains abstracts of all registered papers, a summary of Keynote and Invited Talks, Biodata of Keynote and Invited Speakers, the Program Schedule, a List of Keynote and Invited Speakers and Session Chairs.

Using the facilities of online presentation, CCSN2025 has been re-envisioned as a hybrid mode of conference with facilities for online and offline presentations. The virtual format will provide an opportunity for our presenters to present their research works and also some invited talks as online which could be followed by the audiences across the Globe.

More than 100 Papers were received, and among them, only 60 were selected for presentation. Papers are in the areas of wireless technology, applications of IoT, algorithms, software engineering, artificial intelligence methods, bioinformatics, cyber security, machine learning, applications of various types of sensor networks, VLSI design for wireless communication, antenna design etc.

These abstract proceedings of CCSN2025 are published as printed and online version. It will be available online in this link: <https://actsoft.org/science/proceedings.html>. Abstracts of these papers can be linked in any website of any institutes or universities. After the conference, as per qualities of the papers, most of the papers will be forwarded for possible publication in SCI Journals or SCOPUS Proceedings/Book Chapters published by Springer-Nature or by other publishers. Some full revised version of papers will be also published in the 'ACT Proceedings' with ISBN and AOI indexing.

After the conference, all authors are requested to submit the revised version of the paper including one two foreign coauthors(if possible) which increases visibility of your paper throughout the World.

The Editors of CCSN2025

Dr. Kanchan Sharma (Professor Dept. of ECE, Indira Gandhi Delhi Technical University For Women, Delhi, India.)

Dr. Madhu Bala Myneni (Professor, Department of Computer Science and Engineering, VNR Vignana Jyothi Institute of Engineering and Technology Hyderabad, Telangana, India.)

Dr. Santosh Kumar (Professor, School of Computing Science and Engineering, Galgotias university, greater Noida, India.)

Mr. Arup Halder (Scientist, Applied Computer Technology, Kolkata, West Bengal, India.)



Indira Gandhi Delhi Technical University For Women
(Established by Govt. of Delhi vide Act 09 of 2012)
Kashmere Gate, Delhi-110006

Prof. Ranjana Jha
Vice Chancellor,
IGDTUW, Delhi.



No. AU/VC/ /25

Date: 02/09/2025

FOREWORD

I am pleased to extend my warmest greetings to all the distinguished participants, speakers, and organizers of the 14th International Conference on Computing, Communication, and Sensor Networks (CCSN2025) hosted by Indira Gandhi Delhi Technical University for Women (IGDTUW), Kashmere Gate, Delhi. This prestigious event, taking place on the 12th and 13th of September 2025, marks yet another milestone in our university's commitment to fostering academic excellence and innovation.

In today's rapidly evolving world, the fields of computing, communication, and sensor networks are at the heart of technological advancement. The contributions from these domains have transformed the way we live, work, and interact with our surroundings. By bringing together leading researchers, academicians, and industry experts, CCSN2025 serves as a dynamic platform to exchange ideas, share research findings, and discuss the future directions of these crucial areas.

I am particularly pleased to note that this conference features an impressive range of papers, presentations, and discussions that reflect cutting-edge research and global collaboration. It is also heartening to know that the proceedings will include a published book of abstracts, ensuring that the contributions made here will have a lasting impact.

On behalf of Indira Gandhi Delhi Technical University for Women (IGDTUW), Kashmere Gate, Delhi, I would like to express my sincere gratitude to the organizing committee, the speakers, and all participants for their dedication and hard work. I have no doubt that this conference will be a resounding success and will contribute significantly to the advancement of knowledge in the fields of computing, communication, and sensor networks.

I wish all the participants a productive and engaging conference and look forward to the innovative ideas that will emerge from CCSN2025.

Prof. Ranjana Jha

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Phone: 011 2390 0220

Program Schedule of CCSN2025

Day1 (12/09/2025) (All dates/times are as per IST)	
Inaugural Session: (11:00am-12:00pm) Award Session: 12:00-12:15pm TEA BREAK: 12:15pm-12:30pm Keynote Talk: 12:30pm-1:15pm: Prof. Rajat Shubhra Chakraborty, Professor of Department of CSE, IIT Kharagpur, WB, India.	
LUNCH BREAK: 1:15pm-2:00pm	
Technical Sessions:	
Link: http://meet.google.com/uwc-tctf-wnc	Link: http://meet.google.com/nnr-ggtd-rcf
Session 1 (12/09/2025: Time: 2:00-4:00pm) Session Chair: <ul style="list-style-type: none"> • Dr. Nitin Sharma, Professor Department of ECE, Maharaja Agrasen Institute of Technology (MAIT), Delhi, India. • Dr. Aditya R Chandre (online), Research Scientist and CTO, Priority Technologies, Delaware, USA Invited Speaker: <ul style="list-style-type: none"> • Dr. Harsupreet Kaur, Professor, Department of Electronic Science, and Dean of Faculty of Interdisciplinary and Applied Sciences, University of Delhi, India Paper IDs: 2, 20, 32, 67 Faculty in charge & student volunteers:	Parallel Session 1 (12/09/2025: Time: 2:00-4:00pm) Session Chair: <ul style="list-style-type: none"> • Prof. Pankaj Gupta, Professor, Department of ECE, Indira Gandhi Delhi Technical University for Women, Delhi, India. • Dr. Abhijeet U. Banode (online), Head of Apple Product Development, DISH Wireless, Colorado, USA Invited Speaker: Dr. Gunajit Kalita , Associate Professor, Department of CSE, Assam Engineering College, Guwahati, Assam. Paper IDs: 17, 29, 57, 73 Faculty in charge & student volunteers:
Session 2 (12/09/2025: Time: 4:00-6:00pm) Session Chair: <ul style="list-style-type: none"> • Dr. Jyoti Jain, Associate Professor, Dept. of EEE, Maharaja Surajmal Institute of Technology, Delhi • Dr. Marta Zurek-Mortka, Lukaszewicz Research Network - Institute for Sustainable Technologies, Department of Control Systems, POLAND. Invited Speaker: Paper IDs: 9, 27, 53, 59, 88,65,85 Faculty in charge & student volunteers:	Parallel Session 2 (12/09/2025: Time: 4:00-6:00pm) Session Chair: <ul style="list-style-type: none"> • Dr. Raghvendra Sahai Saxena, Scientist Grade-G, Head R&QA Division & Mgmt. Rep. Head IEEE Division, SSPL (DRDO), Delhi FIETE, FIE, MIAEng, MSSI. • Chandra Sekar Nandanavanam (online), Principal Applications Engineer, Oracle, Redwood Shores, CA, USA Invited Speaker: Dr. Piotr Bilski , Professor of Faculty of Electronics and Information Technology, The Institute of Radioelectronics and Multimedia Technology, Poland. Paper IDs: 19, 30, 41, 75,97,86 Faculty in charge & student volunteers:
Day 2 (13/09/2025) (All dates/times are as per IST)	
Session 3 (13/09/2025: Time: 10:00am-12:00pm) Session Chair: <ul style="list-style-type: none"> • Dr. Sangita Roy, Assistant Professor of CSE, Thapar University, Patiala, Punjab • Mahesh Mole (online), Senior Software Engineering Manager, Motorola Solutions, Inc., 	Parallel Session 3 (13/09/2025: Time: 10:00am-12:00pm) Session Chair: <ul style="list-style-type: none"> • Ms.Najme Zehra Naqvi, Associate professor, Department of CSE, IGDТУW, Delhi • Chandra Sekar Nandanavanam (online), Principal Applications Engineer, Oracle, Redwood Shores,

<p>USA</p> <p>Invited Speaker:</p> <ul style="list-style-type: none"> • Dr. Aditya R Chandre, Research Scientist and CTO, Priority Technologies, Delaware, USA <p>Paper IDs: 52, 64, 77, 72, 94</p> <p>Faculty in charge & student volunteers:</p>	<p>CA, USA</p> <p>Invited Speaker:</p> <ul style="list-style-type: none"> • Dr. Santosh Kumar, Professor, CSE, Galgotias University, Greater Noida, UP <p>Paper IDs: 5, 11, 22, 37, 44, 66</p> <p>Faculty in charge & student volunteers:</p>
<p>Session 4 (13/09/2025: Time: 12:00pm-1:30pm)</p> <p>Session Chair:</p> <ul style="list-style-type: none"> • Dr. Anuradha Saha, Assistant Professor, AEIE Department, Netaji Subhash Engineering College, Kolkata, WB • Dr. Myneni Madhu Bala (online), Professor of CSE, VNR Vignana Jyothi Institute of Engineering and Technology, Pragathi Nagar, Hyderabad <p>Invited Speaker:</p> <ul style="list-style-type: none"> • Prof. Rashmi Bhardwaj, Fellow of Institute of Mathematics and Applications, UK; Professor of Mathematics, USBAS, Guru Gobind Singh Indraprastha University, Sector 16 C, Dwarka, Delhi. <p>Paper IDs: 8, 51, 63, 62,78</p> <p>Faculty in charge & student volunteers:</p>	<p>Parallel Session 4 (13/09/2025: Time: 12:00pm-1:30pm)</p> <p>Session Chair:</p> <ul style="list-style-type: none"> • Prof. Kanchan Sharma, Professor, Department of ECE, IGDTUW, New Delhi. • Dr. Chintalapudi V.Suresh(online), Professor of EEE, Vasireddy Venkatadri International Technological University (VVITU),Guntur District, A.P. <p>Invited Speaker:</p> <ul style="list-style-type: none"> • Dr. S. Nagini, Professor, CSE, VNR VJIET, Hyderabad, Telangana <p>Paper IDs: 7, 13, 35, 45, 58,96</p> <p>Faculty in charge & student volunteers:</p>
<p>LUNCH BREAK: 1:30pm-2:00pm</p>	
<p>Session 5 (13/09/2025: Time: 2:00pm-4:00pm)</p> <p>Session Chair: Ejaz Aslam Lodhi, Assistant Professor, Department Of ECE, IGDTUW, Delhi. Dr. Subhas Chandra Sahana(online), Department of CSE, NIT, Durgapur, West Bengal.</p> <p>Invited Speaker:</p> <p>Paper IDs: 49, 50, 54, 60, 70, 56, 69, 76, 91,98</p> <p>Faculty in charge & student volunteers:</p>	<p>Parallel Session 5 (13/09/2025: Time: 2:00pm-4:00pm)</p> <p>Session Chair(s): Prof. Dulal Acharjee, Director, Applied Computer Technology, Kolkata, West Bengal, India</p> <p>Dr. Olga Jaksic, Senior Research Associate, National Institute of the Republic of Serbia, Department of Microelectronic Technologies, UNIVERSITY OF BELGRADE, Belgrade, Serbia.</p> <p>Mr. Raman Sharma, (online) Software Senior Principal Engineer, Company: Dell Inc., Austin, Texas, USA.</p> <p>Invited Speaker:</p> <p>Paper IDs: 6, 14, 36, 43, 65, 71, 74, 79, 95,92,83</p> <p>Faculty in charge & student volunteers:</p>
<p>Parallel TEA BREAK: 4:00pm-4:30pm</p>	
<p>13/09/2025, 5:00pm-6:00pm - Valedictory Session(Certificate distribution, Best Paper declaration, Concluding: END of CCSN2025</p>	

Index

Sl. No.	Content	Page No.
01	About the Conference and Venue and date	i - ii
02	Inaugural Song	iii
03	Editorial	iv
04	Message of the VC of Indira Gandhi Delhi Technical University For Women	v
05	Program Schedule of CCSN2025	vi-vii
06	Index	viii-x
Abstracts		
07	Speech of: Prof. Dulal Acharjee, Executive Chairman, CCSN2025 and Director, Applied Computer Technology, Kolkata, West Bengal, India.	1
08	Invited Speaker, Dr. S.Nagini, MCA, M.Tech (CSE), Ph.D Professor and Head (CSE&CSBS), VNR VJIET, Hyderabad.	2
09	Invited Speaker, Dr. Santosh Kumar, Professor, School of Computing Science and Engineering, Galgotias University, greater Noida, UP	3
10	Invited Speaker, Prof. Rashmi Bhardwaj, Fellow of Institute of Mathematics & Applications, UK	4
11	Invited Speaker, Prof. (Dr.) Harsupreet Kaur, Professor, Department of Electronic Science, University of Delhi, India.	5
12	Towards Neuro Quantum Intelligence: The Cohesion of Quantum Computing, AI, and Neuroscience Dr. Gunajit Kalita	6
Biography		
13	Invited Speaker, Dr. Harsupreet Kaur, Professor, Department of Electronic Science, University of Delhi, India.	7
14	Invited Speaker, Dr. Kandarpa Kumar Sarma, Professor and Head, Department of Electronics and, Communication Engineering, GUIST, Gauhati University, India	
15	Prof. Dr. (Mrs.) Rashmi Bhardwaj Professor, Department of Mathematics, Non-Linear Dynamics Research Lab, School of Basic & Applied Sciences, Guru Gobind Singh Indraprastha University, Dwarka, New Delhi, India.	8
16	Dr. S.Nagini, MCA, M.Tech(CSE), Ph.D, Professor and Head (CSE&CSBS), VNR VJIET, Hyderabad, Hyderabad, India,	9
17	Dr. Santosh Kumar, Professor, School of Computing Science and Engineering,, Galgotias University, greater Noida, UP	

Sl. No.	PID	Title of Paper/ Author	Page No.
17	2	A Novel Dual-Band Modified Rectangular Patch Antenna Having Different Slots with Parasitic Structure for V-Band Applications and 60GHz mmWave Applications Anandita Chaudhary, Bhavya Taneja, Joel Saxena, Vaishali Kikan, Ashwani Kumar	10
18	5	Federated Learning with Autoencoder for DDoS Anomaly Detection in IoT Networks Aditi Chaudhary, Arnisha Barman, Riya Sur	
19	6	Centralized Web Portal Assisting Hackathon Teams in Efficient Collaborative Workflows and Transparent Task Execution Purvi Saini, Seemran Sethi, Shikha Dhiman, Brijesh Kumar	11
20	7	Predicting Tomato Plant Disease Using Machine Learning And Deep Learning Algorithms Lovely Kumari, Sapna, Brijesh Kumar	
21	8	White-Papers Hub Divyam Kaushik, Ansh Tiwari, Salil Aryan, Dr. Santosh Kumar	12
22	9	A Comparative Review : Discord Bot And Alternative Similar Platforms Dr. Santosh Kumar (Professor), Nishika Singh, Himanshi Sharma, Shivangi Srivastav	
23	11	Farm Management System Using Machine Learning Dr. Praveen Kumar Gupta , Ashish Yadav , and Venu Gopal Singh	13
24	13	Facial Recognition Algorithms: A Review Dr. Gaurav Indra, Harshita Bhardwaj, Tarni Balgoher	
25	14	Reliability-Enhancement CardioAI: A Proactive Approach to Cardiovascular Health Monitoring Santosh Kumar, Rama Shankar Yadav, Upasna Joshi, Deepak Kumar Panda	14
26	17	Attention-Driven ANFIS for Plant Leaf Disease Detection and Classification Astha Sharma, Ashwni Kumar	
27	19	A Lightweight Perceptual Kernel Framework for Realistic Multi-Band Image Augmentation in Remote Sensing Nishi Madaan, Renu Dhir, Nonita Sharma	15
28	20	H-SLSHAP: A Split Learning and SHAP-Based Hybrid Framework for Malware Detection in Healthcare IoT Devices Riddhi Saraswat, Usha Jain, Sunil Kumar	
29	22	SEKAMA: Secure and Efficient Key Agreement and Mutual Authentication in Wireless Sensor Networks for Military Applications Govind Narayan Patel, Muzzammil Hussain, Kapil Saraswat, Rajan Singh, Meenakshi Tripathi	16

30	27	A Machine Learning Approach to Early Lung Cancer Diagnosis Khushi Dutta, Manya Singh, Aruna Tomar, Kanchan Sharma, Brijesh Kumar	
31	29	Power-Optimized FSM Architecture for 64-Bit Bulk State Machines: A Comparative Analysis of State Encoding Techniques Across Technology Nodes Sheetal Rana, Prof. Shobha Sharma	17
32	30	Intelligent Diabetes Management Assistant: Recommendations, Prediction and Feedback Learning Integration Shivika Singh, Nidhi Goel, Pallavi Sharma	
33	32	Optimized Cloud Architectures for Scalable Sensor Networks: A Performance-Driven Approach Ronald Lopes	18
34	35	Ultra low power Current mirror based VCO structure for Biomedical applications Pritty, Mansi Jhamb	
35	36	Improved Image Feature Extraction: A Comprehensive Analysis through Performance Evaluation V V Waykule, D S Bormane	19
36	37	3D QAM-Based Image Transmission over Fading Channels in Wireless Communication Systems Sushant Kabir Dutta, Pawan Kumar Sharma, Rupaban Subadar	
37	41	Performance Evaluation of Machine Learning Based Beamforming Algorithms in Passive and STAR-RIS Using Unit Cell and Array Simulations Y. Manasa, Bhuvan Susheel Meka, Sanikommu Vasantha, Shrabani Sanibhadra	20
38	43	A Real-Time AI-Assisted Code Collaboration Tool for Remote Teams Mrs. K Hari priya, D. Sri Lekha, Ch. Laasya Priya, Ch. Anshitha Reddy, G. Sreevibha, S. Sathvika	
39	44	Implementation Of Api Monitoring Using Opensource Tools K Hari Priya, D Madhura Valli, G Bhargav Reddy, G Lekha Madhuri, S Varshith Kumar	21
40	45	Lora Based Wireless Weather Monitoring System Y Manasa, S Shashank, A Suraj, Md Ayisha	
41	49	Enhancing Public Safety with Machine Learning-Based Violence Detection Raswitha Bandi , CH.Sai Pranav, V.Shree Ram Chandra, P.Pravar, S.Jayanth	22
42	50	From Chalk to Code: Integrating ICT and AI Tools in Science Education in Delhi Government Schools Shraddha Yadav, Gaurav Rao	
43	51	Model Learning on Detection of Weeds by AI Subbarayudu Rayudu, Prof. K Ammulu	23
45	52	Use-Cases of Quantum Computing and Future Scope Deep Shikha Gautam, Brijesh Kumar, Amar Kumar Mohapatra, Ashu	
46	53	Towards Gender-Inclusive Fashion Analytics: Developing Transformer Models for Clothing Review Classification Om Satyam Panda, Rishika Singh	24
47	54	Acute Heart Disease Prediction: An Interpretable Deep Learning Approach C. Laxmi Pranitha, Nyemeesha V	
48	56	A Comparative Analysis of Machine Learning and Deep Learning Techniques for classifying White Blood Cells Mudit Mittal	25
49	57	SecurGeek Sparks Transformation: A Revolutionary Training Model for Small and Medium Enterprises Parv Jain, Lav Upadhyay, Ayan Brijesh, Om Satyam Panda	
50	58	An Investigation into Human Evolution based on similarity analysis of non-coding DNA regions Sauren Sarkar, Soma Barman Mandal	26
51	59	Machine Learning for Energy Optimization Using PINNS Om Satyam Panda, Shreja Mukesh, Mishra, Rishika Singh, Kanwalpreet Kour	
52	60	Road Traffic Congestion Analysis on Video Imagery Surbhi Bharti, Mehar Kapoor, Nisha Rani, Pragya Agarwal, Rishita Kashnia, Prof. Ashwni Kumar	27
53	62	Self-synchronized Synchronverter for Autonomous Grid Synchronization in High-Renewable Microgrids Megha Dua, Pankaj Gupta	
54	63	A Comparative Study of Skin Cancer Image Classification Techniques Surbhi Bharti, Ananya Taneja, Illa, Mansi Kushwaha, Ashwni Kumar	28
55	64	An Ensemble Machine Learning Framework for DoS Attack Detection and Prevention Ayan Brijesh, Parv Jain, Om Satyam Panda, Lav Upadhyay	
56	65	Performance Evaluation of Relay-Assisted NOMA Systems: A Study on Sum Rate and Throughput Shambhavi Tiwari, Kanchan Sharma	29
57	66	An Identity-Based Paring Free Mutual Authenticated Key Agreement Scheme for Telecare Medical Information Systems Ananya Banerjee, Subhas Chandra Sahana	
58	67	Design and Implementation of a LoRa-MQTT Powered Train Collision Avoidance System Nageshwar V, Chintalapudi V Suresh, M. S. Sreenivasa Rao, K. Nagaraju	30
59	69	An Early Stage Detection of Red Spider Mite Infestation in Tea Leaves using Machine Learning Bhaiswajyoti Lahon, Sushanta Kabir Dutta, Ranik Mandal, Pankaj Sarkar, Sangeeta Das	

60	70	An Xai Based Novel Approach to Classify and Predict Skin Cancer G Laxmi Deepthi, Kamma Bharath, N Kaushik Rishi, V Sai Satvik Varma, Y Chandhra Banu	31
61	71	Smart Recipe: Intelligent Recipe Generator and Image Analysis Framework Mrs.G.Laxmi Deepthi, K.Bhavishya, N.S.S.Lakshmi, V.Rishitha, V.Likitha	
62	72	Evaluating Impactful Innovation Components for Smart LPG Cylinder Trolley: An Evidence-Based Approach Nagini S, Jhansi Lakshmi Bai K, Madhu Bala Myneni, Satwik K	32
63	73	Hybrid Metaheuristic Optimization for Energy-Efficient and Reliable Wireless Sensor Network Deployment Kaki Ramya Sree, Vinay Kumar Pamula	
64	74	Hybrid Machine Learning Framework for Early Detection of Liver Disease Using SVM, Neural Networks, and Stacking Models M. S. Srinivasa Rao, Chintalapudi V Suresh, Nageshwar V,K. Nagaraju	33
65	75	Performance Analysis of a Hybrid K-Means -Huffman Image Compression Scheme in Rayleigh Fading Wireless Environments Arti Ranjan, Arvind kumar	
66	76	Cross-Domain Transfer Learning for Customer Churn Prediction: A Comparative Study on Food Delivery, Streaming, and Ride-Hailing Services Priyanka Hazowary, Sushanta Kabir Dutta, Rupaban Subadar	34
67	77	AI based Energy Management System in 4kW Grid-Tied PV-BES System Supriya Sharma, Pankaj Gupta	
68	78	Advanced Quantum Communication Protocols for Multi-Domain Strategic Applications: A Comprehensive Framework for Indian Military, Economic, and National Security Operations Jammana Lalu Prasad	35
69	79	Social Media Monitoring Tool for Emergency Responses Using a Machine Learning Model Neelakantan Puligundla, Madhu Bala Myneni	
70	83	Real-Time Traffic Optimization- The review of multiple techniques, Algorithms and Models Rajat Jain, Pradnya Borkar, Sagarkumar S. Badhiye, Ameya Sontakke, Atharva Dethe, Shailesh Kamble	36
71	85	An Interactive ML-Powered Multi-Disease Prediction Platform Using Streamlit Praveg Chikte, Sagarkumar Badhiye, Pradnya Borkar, Saharsh Vaidya, Swarali Limaye, Shailesh Kamble	
72	86	Time Series Analysis and Forecasting of NVIDIA Stock Prices Using GRU Neural Networks Shreyas Rajendra Hole, Nikhil Mangrulkar, Gyana Ranjana Panigrahi, Vinothkumar Kolluru, Shailesh D. Kamble	37
73	88	iManager: A Lightweight, Scalable, and Cost-Effective Project Management Tool Ritu Kadam	
74	91	SpaceC: A Virtual Reality Learning Game To Teach Conditional Logic in C Programming to Slow Learners Dr. S. Nagini, Mr. K. Akhil, Ms. T. Shatvika Shadvini	38
75	94	Iterative rating through Voting algorithm- Multi Parameter Aggregation Manjula Pilaka, R.Sunitha Rani	
76	92	Smart Traffic Light Controller Including Emergency Services Implementation on Intel Cyclone V-DE1 SOC Board Sreenivasa Rao Ijjada, K.Shashidhar,M. Sushanth Babu	39
77	95	User-Level Depression Severity Assessment via Keyword-Driven Temporal Modeling and Rule-Based Classification K. Jhansi Lakshmi Bai, Y. Radhika	
78	96	Semantic Chatbot for Cognitive Analysis of a Student Karnam Akhil, V.Baby, Malladi Sri Raksha, Manda Akaash, Malapati Pavan, and Architha Mahendra	40
79	97	A Novel Framework for Digital Accessibility for Individuals with Disabilities Karnam Akhil, S Nagini, Thoran Chandra Muvvala, Siripuram Bharath, Upadhyayula Harshitha, Tejasree Lokireddy	
80	98	Adaptive Traffic Signal Management System Using Deep Reinforcement Learning Praful V. Barekar, Girish Nandanwar, Ashu Jenekar, Bhushan More, Nikhil S. Mangrulkar, Shailesh D. Kamble	41
81	99	Multi-Spectral and Panchromatic Image Fusion Using Graph Neural Networks with Extreme Learning Machine Enhancement Rajni sharma, M Ravinder	

Sl. No.	Content	Page No.
Awards		
82	The Vidyasagar Award	42
83	List of Invited Speakers/ Session Chairs	43
Advertisement		
84	ESDA2025	45

Speech of:
Prof. Dulal Acharjee,
Executive Chairman, CCSN2025 and
Director, Applied Computer Technology, Kolkata, West Bengal, India.



Today, we are here to celebrate the inauguration of 14th international conference on ‘Computing Communication and Sensor Networks’, in short CCSN2025. This initiative is for advancing technology for the betterment of the society. Advances of technology provide more security, comfort in day to day lives and it can replace manual hard labours to automations.

Computing and Communication Science is used everywhere in the modern world. It has revolutionized the way we connect, communicate, and process information. In today's interconnected World, communication science has provided all facilities of connections, message-transfer, and high speed data transfer with security with high speed computing facilities.

The invention of wireless communication, internet, WiFi, proliferation of smartphones, Cloud Computing, Big data, sensing data and its Networking sciences have developed applications in all areas of life. The PARAM Supercomputer development of India was another success in the history of Computing. Landing of the Spacecraft, Chandrayan-3 of India, on the surface of the Moon required very skilled software, interfacing of hardware-sensors and signal transporting technology. After invention of Windows in about 1980's, a GUI based OS, computer, electronic and engineering science have explored very rapidly. At that time people could not think about GUI features, but, Microsoft Inc. under the leadership of Bill Gates realised that things. There was a vacuum of GUI features based OS; Microsoft could invent GUI and have been doing largest business on that invention.

We have got lot of papers in CCSN2025 on Medical Electronics, Software and Electronic subjects but not a single on Music-Electronics. In this area of research, there is a vacuum, yet to be invented. In future, music electronics will explore and in all home electronic musical instruments will take place and people will code, encode, do program on sound, volume, tunings, Swaralipis(literal coding of vocal sound of song) in different languages etc. Computer Science has developed lot of, but yet, there is no software which can prepare Swaralipis of different musical instruments like: Harmonium, Synthesiser, Piano, Guitar, etc. That means, if a singer sing a song or play a musical instrument, we need that type of OS and software which can make Swaralipi instantly taking input from microphone. There are large scopes of research in this area. If we can do that- like Windows, another World of science and engineering will be explored which would generate huge employments. We need music OS.

Through this conference, CCSN2025, we like to give a call to the professors, scientists, engineers to start some research projects on musical electronics.

Hope, by your active participation, research people of these subjects will get more efficient supports to furnish their research projects which will come as different applications of technologies with more advanced features in near future.

We work for developing the technology so that the World would be a better sustainable and a peaceful space for the human being.

Date: 03/09/2025, Kolkata.

Invited Speaker

Shaping Tomorrow's Intelligence: Quantum Classifiers and Transfer Learning

Dr. S. Nagini

M.Tech (CSE), Ph.D

Professor and Head (CSE&CSBS)

VNR VJIET, Hyderabad.

Abstract- Quantum Machine Learning (QML) is an evolving interdisciplinary research area that merges quantum computing with machine learning techniques, enabling more efficient and accurate analysis of complex data (e.g., datasets related to COVID-19). In recent years, significant progress has been made in developing innovative methods at the intersection of neural network transfer learning (NNTL) and various computational diagnosis models in healthcare.

This explores the potential of combining NNTL with QML to address computationally complex problems. The focus is on transfer learning, a method that leverages pre-trained neural network models to adapt and perform effectively across diverse scenarios. Recent developments demonstrate how QML classifiers, when integrated with traditional neural networks, can enhance performance. A case study highlighting improved accuracy in COVID-19 screening is presented, where audio signal spectrograms are evaluated in the frequency domain using ensemble approaches and sliding window processes rooted in computer vision techniques.

Quantum-assisted transfer learning emerges as a promising approach for further enhancing the accuracy of data analysis. A hybrid method is discussed that shows significant improvement in data processing accuracy, thereby highlighting its practical applicability in handling large-scale, complex datasets.

The discussion concludes with insights into the challenges and opportunities of applying QML in the global quantum technology landscape, emphasizing its role in advancing AI through the synergy of QML and NNTL.

Invited Speaker

Machine Learning: Shaping the Present, Defining the Future

Dr. Santosh Kumar

Professor, School of Computing Science and Engineering,
Galgotias University, greater Noida, UP

Introduction

Machine Learning (ML), a pivotal branch of Artificial Intelligence, has rapidly evolved into one of the most transformative technologies of the 21st century. By enabling systems to learn from data and improve autonomously, ML has become the driving force behind the Fourth Industrial Revolution.

Current Applications of ML

- **Healthcare:** Early disease detection, medical image analysis, and personalized treatment planning.
- **Finance:** Fraud detection, credit risk modeling, and algorithmic trading.
- **Transportation:** Autonomous vehicles, intelligent traffic systems, and smart logistics.
- **Retail & Education:** Recommendation engines, adaptive e-learning platforms, and personalized customer engagement.
- **Agriculture & Climate Science:** Crop monitoring, weather prediction, and sustainable resource management.

Future Directions

- **Precision Healthcare 2.0:** Genomics-driven, personalized therapies.
- **Autonomous Systems:** Next-generation self-driving cars, drones, and robotic solutions.
- **Sustainability:** AI-optimized renewable energy, climate modeling, and water conservation.
- **Education Without Borders:** Scalable, adaptive, and personalized learning platforms.
- **Human–AI Collaboration:** Machines as partners augmenting creativity, productivity, and decision-making.

Challenges and Considerations

- **Data Privacy & Security** – safeguarding sensitive personal and institutional data.
- **Bias & Fairness** – ensuring inclusivity and ethical outcomes in ML decision-making.
- **Workforce Transition** – preparing for evolving job landscapes in the AI-driven economy.
- **Governance & Ethics** – creating transparent, accountable, and human-centric AI policies.

Conclusion

Machine learning is no longer confined to laboratories—it is embedded in our daily lives and shaping critical global systems. Its future impact will not be determined solely by algorithms, but by the ethical, responsible, and inclusive choices we make today.

Invited Speaker

Bifurcation and Fractal Pathways for Nonlinear Complexity

Prof. Rashmi Bhardwaj

Fellow of Institute of Mathematics & Applications, UK
Head, Nonlinear Dynamics Research Lab,
Professor of Mathematics, University School of Basic and Applied Sciences,
Guru Gobind Singh Indraprastha University, Dwarka, Delhi, India.

Abstract- In nature daily we encountered with complex structures including the structure of human body. A fractal is a never-ending pattern. Fractals are infinitely complex patterns that are self-similar across different scales. They are created by repeating a simple process over and over in an ongoing feedback loop. Driven by recursion, fractals are images of dynamic systems – the pictures of Chaos. Geometrically, they exist in between geometrical dimensions. Fractal patterns are extremely familiar, since nature is full of fractals. Self-similar objects look the same on any scale; no matter how many times you magnify it, it will look similar. Fractals are composed of smaller versions of itself. The most important fractals are the Mandelbrot-set, Julia set, Cantor set, Henon attractor, Rossler attractor, Lorenz attractor, Ikeda attractor, Horseshoe map, Chua’s circuit, Lyapunov exponent.

A fractal canopies is created by taking a line segment and splitting it into two smaller segments at the end. Iterate this process infinitely. A fractal canopies has the following properties: the angle between two neighboring line segments has to be the same throughout the fractal; the ratio of the lengths of consecutive lines must be constant; points at the end of the smallest line segments should be interconnected. Fractal dichotomous branching is seen in the lung, small intestine, blood vessels of the heart, and some neurons. Fractal branching greatly amplifies the surface area of tissue, be it for absorption (e.g. lung, intestine, leaf mesophyll), distribution and collection (blood vessels, bile ducts, bronchial tubes, vascular tissue in leaves) or information processing (nerves).

Keywords: Fractal, Brownian motion, Mandelbrot set, Cantor set, Henon attractor, Rossler attractor, Lorenz attractor, Lyapunov exponent, Bifurcation

Invited Speaker

Ultra-Wide Bandgap Ga₂O₃ Devices: A Breakthrough for High-Power, High-Frequency Systems

Prof. (Dr.) Harsupreet Kaur

Professor, Department of Electronic Science,
University of Delhi, India

Abstract -The growing demand for faster, more reliable, and energy-efficient communication technologies has accelerated innovation in high-frequency electronics, with applications ranging from 5G networks and radar to satellite communications and high-speed data transfer. However, conventional semiconductor materials such as silicon and germanium have already reached their fundamental limits in meeting the stringent requirements of these systems. This has shifted global attention toward wide and ultra-wide bandgap semiconductors, which offer superior electrical and thermal properties. Among these, gallium oxide (Ga₂O₃) has emerged as a highly promising material due to its ultra-wide bandgap, high breakdown voltage, and scalability, offering unprecedented potential for high-power and high-frequency device applications.

This talk will present an overview of recent advancements in Ga₂O₃ devices, with particular focus on their role in high-frequency systems such as power amplifiers and RF front ends. Cutting-edge device architectures, novel design strategies, and performance benchmarks will be discussed. The effectiveness of Ga₂O₃ in overcoming current technology bottlenecks will be illustrated, along with an outlook on its future role in shaping the landscape of high-power, high-frequency electronics.

Invited Speaker

Towards Neuro Quantum Intelligence: The Cohesion of Quantum Computing, AI, and Neuroscience

Dr. Gunajit Kalita

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Department of Computer Science and
Engineering, Assam Engineering College,
Guwahati, Assam, India

Abstract - In today's world there are lots of amalgamation happening in varied domains. To commemorate these different examples can be drawn that brings Quantum Computing, Artificial Intelligence (AI) and Neurology together and can be named as NeuroAIQ. The commonality of quantum computing, artificial intelligence, and neurology defines an emerging research frontier that unites physics, computation, and biology in the quest to understand and replicate intelligence. These fields are advanced independently, their integration forms a synergistic triad: quantum computing provides novel computational capabilities, AI abstracts and models cognition, and neurology offers the biological foundation of intelligence. Together, they create new opportunities to address complex problems in neuroscience, healthcare, and cognitive science.

For the introduction of quantum computing, information processing is undergoing a paradigm shift. The latter offers some features, such as quantum parallelism, entanglement, and superposition, to address issues that are outside the scope of classical computing. These possibilities are relevant to artificial intelligence, and they are also spawning a new paradigm known as quantum AI. Here, quantum algorithms and hardware speed up machine learning, optimize high-dimensional patterns for pattern recognition, and lower the energy costs associated with deep learning model training. Some recent studies show concrete advancements in this area, such as "quantum-enhanced models can improve Alzheimer's detection using handwritten records, electroencephalogram (EEG) based classification through hybrid quantum-classical architectures like QEEGNet, and DNA microarray brain tumor classification using variational quantum circuits."

From the standpoint of neurology, artificial intelligence (AI) plays a crucial role in decoding complicated brain signals, which are highly encoded and sophisticated. AI can map brain neuron connections and analyze neuroimaging data with ease. These techniques can be expanded to higher dimensions through the use of quantum computing. According to a recent study, hybrid quantum-classical convolutional neural networks that were trained on MRI scans for Alzheimer's disease diagnosis outperformed conventional tests with a classification accuracy of over 97%.

The study on quantum neuroscience explore the possibility whether the brain might exploit quantum phenomena at microscopic scales, giving birth of new quantum-AI and neuromorphic architectures. The implications of this cohesion are profound and visible. In medical science Quantum AI promises earlier and more accurate detection of neurological disorders. Whereas, in brain-computer interfaces, hybrid approaches could enable seamless neural-machine communication with higher fidelity and in cognitive science, new computational frameworks could bridge the gap between biological intelligence, artificial cognition, and quantum mechanics. Quantum algorithms can enhance AI and neurological simulations; AI can optimize quantum resources and decode complex neural data; and neurology provides the blueprint for adaptive, efficient computational systems. This convergence not only advances technological innovation but also enhance our ability of cognition and consciousness, establishing a foundation for futuristic intelligent systems.

Keywords: Quantum Computing, AI, Neurology, Quantum AI, Brain-Computer Interfaces, Neuroinformatics, Cognitive Systems, Consciousness.

Prof. (Dr.) Harsupreet Kaur

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She is currently Head, Department of Electronic Science, University of Delhi, New Delhi, India and Dean, Faculty of Interdisciplinary and Applied Sciences, University of Delhi. She received the B.Sc.(Hons.) and M.Sc. degrees in Physics and the Ph.D. degree in Electronics from the University of Delhi, New Delhi, India, in 2001, 2003, and 2008, respectively. She has authored or coauthored over 120 technical papers in international journals and various international/national conferences. She has supervised 03 Ph.D. students, 50 M.Sc. dissertations and currently 02 students are working under her supervision. Her current research interests are in the areas of analytical modeling, design, and simulation of advanced MOSFET devices like cylindrical/surrounding gate, FinFETs, ferroelectric materials based advanced devices, reconfigurable devices, devices with novel channel materials, Ga₂O₃ devices power devices etc. She is reviewer to many journals including IEEE, IOP, Elsevier, Springer, etc. She is Senior Member of IEEE and life member of Semiconductor Society of India. She is the Secretary of IEEE EDS Delhi Chapter. She has served as TPC, Track chair in many reputed international conferences. She was the recipient of the Young Scientist Award in the XXIX General Assembly of the International Union of Radio Science (Union Radio-Scientifique Internationale) URSI-GA 2008.

Dr. Kandarpa Kumar Sarma

Professor and Head, Department of Electronics and
Communication Engineering, GUIST, Gauhati University, India



Dr. Kandarpa Kumar Sarma, currently Professor and Head, Department of Electronics and Communication Engineering, GUIST, Gauhati University, India specializes in computer vision, human computer interaction, cognitive and software defined radio, mobile communication, artificial intelligence, deep learning, speech processing and antenna design. He completed M. Tech in Signal Processing in 2005 from IIT Guwahati, India. He is a Senior Member of IEEE (USA) and a fellow of Institution of Electronics and Telecommunication Engineers (IETE) (India). Currently he is associated with research in the areas of pandemic compliant smart infrastructure development, AI aided approaches in MIMO-NOMA networks, cognitive electronic warfare and high data rate micro-strip patch antenna designs. Earlier he was associated with the design of high data rate wireless system design using software defined radio. He has been the editor in chief two international journals (International Journal of Intelligent System Design and Computing, Inder science and International Journal of Circuits and Electronics) and Associate Editor of Network: Computation in Neural Systems, Taylor and Francis.

Prof. Dr. (Mrs.) Rashmi Bhardwaj

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Academic Qualification: Ph.D. in Mathematics (1997) from University of Delhi; M.Sc. (Mathematics) (89.3%, 1991) and. Second topper of University of Delhi in M.Sc. examination with 100/100 marks in Integral Equation & Boundary Value Problem and 98/100 marks in Space Dynamics papers of M.Sc. (Mathematics) Examination; B.Sc.(H)Mathematics (81.9%, 1989) and seventh topper of University of Delhi in B.Sc. (H) Mathematics Examination. Also, the topper of Zakir Husain College, University of Delhi in B.Sc. & M.Sc. Examination.

Professional Achievements: Appointed as Consultant, Examiner – Head examiner, Evaluator, Moderator for various examinations of Central, State, Government Organizations and Foreign Universities. Subject Expert in various selection committees of Central, States, Board, Universities, Institutions and Organizations. Resource persons and Chaired Technical Sessions in workshops/ conferences/ seminars of Central, State, Board, Universities, Government Organizations and Foreign Universities.

Dr. S. Nagini

MCA, M.Tech (CSE), Ph.D
Professor and Head (CSE&CSBS)
VNR VJIET, Hyderabad, Hyderabad, India



With an illustrious tenure spanning 27+ years at the esteemed VNR Vignana Jyothi Institute of Engineering and Technology in Hyderabad and 2 years in Industry- UPTRON ACL, she boasts a wealth of experience in both teaching and cutting-edge research. Her academic contributions are exemplified by the publication of over 40+ research papers in distinguished National and International Conferences and Journals, all of which are cataloged in esteemed platforms such as Scopus, IEEE, and Springer Proceedings. Apart from this she authored a text book on “Blockchain Unchained” which is published by Notion Press.

As a distinguished Senior member of IEEE, Chair, Programme Committee ISoC and a lifelong member of ISTE and CSI, she stands as a stalwart in the academic community. Her research endeavors encompass a diverse array of domains including Data Mining, Algorithms, Image Processing, Machine Learning, Deep Learning, and Blockchain technologies.

Functioning as the linchpin for numerous International Conferences, seminars, workshops, and Faculty Development Programs (FDPs), she brings forth eminent personalities from reputable institutions and industries to benefit both students and faculty members alike. As Head of Department of both CSE & CSBS and as Chairman of the Board of Studies, her contributions to curriculum enrichment have added substantial value.

Her indomitable spirit has been instrumental in the establishment of a Center of Excellence Data Science, Big Data, Virtual Reality, and Augmented Reality. Under her stewardship, the department has forged significant Memorandums of Understanding (MoUs) with prestigious software industries and academic institutions, thus bridging the gap between the Industry and Academia and conducted International Conference ICACECS for 6 times. In the interest of students, she founded a coding club christened as Turing Hut.

Her unwavering dedication has been pivotal in achieving coveted accreditations including NBA accreditation, NAAC A++, and a notable NIRF ranking. Guiding a multitude of Undergraduate and Postgraduate projects across diverse technological domains, she has also garnered SEVEN patents. Currently, she is actively mentoring two Ph.D. scholars.

Dr. Santosh Kumar

Professor, School of Computing Science and Engineering,
Galgotias University, greater Noida, UP



Dr. Santosh Kumar is currently working as Professor in the School of Computing Science and Engineering. He has worked as a Faculty for more than 14 years in total. Since 2022, he has been connected to Galgotias University. He firmly thinks that efficiency and productivity at work are important. He demonstrates a sincere work ethic and the capacity to perform well in a hectic, time-sensitive setting. Being an enthusiastic educator, he feels that education should encompass more than just helping pupils grasp the fundamental ideas of a subject; it should also foster critical thinking skills and the evaluation of alternative approaches to problem-solving. He consistently directs his efforts on his students' overall growth.

Experience and Designation:

- 14+ Years and Professor

Academic Qualification:

- Ph.D. Computer Science
- Master of Computer Applications

Publications:

- SCI/SCIE Article Publications: 5
- Scopus Article Publications: 41
- Non-Scopus/UCG Article Publications: 60
- International/National Conference Publications: 21
- Patent/Grant Publications: 0

Paper Id.: 02

A Novel Dual-Band Modified Rectangular Patch Antenna Having Different Slots with Parasitic Structure for V-Band Applications and 60GHz mmWave Applications

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Abstract- In this research paper, we will explore a dual-band microstrip modified rectangular antenna featuring various types of slots. The antenna design employs a radiating rectangular monopole to achieve resonance at 60.0 GHz with a return loss of -42.1840 dB. The antenna design features a modified rectangular patch with an intricate layout on a substrate, including a feed line and patches in a distinct pattern. It is constructed on a Rogers RT/Duroid 5880 substrate with a thickness of 0.0254 mm. The HFSS software is used to design the proposed antenna and its electromagnetic waves analysis has been conducted. A single element efficiently converts bounded energy into electromagnetic waves, resulting in high efficiency and gain. The proposed antenna has highly compact dimensions of 6x7 mm², making it ideal for use in compact 5G devices. The design provides a good resistance and a reactance of 50 ohms and 1 ohms respectively. The antenna exhibits strong diversity performance which is suitable for use in 5G devices and has applications in mobile networks and wireless technology. This paper analyses various parameters such as E- plane and H-plane 2 -D radiation pattern, VSWR and reflection coefficients.

Keywords- Microstrip, V-band, MIMO, VSWR, monopole, radiation pattern.

Paper Id.: 05

Federated Learning with Autoencoder for DDoS Anomaly Detection in IoT Networks

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Abstract- This work puts forward a decentralized approach to anomaly detection in IoT networks by integrating federated learning with deep autoencoders. Unlike conventional methods that require centralizing data, our framework enables multiple clients to train a shared model locally to safeguard sensitive information. Each device updates its copy of the model using local data, while only the learned parameters are communicated to a central server for aggregation by the Federated Averaging algorithm. The deep auto-encoder is optimized to reconstruct normal input patterns to allow it to flag significant deviations as anomalies. The model achieves strong detection performance alongside ensuring data privacy, making it highly applicable to distributed real-world environments where security and confidentiality are paramount.

Keywords- Federated Learning, Autoencoder, Anomaly Detection, IoT Security, Privacy- Aware Systems.

Paper Id.: 06

Centralized Web Portal Assisting Hackathon Teams in Efficient Collaborative Workflows and Transparent Task Execution

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Abstract- Hackathon is a fast-paced and time-bound activity, often resulting in ineffective team collaboration due to weak communication between teams and poor execution. A platform focused on project tracking, management, and seamless collaboration is a necessity in such scenarios. This paper presents the design and development of an online centralized web portal assisting hackathon teams in efficient collaborative workflows and transparent task execution. The implementation is accomplished using MERN Stack, aimed at optimizing the communication, productivity, time, and effort required for the development lifecycle. This web portal simplifies and optimizes the process by offering features like Team formation, Tasks management, Resource sharing, Documenting project information, Idea generation, and Visualizing team progress through interactive charts. The interface, built with React.js, offers a sophisticated design, leveraging React's efficient rendering to ensure quick updates and smooth user interactions, all within a unified platform for seamless collaboration, besides this, the Node.js backend allows server scripting, and MongoDB database provides secure login features and fast data access, ensuring the platform remains responsive and reliable. Currently, there is no existing system that provides aforementioned diverse functionalities required by the hackathon participants in a single platform. So, this proposed web portal is an emerging solution that not only allows ease of execution in a short deadline, but also lays the foundation for future enhancements, such as deeper analytics for team performance and seamless integration with emerging tools, thereby advancing the field of project management and team collaboration. This portal enhances the overall efficiency, increases productivity, ensures better time management, and improves the project development experience.

Keywords- Project Management, Hackathon, Team Collaboration, Task Tracking, Web Portal.

Paper Id.: 07

Predicting Tomato Plant Disease Using Machine Learning and Deep Learning Algorithms

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Abstract- Tomato crops are highly prone to a variety of leaf diseases that can significantly impact yield and quality. However, the production of tomatoes gets hindered due to various diseases of tomato leaves. Early and accurate detection of these diseases is essential for effective management and control. This research presents a deep learning-based approach for the classification and prediction of tomato leaf diseases, using Convolutional Neural Network (CNN) as the primary model. The study explores and compares the performance of CNN with three other models: Artificial Neural Network (ANN), Support Vector Machine (SVM), and Random Forest. In our model, the Tomato Leaf Disease Detection dataset from kaggle was utilized to detect tomato leaf disease. The dataset contains images of tomato leaves both healthy and diseased. These images were used for training and testing the models. Various preprocessing techniques were applied to enhance the quality of the input data. The experimental results demonstrate that the CNN model outperforms the other models in terms of accuracy. The comparative analysis also provides insights into the strengths and limitations of each model, contributing to the development of a reliable and efficient disease prediction system for tomato crops. This work aims to support farmers and agricultural stakeholders by integrating intelligent systems into plant disease management practices.

Keywords - Tomato Leaf Disease, CNN, Deep Learning, Classification, Data augmentation.

Paper Id.: 08

White-Papers Hub

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Abstract- White-Papers Hub website is a dynamic platform designed to centralize and disseminate research, academic papers, and industry reports. Developed using HTML and CSS, this site emphasizes a clean and intuitive user interfaces, ensuring easy navigation and accessibility for users seeking valuable insights. Key features include a streamlined search function, categorization of documents by topic, and a user- friendly layout that enhances the reading experience. The responsive design ensures optimal performance across various devices, catering to both desktop and mobile users.

Keywords - Web Development, HTML, CSS, Back-end Development, Front-end Development, Responsive Web Design, UI design, Website Hosting, Web Security.

Paper Id.: 09

A Comparative Review: Discord Bot and Alternative Similar Platforms

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Abstract- In the expanding era of digital communication, the choice of collaborative platforms is essential for information flow and productivity. In this study, we primarily focused on four popular platforms—Discord, Telegram, Slack, and Microsoft Teams— compared with an emphasis on four key areas: professional deployment suitability, security structures, chatbot integration capabilities, and collaboration usability. Our research combines results from usability tests, platform architecture papers, security experiments, and recent real-existing studies conducted between 2019 and 2025. The findings show that while Telegram and Discord provide community- focused or lightweight features that are more appropriate for casual or public setting environments, Slack and Microsoft Teams lead in professional and enterprise contexts due to their superior integration, security, and productivity tooling. This study provides a valuable insight for developers, organizations, and future studies.

Keywords - Slack, Microsoft Teams, Telegram, Discord, Chatbots, Collaboration Platforms, Security, Bot APIs.

Paper Id.: 11

Farm Management System Using Machine Learning

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Abstract-The Farmers Management System (FMS) is an innovative, machine learning-based platform transforming agriculture through data -driven insights. Recognizing the complex interplay of factors affecting farming success, the FMS integrates and analyzes diverse data, encompassing soil properties (type, pH), weather patterns (climate, rainfall, temperature, humidity), and potentially other relevant information like past yields, market values, and pest/disease occurrences. Utilizing advanced data processing and predictive modeling, the FMS transcends traditional farming methods, offering precise, customized recommendations. These recommendations guide critical decisions, such as selecting optimal crops for specific local environments, efficiently allocating resources for irrigation, fertilization, and pest management, and proactively managing risks from weather events or disease. The FMS addresses key agricultural challenges: increasing productivity to meet global food demands, adopting sustainable practices to minimize environmental impact, and ensuring the economic viability of farming, especially in rural areas. Developing and implementing the FMS involves rigorous algorithm design, model training and validation using real agricultural data, and field testing to evaluate performance and impact under varied conditions. Ongoing research focuses on improving accuracy, expanding functionality, and ensuring accessibility for farmers with diverse technical skills. The FMS ultimately aims to bolster global food security, improve rural farming livelihoods, and foster a more sustainable and resilient agricultural sector. This work details the system's methodology, the specific machine learning algorithms used, experimental results, and future development plans.

Keywords - Support Vector Machine (SVM), Decision Trees, Model Accuracy, Customer Retention, Predictive Analytics, Time-Series Data, Precision and Recall, Artificial Neural Networks (ANN), LSTM Networks, Churn Risk Factors, Customer Lifetime Value (CLV).

Paper Id.: 13

Facial Recognition Algorithms: A Review

Dr. Gaurav Indra, Harshita Bhardwaj, Tarni Balgoher
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Indira Gandhi Delhi Technical University for Women, Delhi, India

Abstract- Facial recognition technology identifies individuals by analysing unique facial features from digital media. It uses physiological features to create a digital facial signature. Being at the intersection of computer vision and artificial intelligence, it analyses nodal points (also known as distinct facial features) to create this signature. It is driven by improvements and has extensive applications across healthcare, security, consumer service, and even law enforcement. In addition, we briefly describe our implemented facial emotion recognition system, which integrates deep learning libraries and OpenCV to illustrate the use of emotion detection in mental health applications. Through this review, we aim to highlight advancements and challenges in facial recognition, identify gaps, and advocate for future solutions.

Keywords - AI, CNN, deep learning, emotion detection, face detection, mental health, NLP, sentiment detection, virtual friend.

Paper Id.: 14

Reliability-Enhancement CardioAI: A Proactive Approach to Cardiovascular Health Monitoring

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Galgotias University, greater Noida

Virendra Kumra(Assistant Professor)
Sharda University, Greater Noida, India

Abstract- Background: Cardiovascular disease (CVD) continues to be a predominant cause of global morbidity and mortality, presenting constant difficulties to medical facilities notwithstanding progress in detection and management. Prompt and accurate risk assessment is essential for enhancing customer satisfaction by prompt therapeutic action.

Objective: The goal of this research seeks to establish a precise and resilient prediction system, CardioAI, that amalgamates various machine learning methodologies to improve the early identification of cardiopulmonary illness through medical and research data.

Methods: CardioAI is an innovative collective deep learning architecture that integrates the advantages of various techniques, include k-Nearest Neighbors (KNN), Extreme Gradient Boosting (XGBoost), Long Short-Term Memory (LSTM) networks, and Convolutional Neural Networks (CNNs). The algorithm was developed and verified employing two kinds of data: the Cleveland Heart Disease dataset (n = 303) and a real-world, multi-institutional dataset (n = 1,500) acquired from healthcare facilities in Lucknow, India. Data preliminary processing, characteristic standardization, and optimized model methods were employed to guarantee elevated accuracy and generalization.

Results: The suggested composite architecture attained an exceptional prediction accuracy of 99.8% on the integrated dataset, markedly surpassing conventional and cutting-edge models regarding precision, recall, and F1-score.

Conclusion: CardioAI exhibits remarkable potential as a dependable and adaptable medical decision-support technology for the early identification of cardiovascular disease risk. The incorporation of this into standard medical procedures could provide prepared, data-informed approaches to mitigate cardiac issues and improve the treatment of patients.

Keywords - Heart Disease, Artificial Intelligence, CardioAI, Machine Learning, Prediction.

Paper Id.: 17

Attention-Enhanced Adaptive Neuro-Fuzzy Inference System (ANFIS) for Plant Leaf Disease Detection

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Indira Gandhi Delhi Technical University for Women
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Abstract- To minimize the financial losses and increase the productivity of the crops, it is essential to timely detect the plant leaf diseases. Accurate detection of the same is necessary to reduce the economic consequences. However, it can be challenging to precisely identify certain diseases due to farmers' reliance on traditional manual methods. In this direction this paper presents a novel approach to detect and classify plant leaf diseases. The paper presents an attentive adaptive neuro-fuzzy inference-based framework to highlight important features. The attention-based rule selector prioritizes the most informative fuzzy rules and feature subsets derived from leaf image region that helps to classify the plant leaf diseases. Also, by integrating neural learning (ANFIS) with fuzzy logic and attention, the model leverages both adaptability and expert knowledge representation that bridges the gap between data-driven and knowledge-driven approaches. To validate the effectiveness of the proposed model extensive experiments are conducted on Plant Village Dataset that provided an accuracy of 98.77%.

Keywords - Plant Leaf Disease Detection, Classification, Attention Mechanism, ANFIS.

Paper Id.: 19

A Lightweight Perceptual Kernel Framework for Realistic Multi-Band Image Augmentation in Remote Sensing

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National Institute of Technology Jalandhar, Jalandhar, India

Nonita Sharma
Dept. of Information Technology
IGDTUW, Delhi, India

Abstract- Atmospheric distortions such as haze and blur critically impair the dependable application and broad utility of deep learning models in optical remote sensing. To address this, we propose a novel data augmentation framework that leverages Learned Multi-Spectral Perceptual Kernels for realistic simulation of atmospheric degradations. This method integrates systematic physics-based atmospheric modelling with a compact neural network to generate diverse, perceptually consistent, and spectrally accurate augmentations directly within multi-spectral imagery. These synthetic degradations enrich the training data distribution, allowing models to acquire resilient features that withstand actual atmospheric variations. This framework effectively reduces the discrepancy between training and deployment environments, leading to a more dependable interpretation of remote sensing data. Experimental evaluations on challenging synthetically degraded test sets demonstrated our framework's substantial impact: the augmented models achieved an 84.3% classification accuracy, 0.835 F1-score, and 0.829 kappa coefficient, consistently outperforming standard (68.5% accuracy) and physics-based (75.8% accuracy) augmentation baselines. These results confirm the framework's ability to bridge the domain gap, leading to markedly enhanced model robustness and more dependable interpretation of remote sensing data in variable atmospheric conditions.

Keywords- Optical remote sensing, atmospheric degradation, data augmentation, perceptual kernels, haze simulation, blur modeling.

Paper Id.: 20

H-SLSHAP: A Split Learning and SHAP-Based Hybrid Framework for Malware Detection in Healthcare IoT Devices

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Manipal University Jaipur, Jaipur, India

Sunil Kumar
School of Computing Science and Engineering
Galgotias University, Uttar Pradesh, India

Abstract- With the growing usage of smart devices within the healthcare environment, there's an intensifying demand for strong and interpretable cybersecurity models. This paper presents H-SLSHAP, a Hybrid Split Learning and SHAP (SHapley Additive exPlanations)-based Explainable AI model, for malware detection in limited-resource Healthcare IoT (H-IoT) devices. H-SLSHAP adopts a split learning approach, dividing the learning process among edge devices (such as the smart fridge and thermostat) and a central server to maintain data privacy. The architecture combines a deep learning-based classifier with an autoencoder-enabled anomaly detector to enhance the accuracy and robustness of detection. For greater transparency, SHAP (SHapley Additive exPlanations) is employed to interpret predictions from the model and determine essential features responsible for malware detection. A Zero Trust-derived risk-scoring model is also utilized to mimic threat levels according to model confidence. Experiments on real-world IoT data sets show that H-SLSHAP provides high accuracy while keeping interpretability and privacy intact and thus can be used for safe deployment in current healthcare settings.

Keywords - Artificial Intelligence (AI), Cybersecurity, Internet of Things (IoT), Split Learning (SL), SHapley Additive exPlanations (SHAP).

Paper Id.: 22

SEKAMA: Secure and Efficient Key Agreement and Mutual Authentication in Wireless Sensor Networks for Military Applications

Govind Narayan Patel
National Institute of Technology, Jamshedpur, India

Muzzammil Hussain, Kapil Saraswat, Rajan Singh
Central University of Rajasthan, India

Meenakshi Tripathi
Malviya National Institute of Technology Jaipur, India

Abstract- Wireless sensor networks (WSN) are becoming popular in military applications as they minimize the risk of casualty and enhance the efficiency of secret operations. Some military operations involve the transfer of sensitive information between the sensor nodes, so verifying the authenticity of the nodes is the primary requirement for these operations. Mostly sensor nodes communicate over unsafe channels, so they are prone to attacks such as impersonation attacks, replay attacks, Sybil attacks, etc. At the same time, since these nodes are inherently limited by resources such as memory capacity and battery lifetime, traditional security schemes do not perform well with them. Thus, this paper proposes an efficient mutual authentication scheme for WSNs applicable in military operations. In the proposed scheme, customized authentication tokens are acquired by all the nodes in the registration phase, later during network operations, these tokens are used for mutual authentication. Major steps of key sharing are minimized during network operation. This approach provides optimum security while reducing the energy consumption of WSNs. A formal security analysis of the proposed scheme has been done using BAN logic, ProVerif and AVISPA tools. It was observed that the scheme is safe and immune to known potential attacks. Also, the proposed scheme is implemented in real-time, and performance comparison is done with existing schemes. It was found that the proposed scheme is energy-efficient and outperforms the existing schemes.

Keywords - Node Authentication, Key Agreement, Network Security, Military Operations, Authentication Tokens.

Paper Id.: 27

A Machine Learning Approach to Early Lung Cancer Diagnosis

Khushi Dutta, Manya Singh, Aruna Tomar, Kanchan Sharma
Department of ECE
Brijesh Kumar
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Abstract- Lung cancer remains a major cause of global mortality, primarily due to uncontrolled cellular proliferation within pulmonary tissues. Early and accurate detection is critical, as primary prevention remains difficult given the multifactorial etiology. Recent advances in supervised learning have facilitated the construction of predictive models for the detection of malignancy. In this research, K-Nearest Neighbors, Naive Bayes, Random Forest, Decision Trees, Support Vector Machines, and Logistic Regression models are considered. These models are tested for accuracy, sensitivity and specificity with multi-dimensional data, which would incorporate both clinical, demographic parameters as well as symptom-based parameters. The implications underscore the importance of machine learning for secondary prevention by showing excellent results in several classifiers. However, the problems on interpretability and the data imbalance still persist. AI-assisted early-stage lung-cancer diagnosis is being made ever easier with better data preprocessing and tuning of the model, though..

Keywords - Lung Cancer, Logistic Regression, Decision Tree, KNN, RandomsearchCV, GridSearchCV.

Paper Id.: 29

Power-Optimized FSM Architecture for 64-Bit Bulk State Machines: A Comparative Analysis of State Encoding Techniques Across Technology Nodes

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Abstract- This paper presents the design and implementation of a power-optimized finite state machine (FSM) architecture aimed at reducing power consumption while maintaining performance. Various encoding techniques, including One-hot, Binary, and Gray encoding, are employed to achieve significant power savings. The study explores trade-offs between power reduction and circuit complexity, focusing on minimizing state register transitions through algorithms such as Karnaugh maps and partitioning functions. A comparative analysis of different FSM architectures is conducted across multiple technology nodes, evaluating power usage, state minimization approaches, and their impact on performance and scalability. The implementation includes diagrams, circuits, simulations, and RTL descriptions, utilizing hardware description language (HDL) for building an application-specific integrated circuit (ASIC). Simulated techniques are used to assess performance across varying process technologies. Results demonstrate substantial power reductions with equivalent performance compared to conventional FSM architectures. The findings underscore the potential of optimized FSMs to lower power consumption in digital systems, particularly as technology nodes continue to scale down. The paper concludes by discussing the relevance of power optimization in contemporary digital architectures, highlighting possible applications and advantages, and suggesting future research directions.

Keywords - Power optimization, FSM, encoding, HDL.

Paper Id.: 30

Intelligent Diabetes Management Assistant: Recommendations, Prediction and Feedback Learning Integration

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Abstract- Effective Type 1 diabetes care requires timely decisions based on a complex, constantly changing balance of factors like insulin, food, and physical activity, making it challenging to manage all at once. This research proposes an intelligent AI-based assistant system that supports Type 1 diabetes self-management by providing personalized insulin and lifestyle recommendations, predicts glucose levels over multiple time frames to evaluate its own effectiveness, and continuously improves through patient feedback. To achieve this, three models are integrated: a Random Forest (RF) model that generates a range of possible recommendations tailored to the patient's current state, an Long Short-Term Memory (LSTM) network that forecasts glucose trajectories at future intervals for each recommended action and a Deep Q-Network (DQN) that further refines the recommendation strategy by learning from real-world outcomes, maximizing glucose stability, and minimizing adverse events through reinforcement learning. Performance evaluation showed that the RF model achieved a Mean Absolute Error (MAE) of 0.092, Root Mean Square Error (RMSE) of 0.1464, and Coefficient of Determination (R² score) of 0.8590 and the LSTM model achieved MAE of 8.73, RMSE of 14 and R² score of 0.961 for glucose prediction at the 15-minute time step. Additionally, the DQN was assessed based on its maximum Q-values and loss trends across multiple training episodes, showing effective learning and convergence. Together, these results confirm that each model performs well in its designated role, contributing to a robust and cohesive diabetes management assistant system which not only enhances glucose control but also evolves with the patient's changing needs, paving the way for more effective, personalized diabetes management.

Keywords - Diabetes Management, Personalized Recommendations, Random Forest, Long Short-Term Memory Network, Deep-Q Network.

Paper Id.: 32

Optimized Cloud Architectures for Scalable Sensor Networks: A Performance-Driven Approach

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Abstract- The integration of wireless sensor networks with cloud computing is transforming real-time data processing and scalability across multiple domains. This study explores a performance-optimized framework for sensor-cloud interaction, evaluating various cloud architectures to enhance data transmission, storage efficiency, and computational scalability. By leveraging distributed processing models, the proposed approach minimizes latency and maximizes adaptability for dynamic sensor environments. Experimental results highlight the trade-offs between cloud-based infrastructures, offering insights into the future of large-scale sensor network deployments in industrial and smart monitoring applications.

Paper Id.: 35

Ultra low power Current mirror based VCO structure for Biomedical applications

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Abstract- Voltage-controlled oscillator (VCO) is an indispensable component in communication transceivers. This work proposes a novel structure of VCO for low voltage, low power applications. The proposed VCO comprises of an Ultra low power current mirror design with enhanced bandwidth. This VCO operates at 0.8 V supply voltage, offers the power of 45.73 μ W with output noise -132.84 dB. Moreover, the parameters of proposed VCO like oscillation frequency (3.64 GHz), gain (18.80 dB), and tuning range (99.01 %) are significantly improved compared to state-of-art VCO designs.

Keywords - Current mirror (CM), Voltage-controlled Oscillator (VCO), comparators, Flip flops, low power circuit.

Paper Id.: 36

Improved Image Feature Extraction: A Comprehensive Analysis through Performance Evaluation

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Abstract- Image analysis involves feature extraction as an essential process that can be used to convert raw image data into concise and meaningful data for image classification. The proposed method of extracting features in this paper is an extension of the Improved Grey Level Co-occurrence Matrix (GLCM) feature, which is sensitive to small changes in texture by combining statistical descriptions, namely mean and standard deviation of the GLCM features at various spatial sizes and different angular directions. Also, a new texture measure notion, called entropy, is presented, which quantifies the randomness and complexity of the structure of image regions. The given approach is compared to several traditional algorithms: standard GLCM, Histogram of Oriented Gradients (HOG), Haar-like features, Gabor filters, Content-Based Image Retrieval (CBIR), and Scale Invariant Feature Transform (SIFT). To evaluate the effectiveness, the features are analyzed in terms of variance by utilizing Principal Component Analysis (PCA), and the classification performance is checked by using Random Forest (RF), K-Nearest Neighbors (KNN), and Decision Tree (DT) classifiers. The evaluation criteria are the PCA variance, classification accuracy, and the runtime, which give a multidimensional performance analysis. As indicated by experimental outcomes, the Improved GLCM method yields the best results under all conditions: it gave the best PCA variance (1.0). It performed well in classification (RF: 0.903, KNN: 0.780, DT: 0.855) with little computational overhead. Moreover, the final mechanism of ranking by the system of scores proves the supremacy of the suggested technique in terms of predictive precision and efficiency. These results establish the Improved GLCM method as a stable and scalable one in feature extraction for real-time image classification applications.

Keywords - Feature Extraction, Grey Level Co-occurrence Matrix, Classification, Decision Tree, K-Nearest Neighbour.

Paper Id.: 37

3D QAM-Based Image Transmission over Fading Channels in Wireless Communication Systems

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Abstract- In this work, the effectiveness of a more sophisticated 3D QAM scheme with polarisation diversity in comparison to conventional Quadrature Amplitude Modulation (QAM) for image transmission across Rayleigh fading channels is purposed. The 3D QAM system efficiently divides the data stream by employing both horizontal and vertical polarisations, improving resilience against multipath fading. This work examine the Bit Error Rate (BER) and Peak Signal-to-Noise Ratio (PSNR) for both modulation systems in order to replicate realistic fading situations. The outcomes unequivocally show that 3D QAM performs better than conventional QAM, obtaining reduced BER and noticeably higher image reconstruction quality.

The promise of 3D QAM with polarisation diversity as a dependable and effective method for transmitting high-quality images in wireless communication networks is highlighted by mathematical modelling and simulation findings.

Keywords - 3D QAM, Polarization Diversity, Bit Error Rate, Rayleigh Fading, Image Transmission, Wireless

Communication.

Paper Id.: 41

Performance Evaluation of Machine Learning Based Beamforming Algorithms in Passive and STAR-RIS Using Unit Cell and Array Simulations

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Abstract- Reconfigurable Intelligent Surfaces (RIS) are revolutionizing wireless communications by enabling programmable control over electromagnetic propagation. This study presents a comprehensive, simulation-driven analysis comparing Passive RIS and Simultaneous Transmission and Reflection RIS (STAR-RIS) in the context of machine learning based beamforming. By leveraging measured S- parameter data and advanced algorithmic strategies, we evaluate performance across both unit cell and full array levels. The results provide actionable recommendations for practical deployment and algorithm selection in next- generation wireless networks.

Keywords- Reconfigurable Intelligent Surface, STAR-RIS, beamforming, machine learning, wireless communications, simulation.

Paper Id.: 43

A Real-Time AI-Assisted Code Collaboration Tool for Remote Teams

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Abstract- Collaborative software development often faces challenges such as latency in code synchronization, difficulties in handling simultaneous edits from multiple users, and the absence of intelligent assistance for debugging and test case generation. Existing platforms provide only partial solutions: for example, during academic coding competitions or course- based projects, students might use video conferencing apps to share the screen while coding so that the other team members can view what is been coded. They might manually share the code via other platforms like Google Docs. But it only allows simultaneous editing and is not designed for programming and lacks AI support for code generation or debugging. GitHub is widely used to share codes but it requires users to push and pull code to share updates, which limits real-time collaboration. To overcome these limitations, this research presents a web-based collaborative code editor that integrates WebSocket-based communication for low-latency, real-time synchronization along with a file-locking mechanism to prevent overwrite conflicts. A key innovation of the system is the incorporation of an AI-powered chatbot assistant, which responds to developer prompts by generating new code snippets, correcting existing code, and creating test cases to support debugging. This combination of real-time multi-user collaboration and AI- driven coding assistance enhances productivity, reduces development errors, and provides an interactive environment suitable for distributed teams, academic learning, and competitive programming.

Keywords- Real-time collaboration, Web-based code editor, WebSocket communication, Authentication and access control, AI-assisted coding, Code suggestions, Automated test case generation, Remote software development, Distributed teams.

Paper Id.: 44

Implementation of Api Monitoring Using Opensource Tools

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Abstract- In response to the increasing demand for modern applications with microservices architecture, developers have to develop mechanisms for tracking and diagnosing faults perpetrated within many services. With conventional systems, slow performance and faults have been diagnosed with respect to logs, that is mostly after deployment. This causes the resolution of the problem to be delayed, increasing the debugging and ultimately decreasing the productivity of the developers. The objective of this project is to develop an API monitoring and tracing system which integrates open-source tools such as OpenTelemetry and Zipkin for visualizing the flow of requests and analyzing payloads throughout the development process, so that errors and privacy concerns can be addressed sooner.

Keywords- Monolithic architecture, microservice architecture, API monitoring, logs, traces, OpenTelemetry, Zipkin.

Paper Id.: 45

Lora Based Wireless Weather Monitoring System

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Abstract- The LoRa-based Wireless Weather Monitoring System surpasses conventional practices by employing IoT sensors and ISM bands to transmit data real-time, long-range, and low-power interference-free. Contrary to conventional practices, based on manual observation and mechanical tools, the system offers instant access to weather information through dashboards, mobile apps, or cloud storage, enabling users to observe conditions remotely. This paper combines Arduino UNO, LoRa, and WiFi to monitor temperature, humidity, light, rain, and sea tides. Sensors such as DHT11, LDR, MEMS accelerometer, and rain sensor record data, processed by Arduino and transmitted through LoRa to a remote station and an Android application. The receiver unit, consisting of a LoRa receiver and WiFi module, sends real-time alerts on irregular conditions. Calibration of sensors provides accuracy, using reference instruments such as a thermometer, hygrometer, lux meter, and gravity checks. LoRa communication is confirmed through signal strength checks, while software adjustments improve data accuracy. The system is scalable, enabling the addition of extra sensors with ease. Real-time access to weather information facilitates decision-making in agriculture, disaster management, and smart cities.

Keywords- LoRa, wireless weather monitoring, IoT sensors, Arduino Uno, DHT11, MEMS accelerometer, LDR, rain sensor, ESP8266, real-time data transmission, low power communication, remote monitoring, smart agriculture, cloud integration, LPWAN.

Paper Id.: 49

Enhancing Public Safety with Machine Learning-Based Violence Detection

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Abstract- The need for immediate response to rising public violence together with accelerated urban growth creates pressure for surveillance systems to develop faster automated threat detection capabilities. Systems that rely on human monitoring through surveillance tools function with excessive delays along with errors which make them unable to respond instantly. The proposed deep learning design merges Convolutional Neural Networks (CNNs) with Long Short-Term Memory (LSTM) units for monitoring violent activities in video sequences. Between them the InceptionV3 CNN analyzes video spatial features although the LSTM processes sequential data to develop temporal patterns associated with violence. The model achieves successful binary classification on both Hockey Fight and Real- Life Violence Dataset benchmarks reaching accuracy exceeding 95%. Our framework includes deployment of the trained model through Flask connected to a React frontend that utilizes the Twilio alert service. The configured architecture reaches faster reactions and decreases human operational strain through automated violence detection capabilities. The suggested system demonstrates promising feasibility when employed in crucial areas including schools and metro stations and major public locations.

Keywords- Violence Detection, CNN, LSTM, Deep Learning, Real-Time Surveillance, Flask, InceptionV3, Public Safety, Video Analytics.

Paper Id.: 50

From Chalk to Code: Integrating ICT and AI Tools in Science Education in Delhi Government Schools

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Abstract- This paper examines the integration of information and communication technologies (ICTs) and emerging artificial intelligence (AI) technologies into science teaching and learning in Delhi government schools. The study uses a mixed-methods documentary and secondary data approach- analyzing policy documents (NEP 2020), SCERT (Delhi) circulars, government rollout documentation, and recent literature on ICTs and AI in classrooms- to map for ICT- and AI-related infrastructure developments, teacher readiness, curriculum alignment, equity issues, and early pilot instances of AI being used for administrative and formative assessment purposes. The paper finds that the Delhi government is committed to a renewed, large-scale partnership, involving the installation of smart classrooms and teachers' training in digital pedagogy and AI-enabled non-teaching tools. However, important gaps remain in access, teacher confidence, localized content, and the evaluation of learning gains. The paper makes policy recommendations (to focus targeted investments and evaluation), pedagogy (active, inquiry- based ICT use in science), teacher professional development (practice-based training in AI), and research (randomised evaluations of learning outcomes). The findings are of wider relevance to computing, communication, and AI-based systems of education, and provide policy and design implications for urban public education all over the world.

Keywords- NEP 2020, ICT integration, AI in education, Science pedagogy, Delhi government schools.

Paper Id.: 51

Model Learning on Detection of Weeds by AI

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Abstract- The Indian economy is primarily based on agriculture. Many people in the country depend on agriculture. With increasing threats, the number of people working in agriculture is decreasing. Weeds are one of the main causes of crop loss in the fields. In this study, we present a simple image processing technique that can quickly and easily detect weeds by closely examining the input image. A digital camera is employed to capture photographs of various agricultural plants, subsequently utilized to categorize the regions impacted by these plants.

The Python 3.1 version and OpenCV were used in this context. A deep convolutional neural network (CNN) architecture is created for image processing to enhance classification accuracy. This feat is achieved by increasing the number of layers in the network compared to existing CNNs. The proposed CNN-based model achieved an accuracy of 97% on the weed dataset. The results demonstrate that our approach is effective in distinguishing between crops and various weed species, making it suitable for precision agriculture applications.

Paper Id.: 52

Use-Cases of Quantum Computing and Future Scope

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Abstract- Quantum computing is a fast-growing technology that is shifting from theoretical research to real-world applications. It can solve problems that are difficult to compute. This paper looks at various uses of quantum computing, especially in pharmaceuticals, finance, logistics, and cybersecurity. These fields require strong computation for optimization, simulation, and secure communication. The paper showcases several real-world examples that illustrate the potential of quantum computing. In drug discovery, companies like Roche and Biogen are partnering with quantum computing firms such as D-Wave and Qubit Pharmaceuticals. They are developing quantum algorithms to simulate molecular interactions, which speeds up early-stage pharmaceutical development. These techniques make the process both cost-effective and efficient. In finance, JPMorgan Chase, in collaboration with IBM Quantum, has started quantum experiments focused on portfolio optimization. They are assessing how quantum annealing and variational algorithms can outperform traditional methods in risk assessment and asset allocation. Similarly, Volkswagen is using quantum computing to enhance urban traffic flow, running pilot projects in cities like Lisbon to test quantum-based routing solutions. This serves as a practical example in logistics and supply chain management, where optimization problems are complex and vital. In cybersecurity, researchers are working on quantum-resistant cryptographic techniques to guard against threats from quantum decryption. Organizations are preparing for the "quantum threat" to traditional encryption by exploring post-quantum cryptography and quantum key distribution (QKD). These methods promise theoretically unbreakable encryption through quantum entanglement. The paper also discusses the significance of hybrid quantum-classical systems. In these systems, quantum processors work alongside classical systems to tackle hardware challenges like noise, decoherence, and limited qubit count. These hybrid models represent a promising way forward in the near term and are already being tested across various fields to achieve quantum speedups with current hardware. By linking theory with practical innovation, this paper provides a clear view of how quantum computing is beginning to deliver measurable benefits in real-world applications. It emphasizes the real value of current developments and outlines what to expect as quantum computing progresses toward wider use and commercial viability.

Paper Id.: 53

Towards Gender-Inclusive Fashion Analytics: Developing Transformer Models for Clothing Review Classification

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Abstract- The objective of this research is to analyze customer reviews related to women's clothing styles and to evaluate advanced natural language processing (NLP) models for classification and sentiment understanding. In the modern fashion industry, consumer feedback plays a crucial role in influencing product design, marketing strategies, and brand positioning. This study utilizes a dataset of women's apparel reviews obtained from a publicly available source, comprising multiple clothing categories such as dresses, jeans, outerwear, and intimates. The textual data, inherently unstructured, is preprocessed through techniques such as stopword removal, lemmatization, tokenization, and vectorization to ensure model readiness.

The findings highlight the potential of transformer-based architectures in handling complex, domain-specific text classification tasks, particularly when capturing nuanced language and contextual dependencies. This research underscores the importance of integrating advanced NLP methods into fashion analytics pipelines, enabling brands to derive actionable insights from customer opinions and improve decision-making in product design and marketing.

Keywords- BERT, LSTM, Transfer Learning.

Paper Id.: 54

Acute Heart Disease Prediction: An Interpretable Deep Learning Approach

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Abstract- Since many decades, heart diseases have been increasing and became serious one among other diseases because of its strong impact on human life. It is a major cause for mortality and morbidity across the globe, it needs early and accurate prediction and diagnosis. Present prediction systems use deep learning, ML and AI to generate models, which are used in predicting heart disease due to their interpretability and greater efficiency on datasets. This paper aims to improve heart disease prediction by considering features like gender and family history of heart diseases in addition to present factors used in prediction, so as to know is gender playing a role in heart diseases occurrence or they are passing down genetically. We have used Tabular Network also known as TabNet, a deep learning approach which is used specifically in structural tabular data and selecting relevant features for prediction, to predict heart diseases Framingham heart disease dataset is used which consists of gender, family history and other features. It uses dynamic feature selection for predicting the heart diseases efficiently and achieving an accuracy of approximately 85% while evaluating the model. Our results indicate that including the features gender and family history has produced more accurate information about the heart disease occurrence, is helpful to build models which can predict the heart disease more precisely and accurately.

Paper Id.: 56

A Comparative Analysis of Machine Learning and Deep Learning Techniques for classifying White Blood Cells

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Abstract- Examining the different types of white blood cells (WBCs) is a key diagnostic tool for leukemia and infections. Since then, several machine learning (ML), and more importantly, a deep Learning (DL) approaches have been applied to make this identification automated. The purpose is to improve the detection and classification accuracy of white blood cells (WBCs) from blood smear images along with the improved time and robustness. The present survey-based study provides a comprehensive representation and comparison of the methodologies available by applying some popular Machine Learning (ML) and Deep Learning (DL) along with Artificial Intelligence (AI) approaches for white blood cell classification. This study explores the status of traditional machine learning methods, like Support Vector Machines (SVM) and K-Nearest Neighbors (KNN) when compared with novel deep learning architectures like Convolutional Neural Network (CNN), ResNet, and DenseNet. This research shows that deep learning models far outperform their classical ML predecessors when the dataset is large. However, it is still being held back by barriers such as a lack of open-source medical datasets and expensive computational costs.

Keywords- White Blood Cell (WBC) classification, Machine Learning (ML), Deep Learning (DL), Convolutional Neural Network (CNN), Medical Image Analysis (MIA). AI in Healthcare.

Paper Id.: 57

SecurGeek Sparks Transformation: A Revolutionary Training Model for Small and Medium Enterprises

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Abstract- Small and Medium-sized Enterprises (SMEs) face acute cybersecurity challenges due to limited resources, technical expertise, and awareness. Traditional training methods—often designed for large organizations—fail to address SMEs’ operational constraints such as budget limits, time scarcity, and dispersed workforces. This paper presents SecurGeek v2, a secure, web-based training platform delivering audio-first, podcast-style modules supported by structured PDFs, interactive quizzes, and real-time analytics. Leveraging React 18 + Vite, Supabase (PostgreSQL, Auth, Realtime), and Tailwind CSS, the system provides responsive, role-based access, advanced security through Row-Level Security (RLS) and JWT authentication, and AI-assisted content generation via Google’s NotebookLM. The content creation pipeline automates the conversion of technical material into conversational audio and companion documents, with Python scripts managing multimedia uploads and integration. By combining mobile-friendly delivery, multimodal resources, and embedded assessment tools, SecurGeek v2 addresses SME needs for scalable, accessible, and measurable cybersecurity education. The paper outlines its theoretical foundations, design principles, implementation architecture, and evaluation approach.

Keywords- Cybersecurity training, small and medium-sized enterprises, audio learning, podcast-based education, web-based training framework, NotebookLM, on-the-go learning, interactive assessments, SDG.

Paper Id.: 58

An Investigation into Human Evolution based on similarity analysis of non-coding DNA regions

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Abstract- The mystery of human evolution lies in the non-coding region of the DNA sequence. The change in genomic expression is significant for the study of human evolution. Non-coding DNA (ncDNA) was previously treated as 'junk DNA', but in a recent study it was found that this region is no longer 'junk'; rather, it has huge importance in genomic science. Here, we have investigated the noncoding DNA of humans along with other similar species like chimpanzees and monkeys to find out the correlation among them. Here, we have compared the transposable elements (TE) like SINE (Short Interspersed Nucleotide Element) and LINE (Long Interspersed Nucleotide Element) structure to investigate evolutionary hierarchy. Here, the Dynamic Pattern Search algorithm is used to identify transposable elements (TE) in the non-coding DNA sequence available in the NCBI portal.

Keywords- Dynamic Pattern Search (DPS), Base Pair (BP), Short Interspersed Nucleotide Element (SINE), Long Interspersed Nucleotide Element (LINE), Reverse Transcriptase (RT), Long Terminal Repeat (LTR), Transposable Element (TE).

Paper Id.: 59

Machine Learning for Energy Optimization Using PINNS

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Abstract- This study applies machine learning (ML) to reduce energy use in commercial buildings using the ASHRAE Great Energy Predictor III dataset. Weather, building metadata, and temporal features were used to train and compare supervised models, with Random Forest and Gradient Boosting achieving the best RMSE and R^2 scores. Physics-Informed Neural Networks (PINNs) were integrated to embed thermodynamic constraints, enhancing interpretability and generalization. Key predictors included air temperature, building type, and square footage. Results highlight the potential of combining ML and PINNs for accurate, physically consistent, and sustainable energy management.

Keywords- Machine Learning · Energy Optimization · Physics-Informed Neural Networks · PINNs · Renewable Energy

Paper Id.: 60

Road Traffic Congestion Analysis on Video Imagery

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Abstract- With increasing urban traffic and growing demands on road infrastructure, traffic congestion has become a major concern in cities across the world. In this study, we propose a real-time congestion detection system that leverages only video footage to classify congestion levels without relying on GPS data or physical sensors. This approach involves extracting key motion-based features such as vehicle speed, count, inter-vehicle gap, vehicle size, and flow rate from CCTV videos. A rule-based scoring system is used to generate training labels, eliminating the need for manual annotation. Various machine learning models were explored, starting with Support Vector Machines (SVM), and later extended to include XGBoost(Extreme Gradient Boost), deep learning techniques, and model stacking. The system is designed to be lightweight, cost-effective, and adaptable to different urban traffic scenarios, offering practical applications for smart traffic monitoring and decision-making.

Keywords- Traffic Congestion, Computer Vision, OpenCV, SVM, XGBoost, Video Analytics, Rule-Based Labelling, Smart Transportation.

Paper Id.: 62

Self-synchronized Synchronverter for Autonomous Grid Synchronization in High-Renewable Microgrids

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Abstract- The growing penetration of inverter-based renewable energy sources in microgrids requires control strategies with grid-forming capabilities comparable to those of conventional synchronous generators. This paper proposes and analyzes a self-synchronized synchronverter for grid-connected microgrids. In this approach, the inverter intrinsically emulates the electromechanical dynamics of a synchronous generator and synchronizes frequency and phase autonomously, without an external phase-locked loop (PLL). The proposed control embeds virtual inertia, damping, and automatic frequency adaptation. This enables smooth grid connection, improved transient stability, and enhanced frequency support under disturbances. The paper presents the modeling, control design, and performance evaluation of the self-synchronized synchronverter. Simulation results show smooth grid connection, enhanced frequency support, and improved robustness. Compared to conventional PLL-based grid-following inverters, it offers faster synchronization, better frequency regulation, and increased robustness, making it a viable solution for stable, resilient microgrid operation with high renewable penetration.

Keywords- Distributed Generation, Grid Connection, Renewable Energy Sources, Self-synchronized Synchronverter, Virtual Inertia.

Paper Id.: 63

A Comparative Study of Skin Cancer Image Classification Techniques

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Abstract- One cannot emphasize the importance of early detection in the case of skin cancer. Early detection greatly enhances patient outcomes by enabling less invasive therapies. Cutting-edge technologies, particularly artificial intelligence (AI) in dermatology, have been very beneficial because of its ability in attaining early diagnosis. Additionally, efficient classification helps ensure that medical resources are allocated wisely. Patients can be prioritized for additional evaluation based on the rapid identification of high-risk skin lesions. Therefore, our work aims to utilize the potential of deep learning methods. Neural networks were trained in our study to categorize photos and differentiate between different forms of skin cancer. In order to provide thorough coverage of seven types of skin lesions, the study uses a broad collection of 10,015 photos taken from the publicly accessible Skin Cancer HAM10000 dataset. We looked at various learning methods for skin cancer detection systems, including CNN (97.15%), EfficientNetB1 (91.96%), ResNet50 (99.88%), and Hybrid Model (99.78%). Clearly, hybrid models emerge as a promising and practical method for improving skin cancer classification systems and making substantial contribution to the continuous effort to raise dermatology diagnostic accuracy. This section provides a detailed discussion of the research on each of these deep neural networks.

Keywords- CNN, EfficientNetB1, Hybrid model, ResNet50, Skin cancer, Transfer Learning.

Paper Id.: 64

An Ensemble Machine Learning Framework for DoS Attack Detection and Prevention

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Abstract- Denial-of-Service (DoS) attacks represent critical threats to modern cybersecurity infrastructures, affecting organizations ranging from small enterprises to global service providers. This paper explores the nature of these attacks, categorizes their types, reviews existing detection and mitigation strategies, and introduces a novel hybrid approach utilizing ensemble machine learning models—Random Forest and XGBoost. By combining statistical modeling, contextual traffic analysis, and adaptive decision-making, our model enhances real-time anomaly detection, significantly reduces false positives, and maintains robustness against evolving attack techniques. The implementation demonstrates superior detection accuracy and system resilience in high-traffic and adversarial environments, achieving 96.8% accuracy with sub-500ms detection latency.

Keywords- DoS, Cybersecurity, Machine Learning, Anomaly Detection, Prevention Mechanisms, Ensemble Learning, Random Forest, XGBoost.

Paper Id.: 65

Performance Evaluation of Relay-Assisted NOMA Systems: A Study on Sum Rate and Throughput

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Abstract- Non-Orthogonal Multiple Access (NOMA) has evolved as a promising technique to enhance spectral efficiency and user connectivity in next-generation wireless networks. In this paper, we present a performance evaluation of a relay-assisted NOMA system under imperfect channel conditions. To further strengthen the system design, the proposed framework incorporates an adaptive resource management strategy that balances power distribution among users and optimises the energy-splitting mechanism at the relay nodes. Two key performance indicators, sum rate and throughput, are investigated to quantify system efficiency. Further, analytical expressions are derived by incorporating realistic fading effects and channel imperfections, and the results are validated through numerical evaluations. The findings highlight, across different channel scenarios, the inherent trade-off between sum rate and throughput, while also demonstrating the performance gains of the enhanced NOMA system compared to conventional multiple access schemes. This paper provides insights into the achievable performance of relay-assisted NOMA networks under practical constraints, thereby offering scope for future system design and optimisation.

Keywords- NOMA, Relay-assisted networks, Sum rate, Throughput, Resource allocation

Paper Id.: 66

An Identity-Based Pairing Free Mutual Authenticated Key Agreement Scheme for Telecare Medical Information Systems

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Abstract- Telecare Medical Information Systems (TMIS) have emerged from the convergence of Internet of Things (IoT) and traditional healthcare infrastructures, enabling continuous acquisition and communication of patient health data in real time through wearable technologies. In TMIS, prompt action for the benefit of patients can be taken in an emergency by means of the rapid analysis of patient data collected. However, transmitting sensitive data through an open channel exposes various security threats. To prevent these risks, authentication and key agreement between communicating parties are essential. Since Internet of Medical Things (IoMT) devices in TMIS have limited processing power, there is a vital need for a lightweight and resource-efficient authentication and key agreement mechanism. Many existing Authenticated Key Agreement (AKA) schemes in the literature become inefficient for TMIS because they rely on pairing-based operations with high computational overhead and complicated public key infrastructure (PKI)-based key management. An Identity-based Pairing Free Mutual Authenticated Key Agreement (IB-PFMAKA) scheme is proposed employing Elliptic Curve Cryptography (ECC) and an Identity-Based Cryptosystem (IBC) to overcome these limitations. The IB-PFMAKA scheme enables the establishment of a session key while ensuring enhanced secrecy and keeping both computation and communication costs minimal. Security analysis using ProVerif confirms its resistance to all related attacks, making it well-suited for the TMIS environment compared to the other existing schemes.

Keywords- Identity-Based Cryptography, Elliptic Curve Cryptography, Pairing operation, Mutual Authenticated Key Agreement, ProVerif, Telecare Medical Information Systems.

Paper Id.: 67

Design and Implementation of a LoRa–MQTT Powered Train Collision Avoidance System

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Abstract- Railways play a vital role in national mobility and logistics, but collisions still happen. These incidents are often worsened by human error and limited awareness. This paper introduces a low-cost Train Collision Alerting System (TCAS) that uses long-range, low-power LoRa telemetry along with lightweight MQTT publish/subscribe messaging. This combination enables early warnings about possible head-on or rear-end collisions. The prototype includes ESP32 (publisher) and ESP8266 (subscriber) microcontrollers connected to infrared (IR) train-detection sensors. It also has an LCD for local visualization, a GSM module for SMS notifications without needing a power source, and a buzzer for on-site alerts. We outline the system workflow, list operating scenarios, and present pseudocode for the publisher and subscriber nodes. Bench tests in different scenarios demonstrate reliable detection and prompt alerts without false positives in typical conditions. The TCAS provides a practical safety layer that can enhance existing signaling, particularly in areas with limited resources or mixed traffic. **Keywords:** Intelligent transportation systems, LoRa, MQTT, railway safety, collision avoidance, wireless sensor networks.

Paper Id.: 69

An Early Stage Detection of Red Spider Mite Infestation in Tea Leaves using Machine Learning

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Abstract- This paper presents a study on how the performance of deep learning models varies in the task of detecting and classifying Red Spider Mite (RSM) infestation on tea leaves, based on different feature extraction strategies and model architectures. Red Spider Mite (RSM) infestation poses a serious threat to tea plantations, leading to substantial economic losses and reduced leaf quality. Manual inspection methods are labor-intensive and error-prone, prompting the need for automated solutions. The primary objective is to automate the early detection of RSM damage. Manual inspection methods are labor-intensive and error-prone, prompting the need for automated solutions. This study presents a deep learning-based pipeline for the early detection and classification of tea leaf damage caused by RSM. We categorized tea leaves into four progressive stages—Healthy, Early Attack, Medium Damage, and Complete Damage and trained multiple convolutional models, including - Convolutional Neural Networks (CNNs), ResNet18, MobileNetV3-Small, EfficientNet-B0, Vision Transformer (ViT). And were evaluated for classification performance. Additionally, a semi-supervised clustering pipeline was implemented using KMeans with deep feature embeddings extracted via MobileNetV3. MobileNetV3-Small achieved the highest accuracy (~93.98%) in classification tasks and was successfully deployed to a Kivy-based Android application using TorchScript for real-time inference. The system was tested under real-world variations including lighting, leaf orientation, and mild noise conditions. Experimental results show that MobileNetV3-Small, when combined with dropout and batch normalization, achieves the highest classification accuracy and performs robustly in field conditions. This work demonstrates that a well-optimized CNN-based approach can serve as a reliable, scalable solution for pest damage detection in agriculture, especially for smallholder tea growers.

Keywords- Red Spider Mite, Tea Leaf Damage, Image Augmentation & Preprocessing, Deep Feature Extraction Models, Semi-Supervised Clustering and Agricultural AI.

Paper Id.: 70

An Xai Based Novel Approach to Classify and Predict Skin Cancer

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Abstract- In recent times, with a steady rise in new occurrences each year, skin cancer has quickly become a significant global health concern. Early detection of the condition greatly increases the likelihood of recovery, making prompt and precise diagnosis crucial. Unfortunately, traditional diagnostic procedures like dermatologists' eye inspection or Content-Based Image Retrieval (CBIR) techniques frequently fail. These methods are constrained by human subjectivity, practitioner errors, and the potential to miss small cancerous signs. Deep learning and machine learning (ML) approaches have demonstrated great potential in supporting diagnosis in recent years. These models are capable of accurately and automatically differentiating between benign and malignant lesions by examining dermoscopic images. The "black-box" character of many ML models, however, is a significant disadvantage; although they might produce accurate findings, they do not provide an explanation for how those results were arrived at. Clinical adoption is hesitant as a result of this lack of transparency, particularly in a delicate field like healthcare. By incorporating Explainable AI (XAI) into skin cancer detection, our suggested approach aims to address this issue. In addition to classifying lesions, the model provides easily comprehensible rationale by highlighting the areas of the image that impacted its classification. The method increases professional trust, improves accountability, and gives patients more confidence in their diagnosis by fusing interpretability with accuracy. In the end, this strategy is a step towards AI-assisted healthcare that is safer, more dependable, and more transparent.

Keywords- Melanoma, Dermoscopic Images, Malignant and Benign Classification, Explainable Artificial Intelligence (XAI).

Paper Id.: 71

Smart Recipe: Intelligent Recipe Generator and Image Analysis Framework

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Abstract- Many people appreciate food photography because it shows the beauty and attraction of food while also suggesting the detailed stories and recipes contained within each dish. However, photographs cannot describe the cooking procedure or provide a list of necessary items. This problem is aggravated when you are looking forward to cooking a delicious supper only to learn that you are missing certain essential items. The problem is compounded when access to markets is limited, as it was during the COVID-19 pandemic, when lockdown and supply shortages made it difficult to purchase vital products. A solution is presented to assist individuals in finding meals using things that they currently have in their kitchen. Users can simply enter the ingredients they have on hand to generate complete recipes with step-by-step instructions. In addition, the system can evaluate recipe photos to generate ingredient lists and cooking directions. The system develops personalized recipes by linking user input with a huge recipe library via a powerful natural language processing model. It uses cutting edge computer vision algorithms to recognize and extract text from recipe photographs, resulting in organized ingredient lists and straightforward step-by-step instructions.

Keywords- Recipe generation, Available ingredients, Recipe photos, personalized recipes, NLP, CV algorithms.

Paper Id.: 72

Evaluating Impactful Innovation Components for Smart LPG Cylinder Trolley: An Evidence-Based Approach

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Abstract- Integrating robotics and IoT in the automation of household utilities significantly enhances safety, efficiency, and user convenience. This study revolutionizes smart LPG cylinder trolley prototype design, including hardware, software, communication protocols, cyber security concerns, and operational efficiency. Key components examined comprise real-time monitoring of cylinder weight, gas leakage detection, fire detection capabilities, and robotic operations. The research employs IoT-enabled sensors and intelligent algorithms to provide continuous monitoring and alert systems, addressing common challenges associated with traditional LPG handling. The prototype design secures long-term investments by integrating features that prioritize operational convenience, system security, and user safety. The results demonstrate that these technological innovations significantly enhance the efficiency and reliability of household gas supply system interactions. The findings from this study help the research community to optimize these technologies and expand their accessibility.

Keywords- Robotics, IoT, Household, Smart.

Paper Id.: 73

Hybrid Metaheuristic Optimization for Energy-Efficient and Reliable Wireless Sensor Network Deployment

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Abstract- Wireless Sensor Networks (WSNs) are essential in modern Internet of Things (IoT) applications, including environmental monitoring, smart cities, and industrial automation. However, efficiently placing sensors is a significant challenge. This difficulty arises from the need to maximize coverage, ensure connectivity, minimize redundancy, and lower energy use. Traditional methods for sensor placement, like random or grid-based deployments, are straightforward but often yield subpar results. While metaheuristic algorithms can be effective, they often face issues like premature convergence or an unbalanced approach between exploration and exploitation. This paper tackles the deployment optimization problem by creating a combined objective function that includes coverage ratio, energy consumption, and connectivity to the sink node, along with redundancy control. We implemented and compared five well-known optimization methods: Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Differential Evolution (DE), and Simulated Annealing (SA) against baseline strategies. To further improve performance, we propose a new hybrid approach that combines PSO, GA, and a local search operator (Hybrid-PSO+GA+LS). Simulation results from a 100×100 m² area with 25 sensors show that the hybrid algorithm consistently reaches higher coverage (up to 97%), improved connectivity (100%), and lower energy consumption compared to other methods. Analyses of convergence and statistics confirm the strength and effectiveness of the hybrid algorithm. This work demonstrates the promise of hybrid metaheuristics for dependable and energy-efficient WSN deployment in real-world IoT applications.

Keywords- Wireless Sensor Networks (WSN), Coverage Optimization, Energy Efficiency, Connectivity, Metaheuristic Algorithms, Particle Swarm Optimization (PSO), Genetic Algorithm (GA), Differential Evolution (DE), Simulated Annealing (SA), Hybrid Optimization.

Paper Id.: 74

Hybrid Machine Learning Framework for Early Detection of Liver Disease Using SVM, Neural Networks, and Stacking Models

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Abstract- Early detection of liver disease is crucial for timely treatment and better patient outcomes. In this study, we present a hybrid machine learning framework that combines Support Vector Machine (SVM), Neural Networks (NN), and Stacking models to classify patients using the Indian Liver Patient Dataset. This dataset includes 583 records and 10 clinical features. We processed it with missing value imputation, label encoding, and feature scaling. We used 10-fold cross-validation to evaluate model performance. We compared individual SVM and NN models to hybrid approaches. Additionally, we developed a NN feature-based SVM model to use transformations from the neural network for improved SVM classification. The results show that the hybrid stacking and NN to SVM models outperform single classifiers. They achieve higher accuracy, F1-score, and AUC-ROC metrics. Our feature importance analysis reveals that bilirubin levels and liver enzyme measurements are significant for predictions. This study highlights the effectiveness of hybrid machine learning in enhancing liver disease detection and provides a solid approach for clinical decision support systems.

Keywords- Hybrid Machine Learning, Liver Disease Classification, Support Vector Machine (SVM), Neural Networks (NN), Stacking Model, Feature Importance, Indian Liver Patient Dataset, ROC Analysis, Cross-Validation, Early Disease Detection.

Paper Id.: 75

Performance Analysis of a Hybrid K-Means -Huffman Image Compression Scheme in Rayleigh Fading Wireless Environments

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Abstract- The demand for transmitting digital images over wireless networks necessitates efficient compression techniques that balance compression ratio, image quality, and robustness to channel errors. This paper presents a performance analysis of a hybrid image compression scheme that combines K-Means clustering for lossy vector quantization and Huffman coding for lossless entropy encoding. We evaluate the performance of this scheme in a simulated Rayleigh fading wireless environment, which is characteristic of non-line-of-sight mobile communication channels. Key performance metrics, including Compression Ratio (CR), Peak Signal-to-Noise Ratio (PSNR), and Bit Error Rate (BER) on reconstructed image quality, are analyzed. The results demonstrate that while the hybrid scheme achieves a high compression ratio, its performance is highly sensitive to channel errors.

Keywords- K-Means clustering, Huffman coding, Rayleigh fading, image compression.

Paper Id.: 76

Cross-Domain Transfer Learning for Customer Churn Prediction: A Comparative Study on Food Delivery, Streaming, and Ride-Hailing Services

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Abstract- Predicting customer attrition is still a significant problem in sectors where profitability is directly impacted by client retention. In situations when domain-specific data is scarce, this study explores the application of cross-domain transfer learning to improve churn prediction. A food delivery dataset (388 samples, 55 attributes) was used to train a fully connected neural network (FCNN), which served as the basic model and achieved 91.5% test accuracy. The acquired representations were applied to the datasets of Uber (50,000 samples, 14 features) and Netflix (1,000 samples, 16 features). According to the results, transfer learning to Netflix outperformed conventional machine learning baselines with 52% accuracy and strong memory for churners (69%), while transfer to Uber produced 66.7% accuracy and 82% recall.

Results show that when there is behavioral similarity and a large amount of target data across domains, transfer learning works best. The study provides insights into scalable customer retention tactics by illustrating the advantages and disadvantages of cross-domain knowledge transfer for churn prediction..

Keywords- Customer Churn Prediction, Transfer Learning, Cross-Domain Learning, Deep Learning, Domain Adaptation.

Paper Id.: 77

AI based Energy Management System in 4kW Grid-Tied PV-BES System

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Abstract- For a grid-connected photovoltaic (PV) microgrid with battery energy storage (BES), a fuzzy logic-enabled AI energy management system (FL-AIEMS) is introduced. The battery energy storage system takes over in the event that the photovoltaic system malfunctions. This system returns excess power and primarily uses grid supplies for power balance during shortages. To handle stochastic renewable energy supply and load fluctuations, the suggested FL- AIEMS optimises power distribution among PV, BES, local loads, and the utility grid. In order to facilitate dynamic decision-making and energy distribution, the fuzzy logic controller (FLC) regulates uncertainties and produces reference current for the voltage source converter. The system seeks to minimise operating costs, minimise reliance on the utility grid, and maximise photovoltaic power self- consumption. Power demand profiles and actual solar irradiation data have been used to test FLC techniques. Simulations using MATLAB/SIMULINK show that the FL- AIEMS is effective. This model offers a robust and flexible framework for smart grid applications, according to the results. This makes it possible for renewable energy to be seamlessly integrated into contemporary power systems.

Keywords- Energy Management; Voltage Deviation Mitigation; Artificial Intelligence; Fuzzy Logic Control; Hybrid AC/DC Microgrid; Bidirectional Converters.

Paper Id.: 78

Advanced Quantum Communication Protocols for Multi-Domain Strategic Applications: A Comprehensive Framework for Indian Military, Economic, and National Security Operations

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Abstract- The proliferation of quantum computing threatens conventional cryptographic systems, necessitating the development of quantum-resistant communication protocols for multi-domain applications. This research presents a comprehensive analysis of advanced quantum communication protocols specifically tailored for Indian military operations, economic systems, and national security infrastructure. Through systematic evaluation of ten quantum key distribution protocols and emerging quantum secure direct communication systems, this study establishes performance benchmarks and implementation frameworks for defense, financial, and critical infrastructure applications. Our analysis reveals that Device-Independent Quantum Key Distribution achieves 99% security levels with 1.2% quantum bit error rates, while One-Photon-Interference Quantum Secure Direct Communication enables 494-kilometer transmission distances with enhanced security properties. The research proposes a multi-layered quantum communication architecture integrating satellite networks, terrestrial infrastructure, and economic systems to ensure information-theoretic security across all operational domains. Economic applications demonstrate potential ROI improvements of 200-400% for quantum-safe financial systems, while national security implementations show 85% reduction in cyber vulnerability exposure.

Keywords- quantum communication, military cryptography, quantum key distribution, economic security, national infrastructure, post-quantum cryptography, financial systems.

Paper Id.: 79

Social Media Monitoring Tool for Emergency Responses Using a Machine Learning Model

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Abstract- Social media platforms serve as critical channels for real-time communication during emergencies, offering valuable insights into public sentiment, urgent needs, and situational updates. However, the volume and velocity of social media data render manual analysis infeasible for emergency response applications. This study presents an automated, scalable system for real-time sentiment analysis of social media posts during crises, designed to enhance situational awareness for emergency management. Leveraging a big data framework, the system integrates data collection from platforms such as Twitter/X, Facebook, and Instagram via APIs, storing raw data in Hadoop Distributed File System (HDFS). Posts undergo preprocessing (e.g., deduplication, text normalization, tokenization) and feature engineering, including n-grams, TF-IDF vectors, and emergency-specific indicators (e.g., urgency markers, location references). A weighted voting ensemble of Support Vector Machine (SVM) with RBF kernel and Random Forest classifiers achieves 89.1% accuracy in classifying sentiments as positive, negative, or neutral. Real-time processing is enabled through a Hadoop MapReduce pipeline, aggregating results by time and geography. Evaluated on historical datasets from hurricanes, wildfires, and pandemics, the system effectively identifies distress signals, resource requests, and sentiment trends. A visualization dashboard provides temporal trend charts, geographic heatmaps, and real-time alerts for spikes in negative sentiment. Despite challenges in handling multilingual data and nuanced expressions, this system offers a robust foundation for operational use in emergency response, demonstrating significant potential to improve decision-making and resource allocation during crises.

Keywords- Emergency response, Sentiment analysis, Disaster management, Real-time analytics, Big data processing, Crisis communication.

Real-Time Traffic Optimization- The review of multiple techniques, Algorithms and Models

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Abstract- This paper contains an overview of various detection approaches, algorithms, and models for real-time traffic detection and optimization. This paper covers such techniques as image processing for real-time traffic detection, SVM (Support Vector Machine), MATLAB and C++, and the YOLO algorithm. It identifies which method works and which does not and recommends an effective detection algorithm. Our Proposed approach is based on using YOLOv8 and ByteTrack multi-object tracking algorithm. This correlates with specific vehicle recognition, tracking, and categorization, including fire and ambulance. The paper covered the detection, tracking, and count algorithm for vehicle identification and classification and also an algorithm for traffic control that changes signal timing depending on vehicle counts and classification. This solution is trying to curb traffic issues in real time.

Keywords- YOLOv8, ByteTrack, Traffic, Multi Object Tracking, Counting, Algorithm, Emergency vehicles.

An Interactive ML-Powered Multi-Disease Prediction Platform Using Streamlit

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Abstract- The early and accurate prediction of diseases is crucial for timely intervention and improved clinical outcomes. This study presents a machine learning-based approach for predicting diabetes, heart disease, and Parkinson's disease using publicly available datasets. The datasets contain relevant clinical and demographic attributes, which are pre-processed through standardization and missing value handling to ensure data integrity. For classification, we implemented a Support Vector Machine (SVM) model, leveraging its ability to handle high-dimensional data and non-linearity in disease progression patterns. The performance of the model was evaluated using accuracy scores, demonstrating promising results across all three diseases. The results suggest that machine learning techniques, particularly SVM, can serve as effective predictive tools for disease diagnosis, aiding healthcare professionals in making informed decisions. This study highlights the potential of computational intelligence in medical diagnostics and underscores the importance of feature engineering and model selection in improving predictive accuracy. Future work will explore the integration of additional machine learning models and ensemble techniques to further enhance the reliability of disease classification systems.

Keywords- Disease Prediction, Support Vector Machine (SVM), Diabetes Diagnosis, Heart Disease Classification, Parkinson's Disease Detection, Medical Data Analysis.

Time Series Analysis and Forecasting of NVIDIA Stock Prices Using GRU Neural Networks

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Abstract- Predicting the stock prices of the company NVIDIA Corporation is going to be done using Gated Recurrent Unit (GRU) neural networks which are known to capture dependencies of sequential data very well. The approach used in this study is novel, as stock prices remain notoriously difficult to forecast because of the nonlinear and chaotic attributes of any financial system. The data set spans from January 2018 to September 2024 and contains daily stock information of closing prices, volume, and moving average. In an exploratory data analysis (EDA), it was noted that there was a significant spike in the price starting 2023 which can likely be attributed to NVIDIA's AI innovations alongside the worldwide semiconductor supply and demand. The seasonal decomposition technique established non stationary periodic trends, while the augmented dickey fuller test verified absence of stationary patterns. NVIDIA Corporation stock prices forecasting will be made using GRU-based neural networks. The network can be reliably trained owing to the large dataset collected, plus GRU favorably compares to other machine learning algorithms when little data is available. The model trained on 80% of the data fused with sliding window approach achieved R² Score of 0.9872, Mean Squared Error (MSE) of 12.6181, and Mean Absolute Error (MAE) of 2.4315, meaning overall precision was wonderfully high. In addition, resounding analysis showed no errors besides residual which guarantees power. This study shows GRU's great potential for stock forecasting along with room for further enhancement, including addition of external market factors and sentiment detection.

Keywords- Forecasting, Deep Learning, NVIDIA, Time-series, Finance, Residual

iManager: A Lightweight, Scalable, and Cost-Effective Project Management Tool

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Abstract- This paper presents iManager, a lightweight yet highly scalable project management tool tailored to address the gap between overly complex enterprise project management tools and minimalist systems. While large-scale solutions are feature-rich but costly and complex, existing lightweight options lack scalability, robust integration, and advanced features required by startups, small to medium-scale enterprises, and academic teams. iManager is built using a modern technology stack—React for the frontend, Spring Boot for the backend, and PostgreSQL as the database—deployed on AWS for cloud-native scalability. It integrates with GitHub for seamless developer workflows and Razorpay for secure subscription-based monetization.

The system was evaluated through technical performance tests, transactional reliability analysis, and usability studies guided by Nielsen's heuristics and the Technology Acceptance Model (TAM). Results demonstrate that iManager delivers high performance, resilience under load, secure payments, and positive adoption potential. Contributions of this work include (i) an accessible, cost-effective project management framework; (ii) a robust microservices-based architecture; (iii) seamless third-party integrations; and (iv) empirical validation with scalability testing and usability analysis. The paper further discusses implications for small teams and future directions such as AI-driven features, mobile app support, and expanded ecosystem integrations.

Keywords- Project Management, Agile, Cloud Computing, Microservices, Human-Computer Interaction, Technology Acceptance Model, GitHub Integration, Razorpay, AWS

Paper Id.: 91

SpaceC: A Virtual Reality Learning Game To Teach Conditional Logic in C Programming to Slow Learners

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Abstract- The majority of undergraduate students find it difficult to understand basic programming structures such as decision-making statements in the C language. To address this issue, an Extended Reality (XR)-based interactive learning game was developed with the aim of improving conceptual understanding and learner engagement. The game presents key programming logic in a space-themed setting where students engage with visual representations of if, nested if, else-if ladder. A pre-test was administered in proctored settings to locate students with less performance, who were subsequently recruited for the research. Preliminary observations indicate heightened participation and understanding among participants. The interactive process of the game enabled students to see abstract reasoning, and as such, increased the learning experience to be intuitive and fun. This work points to the promise of XR in computer programming education and provides the groundwork for extending such game-based tools to encompass more sophisticated subjects in C programming and other Computer Science courses.

Keywords- Cognitive Remediation, Augmented Reality (AR), Virtual Reality (VR), Programming, Gamified elements, Cognitive functions.

Paper Id.: 94

Iterative rating through Voting algorithm- Multi Parameter Aggregation

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Abstract- With the rapid growth of academic search engines, the visibility and impact of scholarly articles depend heavily on how effectively they are ranked. While systems such as Google Scholar emphasize citation counts [2], community sentiment and other contextual attributes can also provide important signals of trustworthiness. Similarly, in professional platforms like LinkedIn, the credibility of recommendations depends not only on the recommender's opinion but also on their expertise and standing within the community. This paper introduces an Iterative Voting Algorithm with Multi-Parameter Aggregation (VMPA) that integrates multiple voter attributes into the ranking process. The algorithm is designed to mitigate individual collusion, group collusion, and biased voting, while ensuring that authentic but infrequent voters are not overlooked. Each voter is associated with measurable parameters such as academic experience, citation record, and organizational affiliation, which are incorporated into their voting weight. The method is evaluated using both real and synthetic datasets in the context of conference ranking. Results show that the algorithm successfully identifies colluders, preserves genuine contributions, and produces rankings consistent with credible benchmarks such as CORE. The findings suggest that multi-parameter aggregation improves robustness, enhances trustworthiness, and reduces the number of iterations required for convergence.

Keywords- MPIA - Multi Parameter Identification and Aggregation VMPA - Voting with Multi Parameter Aggregation.

Smart Traffic Light Controller Including Emergency Services Implementation on Intel Cyclone V-DE1 SOC Board

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Abstract- FPGAs offer reconfigurable functionality even after implementation, making them ideal for efficient prototyping and research. They consume less area and power compared to fixed-function hardware. The DE1-SoC board, built on Intel's Cyclone V FPGA, integrates Hard Processor Systems (HPS) with FPGA fabric and supports real-time control, making suitable for complex embedded systems. This combination well-suited for complex embedded applications. Traffic Light Controller (TLC) is crucial for managing traffic particularly in smart cities. Conventional TLCs are not fully compatible with smart city demands and require enhancements. The proposed design introduces control switches that allow manual override of signal states, especially useful during emergency situations like ambulance movement or traffic congestion. This paper presents the design and prototyping of a real-time TLC system. The controller is based on a finite state machine that governs signal timing across a four-way intersection. This is developed using Verilog HDL and simulated to verify its functionality.

Keywords- Traffic Light Controller (TLC), State Machine, DE1 SoC, FPGA, Verilog, power analysis, Chip planner.

User-Level Depression Severity Assessment via Keyword-Driven Temporal Modeling and Rule-Based Classification

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Abstract- Detecting early signs of depression from social media remains a challenging task, primarily due to the lack of a well-structured screening framework and the use of temporal modeling. Most existing tools focus on clinical diagnosis and are not suited for early behavioural assessment. In this work, we present a rule-based depression severity screening framework that utilizes the Depression Anxiety Stress Scales (DASS-21) to analyse Twitter content. DASS-21 is a psychological screening instrument designed to assess emotional states over the past 1–2 weeks, making it ideal for temporal analysis. Each tweet is scored based on mapped DASS-21 indicators, and user-level severity is aggregated over 15-day intervals. This approach is inspired by DSM-5- episode duration criteria and was developed with input from a psychology expert to preserve screening intent. We applied our method to 10,233 tweets from 536 users and categorized them into five severity levels. Machine learning validation achieved 97.02% accuracy, with consistent learning curves across train-test splits. The framework enables scalable and interpretable depression severity screening on social platforms.

Keywords- Depression Severity, Social Media, DASS-21, Temporal Modelling, Rule-Based Annotation.

Semantic Chatbot for Cognitive Analysis of a Student

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Abstract- Cognitive ability plays a key role in a student's growth, influencing how well they can think, remember, calculate, and understand information. This framework introduces a smart semantic chatbot designed to evaluate students' cognitive abilities in a more efficient and personalized way. It automatically gathers student responses through Google Forms, where the questions are thoughtfully grouped into four key areas: Logical Reasoning, Memory & Attention, Mathematical Skills, and Verbal Reasoning. Responses are stored in Google Sheets and fetched dynamically using an API for processing. The scoring system gives points for correct answers (10), medium answers (5), and incorrect ones (0), allowing for a detailed assessment in each domain. After assessing scores, the chatbot provides personalized feedback, identifying strengths and domains to improve, all without repeating itself. Unlike traditional tests, this system shows results in a clear table, helping students easily understand how they did. This proposed framework fills the gap in education by providing a simple, fast, and meaningful way to assess cognitive abilities, with an easy-to-use chatbot. A built-in recommender system further enhances the framework by analyzing students' scores across the four domains and generating targeted suggestions. Based on performance patterns, it identifies areas where students are lacking, whether in logical reasoning, memory and attention, mathematical skills, or verbal reasoning, and provides specific recommendations for improvement in those weaker domains using association rule mining.

Keywords- Cognitive Ability Assessment, Semantic Chatbot, Student Performance Analysis, Feedback, Recommender System, Association Rule Mining.

A Novel Framework for Digital Accessibility for Individuals with Disabilities

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Abstract- In recent times, there is exponential rate of disability increasing with the population and it is emerged a concern for them to utilize the modern re- sources in the era of digitalization. The integration of digital components into individuals' life has transformed the various sectors like education, banking, en- tertainment, and healthcare, enhancing the scalability, efficiency and accessibil- ity. However, there exists many challenges despite of the advancements that are rising in the digital field for the disabled person to access the computers. Based on the above challenges our proposed methodology aims to develop a novel pro- totype based on the computer design with smart and innovative technologies, in- cluding the core concepts of computer vision for eye-tracking and monitoring, and speech recognition for voice commands. The objective of the design is to present an intuitive and accessible interface which minimizes the dependence on traditional input devices. Additionally, the study highlights the impact of motor nerve functioning and neural adaptability, cerebral cortex in designing systems with connected modules that can align with the unique physical and cognitive needs of users. Furthermore, the existing approach termed "one-size-fits-all" in educational frameworks have the limitations of addressing the diverse needs of students with disabilities, resulting in imbalanced learning opportunities. By har- nessing on equity rather than equality, the framework aims for a personalized knowledge-transfer system which is feasible for institutions while ensuring in- clusivity.

Keywords- Computer accessibility, physical disability, eye tracking, voice commands, voice assistant.

Paper Id.: 98

Adaptive Traffic Signal Management System Using Deep Reinforcement Learning

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Abstract- Traffic congestion continues to be a critical problem in urban areas, leading to longer travel times, excess fuel usage, and high emission levels. Conventional approaches such as fixed-time signals and sensor-based controllers are reactive and often fail to cope with unpredictable variations in traffic flow. To address these limitations, this work proposes a vision-driven Adaptive Traffic Signal Control framework that integrates YOLOv8-based vehicle detection with Deep Reinforcement Learning (DRL). Real-time traffic videos are analyzed to estimate lane density, queue lengths, and average waiting times, which are used as state inputs for a Deep Q-Network (DQN) agent. The agent dynamically adjusts green signal durations with the objective of minimizing congestion and ensuring fairness across all lanes. Unlike traditional models, the proposed system is designed as a software-only solution, making use of existing CCTV infrastructure for scalability and cost-effectiveness. Simulation results indicate significant improvements in waiting time reduction, queue clearance, and overall throughput compared to fixed-time, actuated, and other learning-based baselines. This study demonstrates how the combination of computer vision and reinforcement learning can enable more intelligent and adaptive traffic control strategies suitable for smart city deployment.

Keywords- Adaptive Traffic Control, Reinforcement Learning, YOLOv8, Deep Q-Network, Intelligent Transportation System, Smart Cities.

Paper Id.: 99

Multi-Spectral and Panchromatic Image Fusion Using Graph Neural Networks with Extreme Learning Machine Enhancement

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Abstract- This paper presents a novel approach for fusing multi-spectral imagery (MSI) and panchromatic (PAN) images using Graph Neural Networks (GNN) enhanced with Extreme Learning Machine (ELM) components. Traditional pansharpening methods often struggle to preserve spectral fidelity while enhancing spatial resolution. Our proposed GNN-ELM framework addresses this challenge by modeling pixel relationships as graph structures while leveraging ELM's fast learning capabilities for efficient feature mapping. The method constructs adaptive graphs based on spatial-spectral similarity, applies graph convolutions for feature extraction, and employs ELM for rapid fusion mapping. Experimental results on WorldView-2, QuickBird, and IKONOS datasets demonstrate superior performance compared to state-of-the-art methods, achieving PSNR improvements of 2.3-4.1 dB and SSIM enhancements of 0.021-0.043.

The proposed approach maintains spectral integrity while significantly enhancing spatial details, with computational efficiency 3.2x faster than comparable deep learning methods.

Keywords- Pansharpening, Graph Neural Networks, Extreme Learning Machine, Remote Sensing, Image Fusion.

The Vidyasagar Award

The Vidyasagar Award is being given to **Prof. Ranjana Jha**, Vice Chancellor of Indira Gandhi Delhi Technical University For Women, in 14th International Conference on Computing Communication & Sensor Networks. CCSN2025. Date: 12th and 13th September, 2025, as Hybrid mode. In favor of the Organizing Committee, Joint Organizer: Applied Computer Technology, Kolkata, West Bengal, India provides this award.



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	<p>Dr. Santosh Kumar Professor, CSE, Galgotias University, Greater Noida, UP</p>	Invited Speaker
	<p>Prof. Rashmi Bhardwaj Fellow of Institute of Mathematics and Applications, UK; Professor of Mathematics, USBAS, Guru Gobind Singh Indraprastha University, Sector 16 C, Dwarka, Delhi.</p>	Invited Speaker
	<p>Dr. S. Nagini Professor, CSE, VNR VJIET, Hyderabad, Telangana.</p>	Invited Speaker
	<p>Mahesh Mole, Senior Software Engineering Manager, Motorola Solutions, Inc., USA.</p>	Session Chair
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