

PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune



Publication Booklet (A.Y. 2024-25)



Journal Papers

96



Conference papers

49



Book Chapters

09



Books

14



Research and Development Cell, PCCOER, Ravet, Pune

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Summary of Publication

Department-wise Summary of publications (A.Y. 2024-25)

Sr. No.	Department	Publications				
		Journal	Conference	Book Chapter	Books	Total
1	Applied Science	15	04	1	06	26
2	Civil Engineering	09	05	0	01	15
3	Computer Engineering	29	20	2	03	54
4	Electronics and Telecommunication	12	18	4	03	37
5	Information Technology	06	01	1	0	8
6	Mechanical Engineering	24	01	1	01	27
Total Publications		95	49	09	14	167

Summary of Publications

Journal Paper Indexing	
WoS (SCI/ESCI/SCIE)	09
Scopus	74
UGCCare	11
Conference Paper	
National Conference	-
International Conference	49
Scopus-Indexed Conference	38

List of Journal Publication

Sr No	Paper Id	Department	Title of Article	Author(s)	Journal Name	Volume	Issue	Pages	DOI	Indexing
1	JP202425_AS_1	Department of Applied Sciences and Humanities	Internet of things driven hybrid neuro-fuzzy deep learning building energy management system for cost and schedule optimization	Deepshikha Shrivastava	Frontiers in artificial intelligence	8	6		https://doi.org/10.3389/frai.2025.1544183	Scopus, WOS
2	JP202425_AS_2	Department of Applied Sciences and Humanities	Crossing Borders: Narratives of Migration, Exile, and Identity in Contemporary Fiction	Dr. Kunda Raul, Dr. Shivaji Chavan	<i>LangLit</i>	11	4	287-289	NA	UGC Care
3	JP202425_AS_3	Department of Applied Sciences and Humanities	Engineering the Mind, Humanizing the Machine: Teaching English Literature to Engineering Undergraduates	Dr. Shivaji Chavan, Dr. Kunda Raul	<i>LangLit</i>	11	3	299-303	NA	UGC Care
4	JP202425_AS_4	Department of Applied Sciences and Humanities	An Extensive Study of Nanomaterial and Nanotechnology in the Various Fields of Engineering	Aarti Jathar, Kamalkishor Maniyar, Beena Nawghare, Saniya Ansari, Priti GhutePatil	Journal of Mines, Metals and Fuels	72	10	1067-1074	DOI: 10.18311/jmmf/2024/45658	Scopus,
5	JP202425_AS_5	Department of Applied Sciences and Humanities	Investigating the Effect of Heat Transfer Influenced by the Application of Wavy Corrugated Twisted Tape Inserts in Double Pipe Heat Exchangers	Anant Sidhappa Kurhade, Parimal Sharad Bhambare, Vijay Pandurang Desai,	Journal of Advanced Research in Fluid Mechanics and Thermal Sciences	122	2	146-155	https://doi.org/10.37934/arfmts.122.2.146155	Scopus,
6	JP202425_AS_6	Department of Applied Sciences and Humanities	Nature's Echoes: Ecocriticism in Ruskin Bond and Sudha Murty's	Dr Jyothi Ramesh Pai	Langlit An International Peer-Reviewed Open Access	11	2	260-266	-	NA

		Humanities	Literary Landscapes		Journal Vol. 11, Issue 2 November 2024					
7	JP202425_ AS_7	Department of Applied Sciences and Humanities	The Human Side of Technology: AI's Social Impact on Engineering Students	Dr Jyothi Ramesh Pai	https://saltedu.in/index.php/cell/index	1	1	9-13	-	NA
8	JP202425_ AS_8	Department of Applied Sciences and Humanities	Weathering the technological storm: The impact of internet and AI on education	Dr. Vinayak Kottawar, ² Dr. Rutuja Deshmukh, ³ Dr. Neeta Deshpande, ⁴ Mr. Ramdas Popat Jare	Frontiers in Health Informatics	13	3	10794–10804	ISSN-Online: 2676-7104	Scopus,
9	JP202425_ AS_9	Department of Applied Sciences and Humanities	Comprehensive Image Security: ECC, RSA, Steganography, ML Quality, and Authentication System	Gajanan Rajaram Jadhav, Dr. Vinod Kumar	International Journal of Innovative Research in Engineering and Multidisciplinary Physical Sciences	12	4		-	UGC Care
10	JP202425_ AS_10	Department of Applied Sciences and Humanities	Relation between the Fractional Domination number of some Graphs and their Line Graphs	Mahesh Sarada, Rekha Jain, and Ganesh Mundhe.	Communications on Applied Nonlinear Analysis	31	6	670-691	DOI: https://doi.org/10.52783/cana.v31.1260	Scopus,
11	JP202425_ AS_11	Department of Applied Sciences and Humanities	Algorithm Using LPP for Domination and Fractional Domination Number of Some Graphs	Mahesh Sarada, Rekha Jain, Ganesh Mundhe	Communications in Mathematics and Applications	15		1541-1560	DOI: https://doi.org/10.26713/cma.v15i5.2840	, WOS
12	JP202425_ AS_12	Department of Applied Sciences and Humanities	Comparative Solution of Volterra Integral Equation using Successive Approximation Method, Laplace 108 Transform Method and Differential Transform Method	Sachin Varpe	The Indian Journal Of Technical Education	47	1	118-122	-	UGC Care
13	JP202425_ AS_13	Department of Applied Sciences and Humanities	Mitigating Environmental Impact: A study on the Performance and Emission of a Diesel Engine Fuelled with	Shital Anant Patil	Journal of Mines, Metals and Fuels	73	4	861-866	10.18311/jmmf/2025/47669	Scopus,

			Biodiesel Blend							
14	JP202425_AS_14	Department of Applied Sciences and Humanities	Fostering Critical and Ethical Thinking Through Dystopian Fiction in Engineering Education	Shivaji Chavan, Kunda Raul	<i>Lokavishkar International E-Journal</i>	13	2	23-26	NA	UGC Care
15	JP202425_AS_15	Department of Applied Sciences and Humanities	A New Era in Fintech and Insurtech using AI	Vaishnavi Kavade, Dr. Vinayak Kottawar, Pratik Chopade, Pooja Baravkar, Pranjali Bahalkar	Frontiers in Health Informatics	13	3	10794-10804	ISSN-Online: 2676-7104 Vol. 13 No. 3 (2024)	Scopus,
17	JP202425_CI_1	Department of Civil Engineering	Experimental study on the stabilization of laterite soil with chitosan biopolymer for subgrade applications	Banne S.P.;Ingle G.S.;Dhawale A.;Gaikwad S.;Bobade S.	Engineering and Applied Science Research	52	3	270-281	10.14456/easr.2025.24	Scopus,
18	JP202425_CI_2	Department of Civil Engineering	Morphometric evaluation of Manjara watershed, Latur district, Maharashtra, India : a GIS approach	Salvi S.,Tiwari H.;Bobade S.	Innovative Infrastructure Solutions	10	3	1-10	10.1007/s41062-025-01862-w	Scopus,
19	JP202425_CI_3	Department of Civil Engineering	Geoinformatics-Driven Analysis for Watershed Management: Focus on the Manjara River Basin	Salvi S., Bobade S.;Tiwari H.;Ambad S.;Gaikwad J.;Rajput P.;Zadbuke A.	Journal of Mines Metals and Fuels	73	2	285-294	10.18311/jmmf/2025/47423	Scopus,
20	JP202425_CI_4	Department of Civil Engineering	Water Quality Evaluation of Pawna River using QUAL2E Software	Salvi S., Tiwari H.;Bobade S.;Sabale R.;Somwanshi S.;Kshirsagar S.;Mulge K.;Kolnurer S.	Journal of Mines Metals and Fuels	73	2	295-305	10.18311/jmmf/2025/47432	Scopus,
21	JP202425_CI_5	Department of Civil Engineering	Integrated IoT System for Real-Time Air Quality Assessment in Diverse Environments	Salvi S.S., Tiwari H.U.;Bobade S.S.	International Research Journal of Multidisciplinary	6	1	1362-1372	10.47857/irjms.2025.v06i01.02831	Scopus,

					Scope					
22	JP202425_CI_6	Department of Civil Engineering	Bayesian Optimization For Parameter Tuning In Complex Ecological Models	Chetan S. Chavan, Rajeshwar Goud Jangampally	Information Technology and Management	1	1	1-7	https://doi.org/10.5281/zenodo.10254606	NA
23	JP202425_CI_7	Department of Civil Engineering	Total Quality Management & Six Sigma Methodology in Construction Industry	Rahul S.Patil	International Journal of Creative Research Thoughts (IJCRT)	13	4	603-615	-	NA
24	JP202425_CI_8	Department of Civil Engineering	Tempo-spatial impact assessment of landuse land covers on slope stability through GIS modeling at Raigad district of Maharashtra	Bobade S.;Dhawale A.;Garg V.	Innovative Infrastructure Solutions	9	8		10.1007/s41062-024-01602-6	Scopus,
25	JP202425_CI_9	Department of Civil Engineering	Review on Application of Cat Eye Reflector for Pavements	Mayura Yeole, Shreeyash Kalbhor, Pranav Jagdale, Sahil Pachpute, Tejas Bhakare	International Journal of All Research Education & Scientific Methods	12		2662-2666	10.56025/IJARESM.2024.1211242662	NA
26	JP202425_CO_1	Department of Computer Engineering	Distributed two phase intrusion detection system using machine learning techniques and underlying big data storage and processing architecture-HDFS	Jadhav A.D.;Pellakuri V.;Ahire P.G.;Chaugule A.A.;Tiwari H.U.	Inteligencia Artificial	28	76	124-148	10.4114/intartif.vol28iss76pp124-148	Scopus, WOS
27	JP202425_CO_2	Department of Computer Engineering	Discrete variational autoencoders BERT model-based transcranial focused ultrasound for Alzheimer's disease detection	Thipparthi K.R.;Kollu A.;Kulkarni C.;Dutta A.K.;Doshi H.;Kashyap A.;Sinha K.P.;Kondaveeti S.B.;Gupta R.	Journal of Neuroscience Methods	416	-	NA	10.1016/j.jneumeth.2025.110386	Scopus, WOS
28	JP202425_CO_3	Department of Computer Engineering	Evolutionary optimization in VANET services: a comprehensive survey, challenges and futuristic	Badole M.;Thakare A.;Oliva D.	Soft Computing	29	6	2905-2929	10.1007/s00500-025-10571-6	Scopus,

			approach							
29	JP202425_CO_4	Department of Computer Engineering	Elevating intelligent voice assistant chatbots with natural language processing, and OpenAI technologies	Korade N.B.;Salunke M.B.;Bhosle A.A.;Asalkar G.G.;Lal B.;Kumbharkar P.B.	Indonesian Journal of Electrical Engineering and Computer Science	37	1	507-517	10.11591/ijeecs.v37.i1.pp507-517	Scopus,
30	JP202425_CO_5	Department of Computer Engineering	Tomato Leaf Disease Detection with YOLOV8 Leaf Extraction, Resnet-50 Classification, and Gpt-3.5 for Treatment Recommendations	Korade N.B.;Salunke M.B.;Bhosle A.A.;Asalkar G.G.;Joshi D.M.;Patil A.S.;Sangve S.M.	International Research Journal of Multidisciplinary Scope	6	1	879-891	10.47857/irjms.2025.v06i01.02864	Scopus,
31	JP202425_CO_6	Department of Computer Engineering	Real-Time Traffic Light Optimization Using Yolov9 and Length-Based Metrics	Korade N.B.;Salunke M.B.;Bhosle A.A.;Sangve S.M.;Joshi D.M.;Asalkar G.G.;Paralkar S.R.	International Journal of Electrical and Electronics Research	13	2	287-295	10.37391/IJEER.130212	Scopus,
32	JP202425_CO_7	Department of Computer Engineering	Proactive Soybean Disease Detection through YOLO Leaf Extraction and ResNet-50 Classification to Reduce Crop Loss and Boost Productivity	Korade N.B.;Mahendra B.S.;Bhosle A.A.;Sarwade J.M.;Asalkar G.G.;Joshi D.M.;Sakure K.S.;Sangve S.M.	International Journal of Engineering Trends and Technology	73	1	385-396	10.14445/22315381/IJETT-V73I1P133	Scopus,
33	JP202425_CO_8	Department of Computer Engineering	Intelligent Guitar Chord Recognition Using Spectrogram-Based Feature Extraction and AlexNet Architecture for Categorization	Korade N.B.;Salunke M.B.;Bhosle A.A.;Sangve S.M.;Joshi D.M.;Asalkar G.G.;Kadu S.R.;Sarwade J.M.	International Journal of Advanced Computer Science and Applications	16	4	758-767	10.14569/IJACSA.2025.0160475	Scopus,
34	JP202425_	Department of	Leveraging Efficientnet-B4 In Goat Disease Prediction And	Korade D.N.B.;Salunke	Journal of Theoretical and Applied	103	16	-	-	Scopus,

	CO_9	Computer Engineering	Recommendation Systems For Mortality Reduction And Health Optimization	D.M.B.;Bhosle D.A.A..	Information Technology					
35	JP202425_CO_10	Department of Computer Engineering	Integrating deep learning and optimization algorithms to forecast real-time stock prices for intraday traders	Nilesh B. Korade;Mahendra B. Salunke;Amol Bhosle;Dhanashri Joshi;Kavita Patil	International Journal of Electrical and Computer Engineering (IJECE)	-	16s	-	10.11591/ijece.v15i2.pp2254-2263	NA
36	JP202425_CO_11	Department of Computer Engineering	Enhanced selective hyperchaotic encryption using deep neural network for hyperspectral images	Minal Bodke & Sangita chaudhari	Earth Science Informatics	Volume 18,		161	https://doi.org/10.1007/s12145-024-01684-x	Scopus, WOS
37	JP202425_CO_12	Department of Computer Engineering	IoT-driven ensemble machine learning model for accurate dissolved oxygen prediction in aquaculture	Yogeshwari Mahajan, Rupali P. Shete, Amith Shekhar C.,Anupkumar M. Bongale & Deepak Dharrao	Discover Internet of Things	5	1	1-31	10.1007/s43926-025-00201-w	Scopus,
38	JP202425_CO_13	Department of Computer Engineering	Gamified Therapy Platform in Hindi for Children with Misarticulation Issues	Deepa Mahajan, 2Komal Shingavi, 3Kajal Shingavi, 4Apurva Talekar	International Journal of Scientific Development and Research (IJS DR)	10	5	-	ISSN:2455-2631	NA
39	JP202425_CO_14	Department of Computer Engineering	AI-Driven Multimodal Fusion of Neuroimaging and Speech Analysis for Early Detection of Alzheimer's Disease Biomarkers.	Nilam Jadhav, Avani Ray, Tejaswini Gavhane	Journal of Neonatal Surgery	14	15s	8	https://doi.org/10.63682/jns.v14i15S.390	NA
40	JP202425_CO_15	Department of Computer Engineering	A Self-Sovereign Identity Framework for Context-Aware De-Centralized Identifier Creation and Credential Verification	Lohar S.N.;Babar S.D.;Mahalle P.N.	Engineered Science	36	-	-	10.30919/es1629	Scopus,

41	JP202425_CO_16	Department of Computer Engineering	A Smart Waste Management: an Adaptive Algorithm for Classification of Degradable and Non-Degradable Waste using Machine Learning Model	Kodmelwar M.K.;Sukte C.D.;Daulatabad A.;Lohar S.N.;Chadchankar A.;Chavan S.;Kokane C.D.	Panamerican Mathematical Journal	35	2S	482-501	10.52783/pmj.v35.i2s.2933	Scopus,
42	JP202425_CO_17	Department of Computer Engineering	Efficient hybrid approach for feature extraction using metaheuristic algorithm and majority voting in social media networks	Lunawat S.;Rao J.;Patil P.	Sigma Journal of Engineering and Natural Sciences	43	3	1020-1037	10.14744/sigma.2025.00089	Scopus, WOS
43	JP202425_CO_18	Department of Computer Engineering	Survey Paper: A Review on Early Detection and Progression Prediction of Diabetic Retinopathy Using Multimodal Analysis	Swati Kiran Rajput, Dr.Sunil Gupta	International Journal 'INDIAN JOURNAL OF TECHNICAL EDUCATION'	48	1	132-137	ISSN 0971-3034	NA
44	JP202425_CO_19	Department of Computer Engineering	Blockchain Medicine – ePharmacy: A Mobile Application Leveraging Hybrid Blockchain to Solve Challenges in the Pharmaceutical Supply Chain	Govind Suryawanshi	Journal of the Learning Sciences	32	2	17	https://doi.org/10.5281/zenodo.14264001	Scopus,
45	JP202425_CO_20	Department of Computer Engineering	Cluster-based multicast optimized routing in VANETs using elite knowledge-based genetic algorithm	Badole M.H.;Thakare A.D.	Knowledge Based Systems	294	-	NA	10.1016/j.knosys.2024.111773	Scopus,
46	JP202425_CO_21	Department of Computer Engineering	Hyperspectral remote sensing image watermarking using discrete wavelet transform and forensic based investigation archimedes optimization	Minal Bodke & Sangita chaudhari	Earth Science Informatics	Volume 17,	-	4297–4313	https://doi.org/10.1007/s12145-024-01394-4	Scopus, WOS

47	JP202425_CO_22	Department of Computer Engineering	Machine intelligence based early prediction methods for Cardiovascular Diseases (CVDs)	Shivganga Udhan, Bankat Patil, Suvarna Patil, Sneha Kanawade, Priyadarshani Doke, Deepali Hajare	Journal of Electrical systems	20	2s	1240-1251	https://doi.org/10.52783/jes.1767	Scopus,
48	JP202425_CO_23	Department of Computer Engineering	HearingHands : Amplifying the Voices of Deaf Community	Yogeshwari Mahajan, Deepak T. Mane, Devata R. Anekar, Vinod S. Mahajan, Veena M. Kadam, Maqsood Ahmed Ansari	Journal of Information Systems Engineering and Management	Vol. 10 No.	1s	375 - 389	https://doi.org/10.52783/jisem.v10i1s.222	NA
49	JP202425_CO_24	Department of Computer Engineering	Transformer Based Sentiment Analysis of Russia-Ukraine War using BERT Model	Yogeshwari Mahajan, Deepak T. Mane, Devata R. Anekar, Yogeshwari V. Mahajan, Vinod S. Mahajan, Veena M. Kadam, Maqsood Ahmed Ansari	Journal of Information Systems Engineering & Management	Vol. 10 No.	1s	475 - 484	10.52783/jisem.v10i1s.230	Scopus,
50	JP202425_CO_25	Department of Computer Engineering	Machine Learning In Market Forecasting: Trends, Challenges, And Future Pathways In Prediction Models	Dr. Yogeshwari Vinod Mahajan, Dr. Vinod Shamrao Mahajan, Dr. Umesh Badade, Dr. Satpalsing Rajput, Dr. Vishal singh Rajput	Journal of the Oriental Institute	Vol: 73,	-	117-136	NA	UGC Care
51	JP202425_CO_26	Department of Computer Engineering	Restoration of motion blurred hazy images using PSF variable & log Spectrum Analysis	Yogeshwari V. Mahajan, Dr. Vinod Shamrao Mahajan, Dr. Umesh Badade, Dr. Satpalsing Rajput, Dr. Vishal singh Rajput	Journal of the asiatic society of Mumbai	98	-	34-41	NA	UGC Care

52	JP202425_CO_27	Department of Computer Engineering	A New Era in Fintech and Insurtech using AI	Vaishnavi Kavade, Dr. Vinayak Pratik, Pooja Baravkar, Pranjali Bahalkar	Frontiers in Health Informatics	13	3	11057 - 11068	ISSN-Online: 2676-7104	Scopus,
53	JP202425_CO_28	Department of Computer Engineering	Hybrid machine learning models for solving complex optimization problems in information system	Sandip Desai, Neha Amol Rahul, Vaishali Latke, Trupti Deshmukh, Parikshit N. Mahalle, Laxmikant Umate	Journal of Information & Optimization Sciences	46	-	1253-1263	10.47974/JIOS-1987	, WOS
54	JP202425_CO_29	Department of Computer Engineering	Measuring Endodontic Working Length Using Artificial Intelligence	Vaishali Latke, Vaibhav Narawade	Frontiers in Health Informatics	13	-	83-96	10.52783/fhi.10	UGC Care
55	JP202425_ETC_1	Department of Electronics and Telecommunication Engineering	Unpaired recurrent learning for real-world video de-hazing	Patil P.W.; Randive S.N.; Gupta S.; Rana S.; Venkatesh S.; Murala S.	Pattern Recognition	166	-	-	10.1016/j.patcog.2025.111698	Scopus,
56	JP202425_ETC_2	Department of Electronics and Telecommunication Engineering	Lightweight progressive recurrent network for video de-hazing in adverse weather conditions	Shaikh J.A.H.; Mukane S.M.; Randive S.N.	Visual Computer	41	7	4661-4672	10.1007/s00371-024-03683-x	Scopus,
57	JP202425_ETC_3	Department of Electronics and Telecommunication Engineering	Sewage water management and healthcare monitoring in IoT using Optimized deep residual network	Shende D.; Angal Y.S.	Journal of Experimental and Theoretical Artificial Intelligence	37	5	821-844	10.1080/0952813X.2023.2300004	Scopus,
58	JP202425_ETC_4	Department of Electronics and Telecommunication Engineering	An efficient fault diagnosis model using Lappet Falco optimisation based on a deep neural network for the VSI under varying load conditions	Baste V.; Shende D.; Idhate S.; Deshpande A.	International Journal of Power Electronics	21	3	247-278	10.1504/IJPELEC.2025.145951	Scopus,

59	JP202425_ETC_5	Department of Electronics and Telecommunication Engineering	A novel two-way feature extraction technique using multiple acoustic and wavelets packets for deep learning based speech emotion recognition	Bhangale K.B.;Kothandaraman M.	Multimedia Tools and Applications	84	15	14529-14552	10.1007/s11042-024-19674-y	Scopus,
60	JP202425_ETC_6	Department of Electronics and Telecommunication Engineering	Comparison of dual isolated converters with flyback converters for bidirectional energy transfer	Mapari R.;Bhangale K.;Kadlag S.S.;Shriwastava R.	International Journal of Applied Power Engineering	14	1	55-63	10.11591/ijape.v14.i1.pp55-63	Scopus,
61	JP202425_ETC_7	Department of Electronics and Telecommunication Engineering	Novel 2-D Wavelet-Based Spectral-Temporal Representation for Deep Learning Based Stress Detection Using EEG Signal	Dhake D.;Angal Y.	Circuits Systems and Signal Processing	-	-	-	10.1007/s00034-025-03230-6	Scopus,
62	JP202425_ETC_8	Department of Electronics and Telecommunication Engineering	Design and analysis of spin-based logic gates for enhancing computational efficiency	Rajput P.J.;Bhandari S.U.;Malik G.F.A.	Journal of Theoretical and Applied Information Technology	103	9	3866-3876		Scopus,
63	JP202425_ETC_9	Department of Electronics and Telecommunication Engineering	A Novel Optimized Hybrid Deep Learning Framework for Mental Stress Detection Using Electroencephalography	Andhare M.S.;Vijayan T.;Karthik B.;Urooj S.	Brain Sciences	15	8	835	10.3390/brainsci15080835	Scopus,
64	JP202425_ETC_10	Department of Electronics and Telecommunication Engineering	Person identification using novel local triangular binary pattern-based texture descriptor	Arti Tekade, T. Vijayan, B. Karthik and Anurag Mahajan	EURASIP Journal on Advances in Signal Processing	-	-	1-14	https://doi.org/10.1186/s13634-025-01213-y	Scopus,
65	JP202425_ETC_11	Department of Electronics and Telecommunication Engineering	Commercial Automation Using RTOS-Based Architecture	Dr. Dipali Shende, Mrs. Vaishali Baste, Mrs. Shital More	Journal of Advancement in Electronics Design	7	-	39-51	10.5281/zenodo.11483444	NA
66	JP202425_ETC_12	Department of Electronics and	Speech Emotion Recognition Using Generative Adversarial	Bhangale, Kishor and Kothandaraman,	Circuits, Systems, and Signal Processing	43	-	2341--2384	-	Scopus,

		Telecommunication Engineering	Network and Deep Convolutional Neural Network	Mohanaprasad						
67	JP202425_I T_1	Department of Information Technology	Enhanced Network Classification of Brain Tumors Using the Transfer Learning Model and Aquila Optimization-Based Metaheuristics	Pallavi Patil & P.Sharma	Panamerican Mathematical Journal	34	2	121-137	10.52783/pmj.v34.i2.930	Scopus,
68	JP202425_I T_2	Department of Information Technology	Deep learning-based blood cell classification from microscopic images for haematological disorder identification	Jagtap N.S.;Bodade V.;Kadrolli V.;Mahajan H.;Kale P.P.;Pise P.;Hingmire A.	Multimedia Tools and Applications	84	20	21917-21944	10.1007/s11042-024-19900-7	Scopus,
69	JP202425_I T_3	Department of Information Technology	A Survey on DeepFake Detection Using Machine Learning	Santoshkumar Chobe, Swati Nikam, Aditya Bhosale, Atharva Khairnar, Kushal Patil, Pritam Fulari	International Conference on Artificial Intelligence, Communication Technologies & Smart Cities	1533	-	403-419	https://doi.org/10.1007/978-981-96-9196-8_27	Scopus,
70	JP202425_I T_4	Department of Information Technology	QMWT:Design of an Improved EEG Classification Model Via Q-Learning Based Processing of Multispectral Wave Traits	Pranjali A. More, Sonali M. Sonavane, Anita S. Mahajan, Yogendra Patil, Shwetal K. Patil, Trupti T. Tekale	Advances in Nonlinear Variational Inequalities	Volume 27 no 4	-	149-160	https://doi.org/10.52783/anvi.v27.1498	Scopus
71	JP202425_I T_5	Department of Information Technology	Data Validation using Decomposition Technique for Data Transfer Network	Maya Shelke ,Madhuri Kethari,Aparna Mete ,Trupti Tekale ,Renuka Patil	2nd international conference on Artificial Intelligence:Theoryand Applications(AITA 2024)	5588	-	13-30	-	UGC Care
72	JP202425_I T_6	Department of Information	Fine-Grained sentiment analysis using Attention Mechanism in Machine Learning and Deep	Priyanka Patil, Dr.Sunil Gupta	INDIAN JOURNAL OF TECHNICAL	48	1	132-138	NA	UGC Care

		Technology	Learning		EDUCATION					
73	JP202425_ME_1	Department of Mechanical Engineering	Biodiesel Blends: A Sustainable Solution for Diesel Engine Performance Improvement	Kurhade A.S.;Siraskar G.D.;Chekuri R.B.R.;Murali G.;Pawar P.;Patil A.R.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	3	839-847	10.18311/jmmf/2025/47628	Scopus,
74	JP202425_ME_2	Department of Mechanical Engineering	Impact of PCM on Heat Dissipation from IC Chips	Kurhade A.S.;Siraskar G.D.;Deshmukh M.T.;Patil P.A.;Chaudhari S.S.;Kadam A.A.;Dolas A.S.;Mahajan R.G.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	3	717-724	10.18311/jmmf/2025/47522	Scopus,
75	JP202425_ME_3	Department of Mechanical Engineering	Investigating the Impact of Oxygenated Additives on Exhaust Emissions from Unleaded Gasoline Vehicles	Kurhade A.S.;Siraskar G.D.;Raut P.N.;Dolas A.S.;Murali G.;Dalvi S.A.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	2	333-344	10.18311/jmmf/2025/47410	Scopus,
76	JP202425_ME_4	Department of Mechanical Engineering	Passive Cooling of EV Batteries Using Phase Change Material: A Simulation Study	Kurhade A.S.;Siraskar G.D.;Dalvi S.A.;Kharat P.V.;Jadhav N.A.;Shelkande V.D.;Murali G.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	2	447-454	10.18311/jmmf/2025/47368	Scopus,
77	JP202425_ME_5	Department of Mechanical Engineering	Simulation and analysis of heat transfer in counter-flow helical double-pipe heat exchangers using CFD	Kurhade A.S.;Siraskar G.D.;Bhambare P.S.;Murali G.;Deshpande S.V.;Warke	International Journal of Modern Physics C	73	2	-	10.1142/S0129183125500433	Scopus,

				P.S.;Waware S.Y.						
78	JP202425_ME_6	Department of Mechanical Engineering	Turbulence model comparison and optimal geometry identification in trapped vortex combustors: A RANS-based study	Siraskar G.D.;Kurahde A.S.;Murali G.;Prakash M.A.;Bharathiraja N.;Dharmadhikari D.D.;Waware S.Y.	International Journal of Modern Physics C	73	2	-	10.1142/S0129183126500208	Scopus,
79	JP202425_ME_7	Department of Mechanical Engineering	Enhancement in Heat Transfer with Nanofluids in Double-Pipe Heat Exchangers	Kurahde A.S.;Siraskar G.D.;Darade M.M.;Murali G.;Katkar T.R.;Patil S.P.;Charwad G.A.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	1	165-172	10.18311/jmmf/2025/47225	Scopus,
80	JP202425_ME_8	Department of Mechanical Engineering	Failure Investigation of the Driving Shaft in an Industrial Paddle Mixer	Chougule S.M.;Murali G.;Kurahde A.S.	Journal of Mines Metals and Fuels	73	5	1247-1256	10.18311/jmmf/2025/48627	Scopus,
81	JP202425_ME_9	Department of Mechanical Engineering	Finite Element Analysis and Design Optimization of a Paddle Mixer Shaft	Chougule S.M.;Murali G.;Kurahde A.S.	Journal of Mines Metals and Fuels	73	5	1343-1354	10.18311/jmmf/2025/48664	Scopus,
82	JP202425_ME_10	Department of Mechanical Engineering	Harnessing the Power of Plastic Waste: A Sustainable Approach to Fuel Production	Kurahde A.S.;Kharat P.V.;Chougule S.M.;Darade M.M.;Karad M.M.;Murali G.;Charwad G.A.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	2	467-473	10.18311/jmmf/2025/47354	Scopus,
83	JP202425_ME_11	Department of Mechanical Engineering	Dynamic simulation and performance evaluation of vibratory bowl feeders integrated with paddle shaft	Chougule S.M.;Murali G.;Kurahde A.S.	Advances in Science and Technology Research Journal	19	7	179-196	10.12913/22998624/203873	Scopus,

			mechanisms							
84	JP202425_ME_12	Department of Mechanical Engineering	Green Adsorbents for Heavy Metal Removal: A Study on Zinc Ion Uptake by <i>Tinospora cordifolia</i> Biocarbon	Raut P.N.;Dolas A.S.;Chougule S.M.;Darade M.M.;Murali G.;Waware S.Y.;Kurhade A.S.	Journal of Mines Metals and Fuels	73	1	21-25	10.18311/jmmf/2025/47121	Scopus,
85	JP202425_ME_13	Department of Mechanical Engineering	Integrated Approach to Enhance Vehicle Safety: A Novel Bumper Design with Energy-Absorbing Mechanisms	Kurhade A.S.;Chougule S.M.;Kharat P.V.;Kondhalkar G.E.;Murali G.;Raut P.N.;Charwad G.A.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	73	1	27-35	10.18311/jmmf/2025/47168	Scopus,
86	JP202425_ME_14	Department of Mechanical Engineering	Experimental study on performance of diesel engines operating under different fuel injection pressures using Calophyllum methyl ester with and without doping of nickel-oxide	Bawane R.K.;Gadge N.B.;Bawane D.K.;Gadge P.B.	International Journal of Ambient Energy	46	1	---	10.1080/01430750.2025.2531973	Scopus,
87	JP202425_ME_15	Department of Mechanical Engineering	Enhancing Smartphone Circuit Cooling: A Computational Study of PCM Integration	Kurhade A.S.;Siraskar G.D.;Bhambare P.S.;Kaithari D.K.;Dixit S.M.;Waware S.Y.	Journal of Advanced Research in Numerical Heat Transfer	27	1	132-145	10.37934/arnht.27.1.132145	Scopus,
88	JP202425_ME_16	Department of Mechanical Engineering	Computational Study on Thermal Management of IC Chips with Phase Change Materials	Kurhade A.S.;Bhambare P.S.;Siraskar G.D.;Dixit S.M.;Purandare P.S.;Waware S.Y.	Journal of Advanced Research in Numerical Heat Transfer	26	1	34-43	10.37934/arnht.26.1.3443	Scopus,

89	JP202425_ME_17	Department of Mechanical Engineering	Thermal Performance Analysis of Electronic Components on Different Substrate Materials	Kurhade A.S.;Gadekar T.;Siraskar G.D.;Jawalkar S.S.;Biradar R.;Kadam A.A.;Yadav R.S.;Dalvi S.A.;Waware S.Y.;Mali C.N.	Journal of Mines Metals and Fuels	72	10	1093-1098	10.18311/jmmf/2024/45569	Scopus,
90	JP202425_ME_18	Department of Mechanical Engineering	The Impact of Circular Holes in Twisted Tape Inserts on Forced Convection Heat Transfer	Kurhade A.S.;Siraskar G.D.;Jawalkar S.S.;Gadekar T.;Bhambare P.S.;Biradar R.;Yadav R.S.;Waware S.Y.;Mali C.N.	Journal of Mines Metals and Fuels	72	9	1005-1012	10.18311/jmmf/2024/45505	Scopus,
91	JP202425_ME_19	Department of Mechanical Engineering	Numerical Investigation on the Influence of Substrate Board Thermal Conductivity on Electronic Component Temperature Regulation	Kurhade A.S.;Siraskar G.D.;Bhambare P.S.;Dixit S.M.;Waware S.Y.	Journal of Advanced Research in Numerical Heat Transfer	23	1	28-37	10.37934/arnht.23.1.2837	Scopus,
92	JP202425_ME_20	Department of Mechanical Engineering	State-of-the-Art Cooling Solutions for Electronic Devices Operating in Harsh Conditions	Kurhade A.S.;Darade M.M.;Siraskar G.D.;Biradar R.;Mahajan R.G.;Kardile C.S.;Waware S.Y.;Yadav R.S.	Journal of Mines Metals and Fuels	72	8	843-861	10.18311/jmmf/2024/45374	Scopus,
93	JP202425_ME_21	Department of Mechanical Engineering	Optimizing Aerofoil Design: A Comprehensive Analysis of Aerodynamic Efficiency through CFD Simulations and Wind Tunnel Experiments	Kurhade A.S.;Siraskar G.D.;Kondhalkar G.E.;Darade M.M.;Yadav R.S.;Biradar R.;Waware	Journal of Mines Metals and Fuels	72	7	713-724	10.18311/jmmf/2024/45361	Scopus,

				S.Y.;Charwad G.A.						
94	JP202425_ME_22	Department of Mechanical Engineering	Predicting Heat Transfer Enhancement with Twisted Tape Inserts Using Fuzzy Logic Techniques in Heat Exchangers	Kurhade A.S.;Siraskar G.D.;Darade M.M.;Dhumal J.R.;Kardile C.S.;Biradar R.;Patil S.P.;Waware S.Y.	Journal of Mines Metals and Fuels	72	7	743-750	10.18311/jmmf/2024/45348	Scopus,
95	JP202425_ME_23	Department of Mechanical Engineering	Validation of effect of composite additive on optimized combustion characteristics of CI engine using AHP and GRA method	Patil A.R.;Patil S.A.;Patil R.;Pawar A.M.;Chougule V.N.;AboRas K.	Heliyon	10	15	-	10.1016/j.heliyon.2024.e34216	Scopus,
96	JP202425_ME_24	Department of Mechanical Engineering	A Comprehensive Evaluation of Recent Studies Investigating Nanofluids Utilization in Heat Exchangers	Waware S.Y.;Chougule S.M.;Yadav K.H.;Kardekar N.B.;Nimbalkar A.G.;Kurhade A.S.;Murali G.;Kore S.S.	Journal of Advanced Research in Fluid Mechanics and Thermal Sciences	119	2	160-172	10.37934/arfmts.119.2.160172	Scopus,

List of Conference Publication

Sr. No	Paper ID	Department	Author(s)	Conference Paper Title	Conference Name	volume	Page No	International/National	DOI	Date of Conference (Month-Year)	Location of Conference	Indexing
1	CP202425_AS_1	Department of Applied Sciences and Humanities	Mr.Ramdas P.Jare	Netflix Recommendation System by Genre Categories Using Machine Learning	2025 3rd International Conference on Device Intelligence, Computing and Communication Technologies (DICCT)	1	1-5	International	https://ieeexplore.ieee.org/document/10986657/authors#authors	21-22 March 2025	Dehradun, India	Scopus,
2	CP202425_AS_2	Department of Applied Sciences and Humanities	Deepshikha Shrivastava	Artificial Neural Network and Regression Analysis Techniques for Campus Load Forecasting	2024 4th Asian Conference on Innovation in Technology (ASIANCON)	-	1-10	International	https://doi.org/10.1109/ASIANCON62057.2024.10837798	23-24 AUG 2024	Pune	Scopus,
3	CP202425_AS_3	Department of Applied Sciences and Humanities	Ghutepatil P.R.;Khapare S.;Joshi R.B.;Maniyar K.G.	A critical review of nanotechnology in various fields of engineering	Aip Conference Proceedings	3149	1-10	International	https://doi.org/10.1063/5.0224984	9-10 October 2023	Bikaner	Scopus,
4	CP202425_AS_4	Department of Applied Sciences and Humanities	Dr Jyothi Ramesh Pai	The Human Side Of Technology: AI's Social Impact On Engineering Students,	SALT Chronicle of English Language and Literature	1	9-14	National	https://saltedu.in/index.php	1/1/2024	Chennai	NA
5	CP202425_CI_1	Department of Civil Engineering	Dhawale A.W.;Tiwari H.U.;Bobade S.S.;Sabale R.S.	Correlation Study Between Water Yield and Consumptive Use by SWAT Model: A Case Study of Darewadi, Maharashtra	Lecture Notes in Civil Engineering	397 LNCE	217-228	International	10.1007/978-981-97-7467-8_14	21-23 December	Warangal, India	Scopus,
6	CP202425_CI_2	Department of Civil Engineering	Bobade S.S.;Tiwari H.U.;Dhawale	Impact of LULC on Hydrological Settings of Savitri	Lecture Notes in Civil Engineering	397 LNCE	199-216	International	10.1007/978-981-97-7467-8_13	21-23 December	Warangal, India	Scopus,

			A.W.;Sabale R.S.	River Watershed at Raigad, Maharashtra Using SWAT Model								
7	CP202425_CL_3	Department of Civil Engineering	Sabale R.;Bobade S.;Dhawale A.;Narwade R.;Tiwari H.	Application of the Arc-SWAT Model to Assess Climate Change and Land Use/Cover Change Impacts on Water Balance Components of the Pawana River Basin, Maharashtra	Lecture Notes in Civil Engineering	410 LNCE	79-96	International	10.1007/978-981-97-7474-6_7	21-23 December	Warangal, India	Scopus,
8	CP202425_CL_4	Department of Civil Engineering	Babu U.R.;Kumar A.;Sharma A.K.;Ramesh K.;Kirubakaran D.;Chavan C.S.	An Efficient Method for Bridge Condition Assessment from Dynamic Response of a Passing Vehicle Based on KNN-SVM Approach	3rd IEEE International Conference on Data Science and Network Security Icdsns 2025	-	-	International	10.1109/ICDSNS65743.2025.11168710	25th July, 2025	Titur, karnataka	Scopus,
9	CP202425_CL_5	Department of Civil Engineering	Chipade A.M.;Chavan C.;Nerlekar T.;Barkale A.D.;Mane C.P.	Impact of Climate Variability on Crop Yield in Pune District: A Comprehensive Study	E3s Web of Conferences	559	-	International	10.1051/e3sconf/202455901012	19 – 20, December 2024.	DPU, Pune	Scopus,
10	CP202425_CO_1	Department of Computer Engineering	Kollu A.;Raparathi M.;Dodda S.B.;Maruthi S.;Bhatt M.N.	Performance Analysis of Medical Image Fusion Using Wavelet Technique	Lecture Notes in Networks and Systems	1172 LNNS	37-49	International	10.1007/978-981-97-8631-2_3	Oct, 2025	Online	Scopus,
11	CP202425_CO_2	Department of Computer Engineering	Kareemullah H.;Quraishi A.;Prashant G.C.;Shabaz M.;Kollu A.;Sandhu M.	Combination kernel support vector machine based digital twin model for prediction of dyslexia in	Next Generation Computing and Information Systems Proceedings of the 2nd International Conference on Next	-	33-40	International	10.1201/9781003466383-9	Oct, 2024	Jammu, J&K, India	Scopus,

				distributed environment	Generation Computing and Information Systems Icngcis 2023							
12	CP202425_CO_3	Department of Computer Engineering	Govind Suryawanshi; Soham Patil; Krishna Sharma; Aditya Gore; Amey Joshi	Advanced Stealth Protection for Android Devices	International Conference on Signal Processing, Communication, Power and Embedded System (SCOPEs)	-	-	International	10.1109/SETCOM64758.2025.10932378	23.02.2025	Gandhinagar, India	Scopus,
13	CP202425_CO_4	Department of Computer Engineering	Minal Bodke; Vishnu Tiwari; Jayesh Wadhvani; Trapti Gorbade; Rohan Soundane	A Review of Various Deep Learning Approaches for Placement Prediction	2025 International Conference on Machine Learning and Autonomous Systems (ICMLAS)	-	-	International	10.1109/ICMLAS64557.2025.10968796	10-12 March 2025	Prawet, Thailand	Scopus,
14	CP202425_CO_5	Department of Computer Engineering	Shivganga Gavhane, Chaitanya Nerkar, Pratik Patil, Tejas Varpe, Karan Vadenere	Malware Detection using Machine Learning Models for Static and Dynamic Analysis	1st International Conference on Emerging Technologies and Computing (ICETC - 2025),	1	212-215	International	NA	06/02/2025 and 07/02/2025	PCCOER	NA
15	CP202425_CO_6	Department of Computer Engineering	Mrs.Vaishali C.Kulloli, Aalisha Kureshi, Swaraj Panjabi, Harsh Patil, Sneha Kamble	Iris Liveness Detection For Biometric Authentication Using Convolutional Neural Network: VGG16.	1st International Conference on Emerging Technologies and Computing (ICETC - 2025),	1	293-300	International	NA	06/02/2025 and 07/02/2025	PCCOER	NA
16	CP202425_CO_7	Department of Computer Engineering	Golande A.;Kotkar V.A.;Bhosale A.U.;Mulay	Securing Smart Irrigation Systems with Rust and Bytebeam	Lecture Notes in Networks and Systems	1254	19-27	International	10.1007/978-981-96-1744-9_3	12-13 Sept, 2024	Bangkok, Thailand	Scopus,

			S.;Rai S.;Gadam L.;Patil N.										
17	CP202425_CO_9	Department of Computer Engineering	Bhoyar K.;Patil S.	Generative AI for Revolutionizing Personal Style	2025 1st International Conference on Aimi Applications for Engineering and Technology Icaet 2025	-	1-6	International	10.1109/ICAET63349.2025.10932201	45658	Pune, India	Scopus,	
18	CP202425_CO_10	Department of Computer Engineering	Seema Darekar, Prachi Nilekar	A Machine Learning Approach for Bug or Error Prediction using Cat-Boost Algorithm	International Conference for Emerging Technology (INCET)	-	-	International	https://doi.org/10.1109/INCET64471.2025.11140996	45778	BELGAUM, India	NA	
19	CP202425_CO_11	Department of Computer Engineering	Mudholkar R.R.;Srivastava K.;Ahammed J.;Tajne N.;Anap S.;Kavitha R.	Image Captioning Using Deep Learning: Bridging the Gap between Vision and Natural Language Processing	2025 International Conference on Pervasive Computational Technologies Icpct 2025	-	880-884	International	10.1109/ICPCT64145.2025.10939244	08-09 February 2025	Greater Noida, India	Scopus,	
20	CP202425_CO_13	Department of Computer Engineering	Rutuja Magar	Image Captioning With Convolution Neural Network	ICETC-2025	1	244-248	International	NA	06/02/2025 and 07/02/2025	PCCOER	NA	
21	CP202425_CO_14	Department of Computer Engineering	Rutuja Magar	PathLex AI: A Fairness-Driven Architecture for Intelligent Career Guidance	ICETC-2025	1	82-90	International	NA	06/02/2025 and 07/02/2025	PCCOER	NA	
22	CP202425_CO_15	Department of Computer Engineering	Lunawat S.;Rao J.;Patil P.	ASBO-MAT-BiLSTM: Social Media Network Anomaly Detection using Optimized Multihead Attention Transformer based Model	3rd International Conference on Intelligent Data Communication Technologies and Internet of Things Idciot 2025	-	2209-2216	International	10.1109/IDCIOT64235.2025.10915016	05-07 February 2025	Bengaluru, India	Scopus,	

23	CP202425_CO_16	Department of Computer Engineering	Rathod V.U.;Nandgoanekar V.;Dhawas N.;Mali Y.K.;Chaudhari H.;Patil D.	Smart Traffic Light Management System Using IoT and Deep Learning	Communications in Computer and Information Science	2439 CCIS	87-96	International	10.1007/978-3-031-88759-8_9	20 Oct, 2023	kanpur	Scopus,
24	CP202425_CO_17	Department of Computer Engineering	Minal Bodke,Sangita Chaudhari	Remote Sensing Image Watermarking using Archimedes Optimization Algorithm and Discrete Cosine Transform,	IGARSS 2024 - 2024 IEEE International Geoscience and Remote Sensing Symposium	-	-	International	10.1109/IGARSS53475.2024.10640914	07-12 July 2024	Athens, Greece	Scopus,
25	CP202425_CO_18	Department of Computer Engineering	Minal Bodke Pranav Tiwari,Sushant Gurav; Soham Deshpande; Rohit Bagal	A review paper on various image security techniques Available to Purchase	2ND INTERNATIONAL CONFERENCE ON TRENDS IN MATERIAL SCIENCE AND MANUFACTURING ENGINEERING (ICTMSME2024)	-	-	International	https://doi.org/10.1063/5.0239141	6-7 April 2024	Nagpur, India	Scopus,
26	CP202425_CO_19	Department of Computer Engineering	Swati Nikam, santosh chobe, singh, dhyagude, Raheja , dixit	Music Player system using Real time Facial Expression Detection	IEEE Proceedings - ICCUBE24	reshma jadhav	-	International	-	23-24 August 2024	Pune, India	NA
27	CP202425_CO_20	Department of Computer Engineering	Mrs.V.C.Kulloli ,Maheshwari Biradar, Rahul Sharma, Bahubali Shiragapur	“Iris Liveness detection using SIFT, SURF and SVM with Quality Metrics for Biometric Authentication”	ICCUBE24	-	-	International	10.1109/ICCUBE24.2024.10774822	23/08/2024 and 24/08/2024	PCCOE	Scopus,
28	CP202425_CO_21	Department of Computer Engineering	Chaudhari D.;Dhaygude R.;Mulani	Onion Crop Cultivation & Prediction of Yields	2024 2nd International Conference	NA	244-249	International	10.1109/ICAICCIT64383.2024.10912135	28-29 November 2024	Faridabad, India	Scopus,

			U.;Rane P.;Khalate Y.;Borate V.	by Machine Learning	Advances in Computation, Communication and Information Technology (ICAICCIT)							
29	CP202425_CO_22	Department of Computer Engineering	Shrinika Inamdar, Apurva Talekar	CNN for medicinal plant identification: A comprehensive review	2nd International Conference On Trends In Material Science And Manufacturing Engineering (ICTMSME2024)	3214	-	International	https://doi.org/10.1063/5.0239056		GH Raisoni	Scopus,
30	CP202425_ETC_1	Department of Electronics and Telecommunication Engineering	Deshmukh A.;Khan A.;Patil V.;Bhangale K.	FPGA Implementation for Speech Feature Extraction in Real Time	2025 International Conference on Computing Technologies Icoct 2025	-	-	International	10.1109/ICOCT64433.2025.11118733	13-14 June 2025	Bengaluru, India	Scopus,
31	CP202425_ETC_2	Department of Electronics and Telecommunication Engineering	Deshmukh A.;Khan A.;Patil V.;Bhangale K.	Real Time FPGA Implementation for Speech Feature Extraction	2025 6th International Conference for Emerging Technology Incet 2025	-	-	International	10.1109/INCET64471.2025.11140105	23-25 May 2025	Bengaluru, India	Scopus,
32	CP202425_ETC_3	Department of Electronics and Telecommunication Engineering	Gaikwad A.;Narawade G.;Sable S.;Mapari R.;Kawade R.;Bhangale K.	6 Degree of Freedom Robotic-Arm Using Gesture Control	2025 International Conference on Computing Technologies Icoct 2025	-	-	International	10.1109/ICOCT64433.2025.11118735	13-14 June 2025	Bengaluru, India	Scopus,
33	CP202425_ETC_4	Department of Electronics and Telecommunication Engineering	Kawade R.;Kale A.;Chalmeti S.;Mapari R.	Sortify- An Autonomous Voice Controlled 6 DOF Robotic Arm for Object Detection And Sorting	2025 5th International Conference on Intelligent Technologies Conit 2025	-	-	International	10.1109/CONIT65521.2025.11167579	20-22 June 2025	HUBBAL I, India	Scopus,
34	CP202425_ETC_5	Department of Electronics	Andhare M.;Dhoble	Implementation of Central Gateway	2025 International Conference on	-	-	International	10.1109/ICOCT64433.2025.11118488	13-14 June	Bengaluru, India	Scopus,

		and Telecommunication Engineering	P.R.;Patil S.A.;Naik I.M.;Pathrikar V.	with SOME/IP	Computing Technologies Icoct 2025					2025		
35	CP202425_ETC_6	Department of Electronics and Telecommunication Engineering	Badgujar V.;Panse A.;Mohite M.;Bedse S.;Lanjulkar P.;Kumbhar V.;Tekade A.;Andhare M.	Sustainable Agriculture Using Machine Learning and IoT	2024 15th International Conference on Computing Communication and Networking Technologies Iccent 2024	-	-	International	10.1109/ICCCNT61001.2024.10725625	24-28 June 2024	Kamand, India	Scopus,
36	CP202425_ETC_7	Department of Electronics and Telecommunication Engineering	Dr. Dipali Shende	Whether Monitoring and Analysis Using GUI	ConvergenceX:Unitin g the World Through IoT and AI Innovation	-	-	International	-	April, 2024	PCCOER, Pune	NA
37	CP202425_ETC_8	Department of Electronics and Telecommunication Engineering	Dipali Kedar Shende, Vaishali Baste, Shital More	Commercial Automation Using RTOS-Based Architecture	ConvergenceX:Unitin g the World Through IoT and AI Innovation	-	-	International	-	April, 2024	PCCOER, Pune	NA
38	CP202425_ETC_9	Department of Electronics and Telecommunication Engineering	Adke P.;Kushwaha A.K.;Khatavkar S.M.;Shende D.	Use of Improved Generative Adversarial Network (GAN) Under Insufficient Data	Lecture Notes of the Institute for Computer Sciences Social Informatics and Telecommunications Engineering Lnicst	536	288-299	International	10.1007/978-3-031-48888-7_24	April 5–7, 2024	Bhimavaram, India,	Scopus,
39	CP202425_ETC_10	Department of Electronics and Telecommunication Engineering	Bhangale K.;Kadam S.;Chame S.;Saklikar H.	Machine Learning Based Heart Disease Prediction Using ECG Image	2024 5th International Conference for Emerging Technology Incet 2024	-	-	International	10.1109/INCET61516.2024.10593572	24-26 May 2024	Belgaum, India	Scopus,
40	CP202425_ETC_11	Department of Electronics and	Raghupathy M.;Salunkhe S.;Dhende	Neural Stress Mapping with Machine Learning	Communications in Computer and Information Science	2234 CCIS	56-71	International	10.1007/978-3-031-74682-6_5	14 June, 2024	Navi Mumbai, India	Scopus,

		Telecommunication Engineering	S.;Bhangale K.;Dhake D.	from EEG Data								
41	CP202425_ETC_12	Department of Electronics and Telecommunication Engineering	Dharmadhikari S.;Raina A.;Chaskar S.;Bhangale K.;Mogal A.;Awasarmol P.;Bhatkar M.;Mapari R.	Smart IoT Based Real Time Crop Monitoring and Spectrum Management for Hydroponic System	2024 4th Asian Conference on Innovation in Technology Asiancon 2024	-	-	International	10.1109/ASIANCON62057.2024.10838172	23-25 August 2024	Pimari Chinchwad, India	Scopus,
42	CP202425_ETC_13	Department of Electronics and Telecommunication Engineering	Shete A.;Gupta A.;Waghumbare A.;Singh U.;Dhamale T.;Napte K.	Human Activity Prediction Using Generative Adversarial Networks	2024 15th International Conference on Computing Communication and Networking Technologies Iccent 2024	-	-	International	10.1109/ICCCNT61001.2024.10726013	24-28 June 2024	Kamand, India	Scopus,
43	CP202425_ETC_14	Department of Electronics and Telecommunication Engineering	Sital P.S.;Chavan S.;Borse K.;Singh R.K.;Shukla S.;Dhamale T.;Napte K.	Compact and Planar Sinuous Antenna operating in the Wide Band Frequency Range	2024 4th Asian Conference on Innovation in Technology Asiancon 2024	-	-	International	10.1109/ASIANCON62057.2024.10838051	23-25 August 2024	Pimari Chinchwad, India	Scopus,
44	CP202425_ETC_15	Department of Electronics and Telecommunication Engineering	Pagare A.;Shewalkar S.;Yadav S.;Dhake D.	Simulation and Analysis of Solar-Powered Electric Golf Cart	2024 4th Asian Conference on Innovation in Technology Asiancon 2024	-	-	International	10.1109/ASIANCON62057.2024.10837826	23-25 August 2024	Pimari Chinchwad, India	Scopus,
45	CP202425_ETC_16	Department of Electronics and Telecommunication Engineering	Pagare A.;Shewalkar S.;Yadav S.;Dhake D.	Comprehensive Analysis of Solar-Powered Electric Carts	2024 IEEE 3rd International Conference on Electrical Power and Energy Systems Icepes 2024	-	-	International	10.1109/ICEPES60647.2024.10653569	21-22 June 2024	Bhopal, India	Scopus,
46	CP202425_ETC_17	Department of Electronics	Adke P.;Kushwaha	Enlighten GAN for Super-Resolution	Lecture Notes of the Institute for Computer	536	433-445	International	10.1007/978-3-031-48888-7_37	April 5–7, 2024	Bhimavaram, India,	Scopus,

		and Telecommunication Engineering	A.K.;Kshirsagar P.;Hadawale M.;Gaikwad P.	Images from Surveillance Car	Sciences Social Informatics and Telecommunications Engineering Lnicst							
47	CP202425_ ETC_18	Department of Electronics and Telecommunication Engineering	Rajput P.J.;Bhandari S.U.;Khurge D.	Design of Spin- FET Electrical Model for Basic Gates	VLSI Sata 2024 4th IEEE International Conference on VLSI Systems Architecture Technology and Applications	-	-	International	10.1109/VLSISATA61 709.2024.10560268	17-18 May 2024	Bangalore , India	Scopus,
48	CP202425_I T_1	Department of Information Technology	Swati Nikam, santosh chobe, singh, dhyagude, Raheja , dixit	Music Player system using Real time Facial Expression Detection	IEEE Proceeedings - ICCUBEA24	-	-	International	-	23rd & 24th August 2024	Telangana , India	NA
49	CP202425_ ME_18	Department of Mechanical Engineering	Chaudhari Sujit B. Wakchaure Vishnu D.	A Comprehensive Review on the High-Temperature Behavior of Additively Manufactured Inconel 718	Lecture Notes in Mechanical Engineering	1	'439-- 524 '	International	10.1007/978-981-97- 6016-9_34	4-6 March, 2024	Warangal, India	NA

List of Book Chapter Publication

Sr.No	ID	Department	Title	Author(s)	Corresponding Author	Book Chapter	Volume	Pages	DOI	Scopus Indexed
1	BC202425_AS_1	Department of Applied Sciences and Humanities	Dynamic Modeling of PV-Battery Nanogrid for Both Islanded	Amita Mane, Shamik Chatterjee, Amol Kalage	Amita Mane, Shamik Chatterjee, Amol Kalage	: Lecture Notes in Electrical Engineering ((LNEE, volume 1302))	1302	29-42	10.1007/978-981-96-0089-2_3	Scopus
2	BC202425_CI_1	Department of Civil Engineering	Innovation methodologies and techniques applied in green construction through sustainable waste materials	Dr. Sahil S. Salvi	M. Mathiyarasi, Kottana Santhosi, M. Ramarao & Arti Chouksey	Innovations in Energy Efficient Construction Through Sustainable Materials	-	129-157	10.4018/979-8-3693-3398-3.ch006	Scopus
3	BC202425_CI_2	Department of Civil Engineering	Agricultural Innovations Using 5G and IoT for Precision Farming Smart Irrigation and Sustainable Agriculture Practices	Mr.Chetan S Chavan, Dr. Rajeshwar Goud Jangampally	-	5G and IoT for Next Generation Connectivity through Enhanced Network Performance and Seamless Integration	NA	392-428	10.71443/9788197933639-12	NA
4	BC202425_CO_1	Department of Computer Engineering	Social Media Analysis for Business Development using GenAI	Sonali Lunawat, Aman Kocharekar, Ishan Honmode, Ashwin Lavate, Pushkar Sarda	Sonali Lunawat	Frontiers of Innovation	NA	55	-	NA
5	BC202425_CO_2	Department of Computer Engineering	Edge computing: A guide to achieving sustainable living	Gawande M.V.;Hange S.S.;Tandale	Gawande M.V	Machine Learning for Environmental Monitoring in	NA	93-128	10.4018/979-8-3693-3940-4.ch005	Scopus

				M.M.;Kollu A.		Wireless Sensor Networks				
6	BC202425_CO_3	Department of Computer Engineering	Blockchain-Based Secure Digital Twin Framework for Smart Healthy City	Sneha Kanawade, Suvarna Patil, Shivganga Gavhane, Nalini S. Jagtap, Amit Bhanushali	Sneha Kanawade	Digital Twin and Blockchain for Smart Cities	NA	1-15	https://doi.org/10.1002/9781394303564.ch8	Scopus
7	BC202425_CO_4	Department of Computer Engineering	AI-Driven Approach for Optimal Soil-Based Crop Recommendations	Suvarna Patil, Deepali Hajare, Shivganga Gavhane, Nayan Panchal, Sahil Shelke & Aditya Nikam	Suvarna Patil	Lecture Notes in Networks and Systems ((LNNS,volume 1201)	1201	221-238	https://link.springer.com/chapter/10.1007/978-981-97-9839-1_14	Scopus
8	BC202425_ETC_1	Department of Electronics and Telecommunication Engineering	EEG Features Selection by Using Tasmanian Devil Optimization Algorithm for Stress Detection	Dipali Dhake	Evolutionary Artificial Intelligence	Algorithms for Intelligent Systems	245–257	245-257	10.1007/978-981-99-8438-1_18	NA
9	BC202425_IT_1	Department of Information Technology	Blockchain-Based Secure Digital Twin Framework for Smart Healthy City	Sneha Kanawade, Suvarna Patil, Shivganga Gavhane, Nalini S. Jagtap, Amit Bhanushali	Sneha Kanawade	Digital Twin and Blockchain for Smart Cities	NA	1-10	https://doi.org/10.1002/9781394303564.ch8	Scopus

List of Book Publication

Sr. No	Book ID	Department	Name of the Author	Title of the book/chapters published	National / International	ISBN/ISSN number of the proceeding	Name of the publisher
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1	BO202425_AS_1	Department of Applied Sciences and Humanities	Mr. Tushar Gaikwad	Engineering Chemistry	National	978-93-5563-828-1	TechKnowledge
2	BO202425_AS_2	Department of Applied Sciences and Humanities	Mr. Shital Anant Patil	Engineering Mathematics I (2024Pattern)	National	9789360000000	Technical Publication
3	BO202425_AS_3	Department of Applied Sciences and Humanities	Mr. Shital Anant Patil	Engineering Mathematics II (2024Pattern)	National	9789360000000	Technical Publication
5	BO202425_AS_4	Department of Applied Sciences and Humanities	Mr. Tushar Gaikwad	Admission Book	National	978-81-937647-5-6	PCCOE&R
6	BO202425_AS_5	Department of Applied Sciences and Humanities	Priya Oghe	Engineering Physics	National	978-93-5563-602-7	TechKnowledge
7	BO202425_CI_1	Department of Civil Engineering	Dr.M.M.Yeole	Performance Of Concrete With Waste Paper Steel Fiber& Carbon Fiber	National	978-62-06779-62-9	Lambert Publication
8	BO202425_CO_1	Department of Computer Engineering	Archana Chaugule, Archana Kollu and Vaishali Latke	Frontiers of Innovation: Exploring Emerging Technologies and Computing	International	978-81-973215-9-7	JPI
9	BO202425_CO_2	Department of Computer Engineering	Dr. Vijay Kotkar	Data Science and Analytics Tools and Techniques	National	9789360000000	CiiT Publications
10	BO202425_CO_3	Department of Computer Engineering	Sonali Lunawat,Ashwini Bhavsar	Fundamentals of Programming Languages	International	978-93-5563-871-7	TechKnowledge Publication
11	BO202425_ETC_1	Department of Electronics and Telecommunication	Dr. Dipali K. Shende	Machine Learning	International	978-93-6674-194-9	Scientific International Publishing House
12	BO202425_ETC_2	Department of Electronics and Telecommunication	Dr. Dipali K. Shende	Computer Based Optimization	International	978-93-7128-268-0	Global Scholars Press
13	BO202425_ETC_3	Department of Electronics and Telecommunication	Mrs.Maithili Shailesh Andhare	Microprocessor and Microcontrollers	International	978-93-6674-925-9	Scientific International Publishing House
14	BO202425_ME_1	Department of Mechanical Engineering	Dr. Rahul Krishnaji Bawane	A Course of National Board of Accreditation (NBA)-	International	ISBN-978-9362524386	Amazon Kindle

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 Nanyang Technological University, Singapore
 Sujata Alegavi,
 University of Mumbai, India
 Neha Kapadia,
 University of Mumbai, India

*CORRESPONDENCE
 Deepshikha Shrivastava
 ✉ shrivastavadeepshikha@gmail.com

[†]These authors have contributed equally to this work

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Internet of things driven hybrid neuro-fuzzy deep learning building energy management system for cost and schedule optimization

Deepshikha Shrivastava^{1,2*†} and Prerna Goswami^{2†}

¹Applied Science Department-Electrical, Pimpri Chinchwad College of Engineering and Research, Pune, India, ²General Engineering Department-Electrical, Institute of Chemical Technology, Mumbai, India

Optimizing building energy consumption holds significant untapped potential, particularly in a developing economy such as India. Existing solutions have yet to concentrate on a methodology that is cost-effective, small-scale, precise, and open source data-driven. In response, we have implemented an automated, DL-enabled approach to predict energy consumption with the goal to enable cost and schedule optimization. For two years from December 2021 to December 2023 the energy consumption and twenty seven associated energy parameters was monitored by developing an IoT enabled BEMS. The data collected was preprocessed, cleaned, transformed and used for training a machine learning model. Based on the previous literature, a hybrid DL model was developed using artificial neural networks and fuzzy logic by integrating fuzzy layers in the deep neural architecture. The collected electrical data was used for training, hyper-parameter tuning and testing the hybrid DL model. The proposed model when tested for out-of-sample dataset had comparable results on error and performance metrics as compared to other states of the art models. On deployment in the premises of a university, the BEMS achieved a reduction in the electricity bill of 20% highlighting its effectiveness and efficacy.

KEYWORDS

electricity disaggregation, internet of energy, energy consumption monitoring, DL, building energy management system

1 Introduction

Buildings account for 33% of the final energy usage and contributing to 40% of both direct and indirect CO₂ emissions worldwide (Nabavi et al., 2021). This makes monitoring electricity consumption and the cost and task optimization, a crucial focus area in energy management and conservation (Abu-Shikhah et al., 2011). Cost and task optimization involves organizing the high energy consuming activities during off-peak hours. It also involves fixing the voltage, current, apparent power and phase parameters to their optimal values to achieve energy savings. Numerous studies have investigated the implementation of Arduino Uno for monitoring electricity consumption for cost and task optimization (Adepoju et al., 2007). There has been a notable increase in interest toward employing data science along with machine learning (ML) and DL techniques, including supervised and unsupervised methodologies, to optimize consumption patterns of micro, small, and medium enterprises (MSME) (Liu et al., 2019). Electricity optimization systems are advantageous because they deliver real-time data on energy usage, thereby enhancing energy efficiency and reducing



CROSSING BORDERS: NARRATIVES OF MIGRATION, EXILE, AND IDENTITY IN CONTEMPORARY FICTION

DR. KUNDA RAUL,
DR. SHIVAJI CHAVAN

1. Pimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India
2. Pimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India

ABSTRACT

*Migration, exile, and displacement remain central concerns of contemporary world literature, reflecting the complexities of globalization, transnationalism, and the human consequences of political, economic, and environmental crises. This research explores how literary narratives negotiate these experiences through texts like Chimamanda Ngozi Adichie's *Americanah* (2013), Jhumpa Lahiri's *The Namesake* (2003), Mohsin Hamid's *Exit West* (2017), alongside brief engagements with Abdulrazak Gurnah's *By the Sea* (2001) and Valeria Luiselli's *Lost Children Archive* (2019). These works collectively interrogate the intersection of migration with themes of identity, belonging, cultural memory, trauma, and the politics of borders. Using postcolonial theory, diaspora studies, and transnational literary criticism, this article argues that contemporary fiction offers vital insight into the personal and collective transformations produced by migration and displacement.*

Introduction

Migration narratives have always been central to literature, but in the contemporary era of mass displacement, globalization, and rising anti-immigration sentiment, they have taken on heightened urgency and visibility. Migration, whether forced or voluntary, permanent or temporary, fundamentally disrupts established notions of home, identity, and belonging. Literature captures these disruptions by tracing how characters navigate cultural liminality, adapt to new environments, and grapple with the psychological and existential uncertainties of exile.

Critics such as Edward Said and Homi Bhabha have long emphasized that exile and displacement produce fractured identities, hybrid subjectivities, and new forms of cultural negotiation (Said 176; Bhabha 4). Stuart Hall's articulation of identity as fluid, fragmented, and constructed through history and representation aligns with the concerns of contemporary migrant narratives (Hall 223). These theoretical frameworks help illuminate the complex negotiations of identity and belonging in the texts under study.

Through detailed readings of *Americanah*, *The Namesake*, *Exit West*, *By the Sea*, and *Lost Children Archive*, this article demonstrates how migration literature reflects both the personal and political dimensions of crossing borders. These works reveal how migration transforms

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**ENGINEERING THE MIND, HUMANIZING THE MACHINE:
TEACHING ENGLISH LITERATURE TO ENGINEERING
UNDERGRADUATES**

**DR. SHIVAJI CHAVAN,
DR. KUNDA RAUL**

1. Pimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India
2. Pimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India

ABSTRACT

The increasing complexity of technological development in the 21st century requires a parallel evolution in engineering education—one that transcends technical expertise to include ethical reasoning, critical thinking, and cultural empathy. This research article examines the role of English literature in cultivating these competencies among engineering undergraduates. Drawing upon pedagogical theory, global curricular models, industry reports, and interdisciplinary scholarship, the study argues that literature equips future engineers with reflective, communicative, and ethical skills necessary for human-centered innovation. By analyzing current academic practices, surveys, and case studies from institutions worldwide, the paper advocates for a redefined curriculum where literature plays a pivotal role in shaping the ethical and emotional intelligence of engineering students.

Introduction

Engineering has traditionally been regarded as a discipline rooted in logic, mathematics, and technical expertise. However, in an era dominated by artificial intelligence, biotechnology, and digital transformation, the boundaries between the technical and the human are increasingly blurred. Contemporary engineers must navigate not only complex systems but also ethical quandaries, cultural diversity, and the social impact of their innovations. Martha C. Nussbaum emphasizes in *Not for Profit: Why Democracy Needs the Humanities* that a purely technical education is insufficient for fostering the critical faculties required of responsible citizens and professionals (Nussbaum 7).

Literature, particularly English literature, plays a crucial role in developing the nuanced competencies engineers require in the modern world: empathy, ethical reflection, intercultural awareness, and communication. These skills align with the evolving expectations outlined in reports like the *World Economic Forum's Future of Jobs Report* (2021), which lists critical thinking, emotional intelligence, and creativity among the most essential future skills. Yet, within many engineering institutions, literature is marginalized or reduced to basic communication skills training. This paper argues for a more substantial integration of

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An Extensive Study of Nanomaterial and Nanotechnology in the Various Fields of Engineering

Aarti Jathar¹, Kamalkishor Maniyar^{1*}, Beena Nawghare¹, Saniya Ansari², Priti Ghute Patil³, Chaitalee Mali¹, Ramdas Biradar⁴, Swapnil Deshmukh¹, Sudhir Surase⁵ and Sandip Gaikar⁶

¹Dr. D. Y. Patil Institute of Technology, Pimpri, Pune – 411018, Maharashtra, India; kkmaniyar2020@gmail.com

²Ajeenkya DY Patil School of Engineering, Lohegaon, Pune – 411015, Maharashtra, India;

³Pimpri Chinchwad College of Engineering and Research, Ravet, Pune – 412101, Maharashtra, India

⁴Pimpri Chinchwad University, Pune – 412106, Maharashtra, India

⁵AISSMS College of Engineering, Pune – 411001, Maharashtra, India

⁶D. Y. Patil College of Engineering, Akurdi, Pune – 411044, Maharashtra, India

Abstract

The paper provides the overview benefits of applying nanotechnology in various fields, giving an update on the state of nanotechnology breakthroughs in electronics and communication engineering. This paper offers an overview of some of the most current developments in nanotechnology, encompassing a range of gadgets such as tiny transistors, paper batteries, robotics, networks, and wireless technologies. For this reason, it is anticipated that nanotechnology will make it possible to produce increasingly efficient, powerful, yet smaller and less expensive gadgets.

Keywords: Nanorobotics, Nanosensors, Paper Batteries, Transistors, Wireless Technology

1.0 Introduction

Studies of phenomena and material optimization at the atomic, molecular, and macromolecular scales where attributes are markedly different from those at higher scales are referred to as nanotechnology¹. Nanotechnology can alternatively be described as the study of structures with sizes ranging from 1 to 100 nm². Particularly in relation to computers, telecommunications, and optics, nanotechnology is drastically altering the field of electronics³. The real impetus behind nanotechnology research and uses has been, in a way, the miniaturization of electronics⁴. To develop new ICT (Information and Communication Technology) systems that are more affordable, compact, and dependable, the primary goal in this field

is to comprehend the laws and mechanisms present at the nanoscale⁵. Drug delivery is one area where nanotechnology is useful⁶. Most treatment-related adverse effects, including chemotherapy, are caused by drug delivery techniques that are not precise in identifying the target cells⁷. Because they react to chemicals more effectively than bigger iron particles, iron nanoparticles can be useful in cleaning up pollutants found in groundwater⁸. Carbon nanoparticles, such as nanotubes and buckyballs, are incredibly strong carbon particles made entirely of carbon⁹. The best example of how much stronger carbon nanotube-based bulletproof vests will be is a T-shirt-weighted carbon nanotube vest¹⁰. This is due to the unique properties of the bonds separating carbon atoms that give them strength¹¹. Many sunscreens contain nanoparticles of zinc oxide

*Author for correspondence

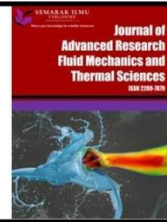


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Investigating the Effect of Heat Transfer Influenced by the Application of Wavy Corrugated Twisted Tape Inserts in Double Pipe Heat Exchangers

Anant Sidhappa Kurhade^{1,*}, Parimal Sharad Bhambare², Vijay Pandurang Desai³, Govindarajan Murali⁴, Rahul Shivaji Yadav⁵, Prashant Patil⁶, Tushar Gadekar⁵, Ramdas Biradar⁷, Swanand Kirpekar⁵, Girish Anant Charwad⁸, Shital Yashwant Waware¹

- ¹ Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune, 411018, Maharashtra, India
² Department of Mechanical and Industrial Engineering, College of Engineering, National University of Science and Technology, Muscat, Oman
³ Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, 412101, Maharashtra, India
⁴ Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt), 522502, Andhra Pradesh, India
⁵ Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune, 411052, Maharashtra, India
⁶ Department of Mechanical Engineering, Abhinav Education Society's College of Engineering and Technology, Satara, 412801, Maharashtra, India
⁷ School of Engineering & Technology, PCET's Pimpri Chinchwad University, Sate, 412106, Pune, Maharashtra, India
⁸ Department of Applied Art, Bharati Vidyapeeth's College of Fine Arts, Pune, 411043, Maharashtra, India

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ABSTRACT

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Keywords:

Heat transfer; heat exchanger; wavy twisted tape; turbulent; pressure drop; friction factor

This study investigates the heat transfer and friction factor characteristics in a heat exchanger utilizing copper wavy (corrugated) twisted tape inserts. By inducing turbulent flow within the inner tube of the heat exchanger, these inserts generated increased turbulence, thereby enhancing heat transfer and causing a rise in pressure drop. The copper twisted tapes, with various twist ratios (TR=10.7, 8.5, 7.1), measured 1 meter in length and 14 mm in width. The heat exchanger's outer tube was made of mild steel, with an outer diameter of 0.0198 m and an inner diameter of 0.0142 m, while the inner tube was constructed of copper, with an outer diameter of 0.038 m and an inner diameter of 0.032 m. The overall length of the pipe-in-pipe heat exchanger was 1.4 m. Bulk mean temperatures were recorded at different positions for various water flow rates, and new correlations for the Nusselt number and friction factor were derived from the results for the twisted tape inserts. The Reynolds number ranged from 5000 to 17000. Comparative analyses revealed that the wavy twisted tape with a twist ratio of 7.1 provided the highest heat transfer rate, showing a 172% increase in the Nusselt number and a 32.11% increase in the friction factor relative to a smooth tube.

* Corresponding author.

E-mail address: a.kurhade@gmail.com

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NATURE'S ECHOES: ECOCRITICISM IN RUSKIN BOND AND SUDHA MURTY'S LITERARY LANDSCAPES

DR. JYOTHI RAMESH PAI

Associate Professor of English Language
and Communication Skills
Pimpri Chinchwad College of
Engineering and Research,
Pune.

ABSTRACT:

Ecocriticism is a field of literary and cultural studies that reflects the relationship between literature and the environment. It explores how nature is represented, valued, and understood in literary works, and how literature can contribute to ecological awareness and environmental activism. Ruskin Bond's and Sudha Murty's literary works consistently picture deep connections with nature. This paper examines Bond's and Sudha Murty's major works through an ecocritical lens, exploring themes of environmental degradation, human-nature relationships, and the preservation of nature. Bond's portrayal of the natural world depicts insights into his ecological consciousness and his ability to inspire readers to appreciate and protect the environment. Sudha Murty's books are a tryst with modern sociology in the Indian Scenario. It gives a great understanding of the changing climate and people's perspective towards nature. This research contributes to Ecocriticism by examining the ecological dimensions in Bond's and Sudha Murty's literary works emphasising the relevance of environmental messages in the contemporary global context. The paper focuses on the intersection of literature and environmental concerns and contributes to the discussion on environment-related issues.

Key Words: Ecocriticism, Ecological Consciousness, Relevance of Nature, Environmental Degradation, Literary and Cultural Studies

Introduction:

Ecocriticism is a literary and cultural theory that emphasizes the relationship between literature and the natural world, recognizing the profound impact that human actions and attitudes have on the environment. This interdisciplinary approach examines how literary texts can shape our perception of the environment and influence our ecological consciousness. In this research paper, we focus on two prominent Indian authors, Ruskin Bond and Sudha Murty, both of whom have expressed a deep appreciation for nature and have consistently incorporated environmental themes into their writings. This research paper hurls one into the realm of Ecocriticism, examining the selected works of renowned authors Ruskin Bond and Sudha Murty. Their literary representations of nature and environmental themes shed light on the authors' ecological consciousness, their portrayal of human-nature relationships, and the messages they convey regarding environmental protection. A comprehensive analysis of

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THE HUMAN SIDE OF TECHNOLOGY: AI'S SOCIAL IMPACT ON ENGINEERING STUDENTS

Jyothi Ramesh Pai

Associate Professor, Pimpri Chinchwad College
of Engineering and Research, Laxminagar,
Ravet, Pune

<https://orcid.org/0000-0002-9306-9095>

Keywords: Technology, Artificial
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Weathering the technological storm: The impact of internet and AI on education

¹Dr. Vinayak Kottawar, ²Dr. Rutuja Deshmukh, ³Dr. Neeta Deshpande, ⁴Mr. Ramdas Popat Jare

^{1,2}D. Y. Patil College of Engineering Akurdi, Pune

^{1,2}vgkottawar@dypcoekurdi.ac.in

³Gokhale education societies R. H. Sapat College of Engineering, Nashik

³neeta.deshpande@ges-coengg.org

⁴Pimpri Chinchwad College of Engineering and Research Ravet, Pune

⁴Ramdas.jare55@gmail.com

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Abstract:

The integration of artificial intelligence (AI) and the internet into educational frameworks represents a significant shift in the traditional teaching and learning paradigms. These technologies provide opportunities to enhance personalized learning experiences, improve accessibility, and streamline administrative processes, but also present formidable challenges, including ethical concerns, resistance to change, and the risk of widening educational inequalities. This paper explores the transformative potential of AI and internet technologies within education, addressing both the benefits and challenges they introduce. By analysing their impact on personalization, affordability, and the creation of new educational roles, this research offers a comprehensive examination of the technological evolution of education, emphasizing the need to balance AI's capabilities with the indispensable qualities of human educator

Introduction:

The digital revolution, characterized by the proliferation of the internet and the advent of AI, has sparked transformative changes across various sectors, with education being one of the most affected. Traditional education systems, built on a model of static, one-size-fits-all instruction, are being challenged by the dynamic and adaptive capabilities of AI-powered technologies. These advancements hold the promise of personalized learning, enhanced accessibility, and administrative efficiency, but they also bring ethical concerns and the risk of deepening the digital divide. This paper aims to critically assess the implications of AI and internet technologies on education by focusing on their transformative potential while recognizing the barriers to their full adoption. Areas of exploration include personalized learning experiences, administrative improvements, and the emergence of new educational roles, juxtaposed with ethical issues and the challenges of equitable access. As we delve into these themes, it becomes essential to consider how educators and institutions can navigate this evolving landscape to harness the benefits of technology while ensuring that all learners are supported and empowered. This requires a collaborative approach, where stakeholders from various sectors come together to create inclusive policies and practices that prioritize accessibility and equity in educational technology.

The integration of the internet and artificial intelligence (AI) into educational frameworks is heralding a significant transformation in traditional teaching and learning paradigms. This evolution presents educators and institutions with both remarkable opportunities and formidable challenges. The multifaceted impact of these technologies extends

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Relation Between the Fractional Domination Number of Some Graphs and Their Line Graphs

Mahesh Sarada^{1,2}, Rekha Jain¹, Ganesh Mundhe³

¹Department of Mathematics, Medi-Caps University, Pigdamber, Rau-453331, Indore, Madhya Pradesh, India.

²Department of Engineering Mathematics, Pimpri Chinchwad College of Engineering & Research, Ravet-412101, Pune, Maharashtra, India.

³Department of Engineering Mathematics, Army Institute of Technology, Dighi-411015, Pune, Maharashtra, India.

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Abstract:

Let G is the simple connected graph with order n and its line graph noted as $L(G)$. Let the fractional dominating number denoted by $\gamma_f(G)$ of graph G and the upper fractional dominating number $\Gamma_f(G)$. In this study we have obtained union and join on $\gamma_f(G)$ and $\Gamma_f(L(G))$ exploring the graphs for upper fractional domination number including Cycle, complete, Star, Bi-Star graph, wheel graph, Cubic graph, Graphs of Cartesian product like $(K_2 \times P_n)$, $(K_3 \times P_n)$ and $(C_m \times C_n)$ with consideration of the computational complexity. We have taken parameters related to fractional domination in line graphs towards generalization. The goal of this paper is to provide a generalized results of sum $\gamma_f(G) + \gamma_f(L(G))$, $\Gamma_f(G) + \Gamma_f(L(G))$ and product $\gamma_f(G) * \gamma_f(L(G))$, $\Gamma_f(G) * \Gamma_f(L(G))$ for some specific graph classes.

Keywords: Domination set, fractional dominating number, line graph, union and join.

2020 Mathematical Sciences Classification: 05C72, 05C76, 05C90.

1. Introduction

Initially, the idea of graph domination was presented by author Ore in the year 1960, and after this it is very important and vital area of research in theory of graph. The research regarding fractional domination number presented by some researchers in the late 1980s as a generalized concept of domination. A graph's fractional dominating number is described as minimum total weights assigned to all the vertices of graph from fractional dominating set, where a fractional dominating set is a method that gives each vertex a weight such that the addition of the weights of all vertices is at least one. At the 18th south-eastern international conference based on Combinatorics, Graph theory and Computing S.T. Hedetniemi initially defined fractional dominating as a function $f: V \rightarrow [0, 1]$ is said to be dominating function of the graph $G = (V, E)$ if $f(N[v]) \geq 1$ for all $v \in V$. The fractional dominating number of G is given by $\gamma_f(G)$.

M. Farber examined the issue of figuring out whether to use the linear programming formulation of $\gamma_f(G)$ could provide an integer solution to LPP.



Algorithm Using LPP for Domination and Fractional Domination Number of Some Graphs

Mahesh Sarada*¹, Rekha Jain¹ and Ganesh Mundhe²

¹Department of Mathematics, Medi-Caps University, Indore, Madhya Pradesh, India

²Department of Mathematics, Army Institute of Technology, Savitribai Phule Pune University, Pune, Maharashtra, India

*Corresponding author: mahesh.sarada@gmail.com

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Abstract. In the given study to find the connected graph's domination number and fractional domination number we have used *Linear Programming Problem* (LPP) formulation. We have design an algorithm using LPP formulation and linear programming solver to obtain the smallest size of dominating set for cycle graph, complete graph, wheel graph, bipartite graph, tree graph, n -connected graph. The basic steps of the simplex method for solving a minimization and maximization LPP problem. Generalized algorithm to find fractional domination number of any graph. The fractional domination number of a graph has a wide range of applications in graph theory and related fields, and it is an important parameter to consider when analysing and designing networks and algorithms.

Keywords. Dominating set, Fractional domination number, LPP formulation, Algorithm

Mathematics Subject Classification (2020). 05C72, 05C85

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1. Introduction

Let $G = (V, E)$ be a graph with a subset D of V is called a dominating set of graph G if each vertex in $V - D$ is connected to at least one vertex in D . The size of the smallest dominance set determines a graph's domination number. The fractional domination number, on the other hand, allows for a real-valued weight to be assigned to each vertex in the graph. A fractional dominating set is a set of vertices with non-negative weights by considering sum of the weights of all vertices and their neighbours is at least one. The fractional domination number of a graph

Comparative solution of Volterra Integral Equation using Successive Approximation Method, Laplace Transform Method and Differential Transform Method

Avinash V Khambayat

Professor
School of Science
Sandip University
Nashik, Maharashtra
✉ avinashkhambayat2@gmail.com

Sachin L Varpe

Research Scholar
School of Science
Sandip University
Nashik, Maharashtra
✉ slvmaths86@gmail.com

ABSTRACT

In many engineering problems, a linear non-homogeneous Volterra integral equation is a useful tool. Many integral equations can be solved analytically and numerically using the Differential Transform Method (DTM), which often yields a solution in series form. The investigation of the comparative solution of the Volterra integral equation using the Successive Approximation Method, Laplace Transform Method, and DTM demonstrates the reliability and efficacy of the DTM.

KEYWORDS: *Volterra integral equation, Differential transform method, Successive approximation method, Laplace transform method.*

INTRODUCTION

The equation for the Linear Volterra integral is defined as,

$$\psi(x)u(x) = f(x) + \lambda \int_a^x K(x,t)u(t)dt \quad (1)$$

The function $u(x)$ involved inside the integral is linear.

Volterra integral equation is categorized as a Second kind if $\psi(x) \neq 0$ and as a first kind if

$$\psi(x) = 0 \text{ and as a first kind if } \psi(x) \neq 0$$

If the unknown function $u(x)$ in equation (1) is in nonlinear form such as $u^n(x)$, $n \neq 1$ or $F(u(x))$ then it is called as nonlinear integral equation.

If $f(x) = 0$ In equation (1), then it is called homogeneous Integral equation and if $f(x) \neq 0$, it is called non-homogeneous Integral equation.

Methods to find the solution

The following techniques can be used to find the solution of Volterra integral equations.

1. Picard's Successive Approximation [6]

2. Laplace Transform [6]

3. Differential Transform [11]

1. Picard's Successive Approximation

Following are the steps to apply the Picard's Successive approximation method,

- 1) Initially Assume $u_0(x)$ as 0, 1, x.
- 2) The first approximation $u_1(x)$ is obtained using $u_0(x)$, $u_1(x) = f(x) + \lambda \int_0^x K(x,t)u_0(x)dt$
- 3) The Second approximation $u_2(x)$ is obtained using $u_1(x)$,

$$u_2(x) = f(x) + \lambda \int_0^x K(x,t)u_1(x)dt$$

- 4) Get the approximation $u_0(x), u_1(x), u_2(x), \dots, u_n(x)$ such that

$$u_n(x) = f(x) + \lambda \int_0^x K(x,t)u_{n-1}(x)dt$$

- 5) Thus the solution $u(x)$ is obtained as [6],

$$u(x) = \lim_{n \rightarrow \infty} u_n(x)$$



Mitigating Environmental Impact: A Study on the Performance and Emissions of a Diesel Engine Fueled with Biodiesel Blend

Anant Sidhappa Kurhade^{1,2*}, P. Bhavani³, Shital Anant Patil⁴, Nilesh R. Kolhalkar⁵, Kolluri Srinivasa Chalapathi⁶, Prashant Ashok Patil¹ and Shital Yashwant Waware¹

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²School of Technology and Research, Dr. D. Y. Patil Dnyan Prasad University, Pimpri, Pune - 411018, Maharashtra, India

³Department of Engineering Chemistry, Sagi Rama Krishnam Raju Engineering College, Bhimavaram - 534204, Andhra Pradesh, India

⁴Department of Engineering Mathematics, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

⁵Department of Mechanical Engineering, MKSS's Cummins College of Engineering for Women, Karvenagar, Pune - 411052, Maharashtra, India

⁶School of Engineering, Anurag University, Venkatapur, Ghatkesar, Medchal–Malkajgiri district, Hyderabad - 500088, Telangana, India

Abstract

This research delves into the operational performance and environmental impact of a single-cylinder diesel engine fueled with a 15 % blend of Nahar biodiesel (B15), derived from non-edible oil sources. The study scrutinizes critical engine parameters such as brake thermal efficiency, specific fuel consumption, exhaust gas temperature, and emissions of harmful pollutants like carbon monoxide, hydrocarbons, nitrogen oxides, and particulate matter (smoke opacity). Experimental results indicate that while the B15 blend exhibited a minor reduction in thermal efficiency at higher engine loads compared to conventional diesel, it demonstrated substantial improvements in emission reduction. The blend significantly lowered emissions of CO, HC, NO_x, and smoke, contributing to a cleaner and healthier environment. Additionally, the combustion process was optimized, as evidenced by a shortened ignition delay, leading to more efficient fuel combustion. In conclusion, the research establishes the viability and sustainability of the Nahar biodiesel blend B15 as a promising alternative to conventional diesel fuel. Its ability to significantly reduce emissions without compromising engine performance to a significant degree underscores its potential to contribute to greener energy solutions and mitigate environmental impact. The findings suggest that B15 biodiesel can play a crucial role in advancing sustainable energy initiatives while ensuring acceptable engine efficiency levels.

Major Findings: Biodiesel blends demonstrate higher Brake Thermal Efficiency (BTE) at low to mid loads, but their performance declines at high loads due to increased fuel consumption. The Brake Specific Fuel Consumption (BSFC) of biodiesel (B15) remains consistently higher than diesel, driven by its lower calorific value and higher viscosity. Despite these drawbacks, biodiesel offers significant environmental advantages, including lower exhaust gas temperatures (6-9 °C cooler)

*Author for correspondence

Fostering Critical and Ethical Thinking through Dystopian Fiction in Engineering Education^aShivaji Chavan, ^bKunda Raul^aPimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India^bPimpri Chinchwad College of Engineering & Research, Laxminagar, Ravet, Haveli, Pune – 412101, Maharashtra, India**Abstract**

In an era defined by rapid technological advancement, engineering education faces the critical challenge of nurturing not only technically proficient graduates but also ethically reflective and socially responsible individuals. This paper explores the pedagogical value of integrating dystopian fiction—specifically texts such as George Orwell’s *1984*, Aldous Huxley’s *Brave New World*, and Kazuo Ishiguro’s *Never Let Me Go*—into engineering curricula to foster critical thinking, ethical awareness, and reflective judgment among future technologists. Drawing upon interdisciplinary research from engineering education, literary studies, and science and technology studies (STS), the study argues that dystopian narratives provide potent frameworks for engaging students with complex ethical questions surrounding surveillance, autonomy, biotechnology, and technological determinism. Through a detailed literature review, this paper highlights the historical integration of humanities in engineering education, the role of literature in enhancing moral imagination and critical reasoning, and the empirical evidence supporting interdisciplinary approaches. The analysis further examines pedagogical models and case studies from leading institutions such as Olin College, Stanford University, and IIT Madras, demonstrating how dystopian texts are practically implemented to cultivate ethical and critical competencies. The findings underscore the potential of dystopian fiction not merely as supplementary reading but as a transformative educational tool that bridges the gap between technological expertise and humanistic understanding. Ultimately, the paper advocates for the deliberate incorporation of dystopian literature in engineering programs as a means to prepare future engineers to navigate the ethical complexities of an increasingly technologized world.

Keywords: Engineering Education, Dystopian Fiction, Ethics, Critical Thinking, Humanities Integration, 1984, Brave New World, Never Let Me Go, Pedagogy, Interdisciplinary Learning.

Introduction

In the 21st century, the rapid advancement of science and technology has fundamentally altered the social, cultural, and ethical fabric of human civilization. While engineering and technology continue to drive unprecedented innovation, they simultaneously raise

A New Era in Fintech and Insurtech using AI

Vaishnavi Kavade¹, Dr. Vinayak Kottawar², Pratik Chopade³, Pooja Baravkar⁴ Pranjali Bahalkar⁵

¹Department of AI & DS

D.Y. Patil College Of Engineering Akurdi, Pune, India

vaishnavikavade44@gmail.com

²Department of AI & DS

D.Y. Patil College Of Engineering Akurdi, Pune, India

vgkottawar@dypcoeakurdi.ac.in

³Department of Computer Engineering

Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, India

pratik.chopade87@gmail.com

⁴Department of AI & DS

Dr. D Y Patil Institute of Technology, Pimpri, Pune, India

pooja.baravkar@dypvp.edu.in

⁵Department of AI & DS

Dr. D Y Patil Institute of Technology, Pimpri, Pune, India

pranjali85bahalkar@gmail.com

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Abstract-

The domain of artificial intelligence, which is frequently abbreviated as AI, is presently experiencing a profound and transformative phase characterized by its substantial capacity to modify and redefine the core practices and operational methodologies employed within both the financial and insurance industries, thereby establishing entirely new frameworks and avenues for innovation as well as enhanced efficiency. Although it is true that the individuals who engage with these sophisticated technological advancements are not simply passive observers or uninvolved participants within this rapidly evolving environment, there nevertheless persists a significant degree of reluctance and skepticism concerning the authenticity and reliability of these groundbreaking innovations, which could potentially impede their widespread acceptance and integration into everyday practices. This research investigation is designed to delve into and scrutinize the foundational beliefs, assumptions, and perceptions that surround the concepts of

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Experimental study on the stabilization of laterite soil with chitosan biopolymer for subgrade applicationsShailendra Pandurang Banne*¹⁾, Ganesh S. Ingle²⁾, Arun Dhawale³⁾, Siddharth Gaikwad⁴⁾ and Sudarshan Bobade³⁾¹⁾Department of Civil Engineering, Pimpri Chinchwad College of Engineering, Nigdi, Pune 411044, India²⁾Department of Civil Engineering, Dr. Vishwanath Karad MIT World Peace University, Pune 411038, India³⁾Department of Civil Engineering, Pimpri Chinchwad College of Engineering and Research, Ravet, Pune 412101, India⁴⁾Pavement and QA Department, Sekura India Management Limited, Mumbai 400098, India

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Abstract

Laterite soil, commonly found in the Konkan region in Maharashtra, India, often needs better engineering properties, posing challenges for its use in construction. By adding chitosan, a naturally occurring biopolymer derived from chitin, the study aims to enhance the geotechnical properties of laterite soil. Both untreated and chitosan-treated laterite soil samples were subjected to various laboratory tests, including the California Bearing Ratio (CBR), compaction, Atterberg limits, and direct shear testing. The chitosan was added in varying percentages (0.15%, 0.30%, and 0.45 % by weight) to determine the optimal dosage for laterite soil stabilisation. As the chitosan concentration increases from 0% to 0.3%, the Maximum dry density (MDD) value increases from 1.41 gm/cc to 1.92 gm/cc; adding chitosan further slightly decreases the MDD. The un-soaked CBR value of laterite soil containing 0.30% chitosan biopolymer increased by 108.81%, while the soaked CBR value increased by 142.83%. The soil's cohesiveness and internal friction angle increased by 120% and 15%, respectively, with the optimal dose of 0.30% chitosan. Utilising chitosan in T8 subgrade soil costs INR 6.48 crores, which is 2.57 times more than laterite soil, and requires a pavement depth of 1395 mm. In the case of T9 subgrade soil, at a depth of 1495 mm, the cost is INR 8.08 crores, which is 3.14 times more than that of laterite soil. This study highlights the potential of chitosan biopolymer as an eco-friendly and sustainable soil stabilizer for subgrade applications. It also offers a comprehensive cost-benefit analysis for pavement applications, demonstrating the financial feasibility of using chitosan biopolymer despite its higher initial costs.

Keywords: Laterite soil, Chitosan biopolymer, CBR, Shear strength, Pavement design, Costing**1. Introduction**

The present study used laterite soil as subgrade soil and stabilised it with chitosan biopolymer. In the construction of roads, the stabilisation of the soil increases the engineering properties of the subgrade soil, hence increasing the capacity of the soil to sustain loads [1]. The subgrade refers to the uppermost layer of soil that serves as the foundation for a road section. The thickness of the various pavement layers in the road's structure is based on the load-bearing capacity of this subgrade. Consequently, the quality of the subgrade significantly influences both the initial construction costs of the road and the costs associated with future maintenance. [2]. Designing a thick and expensive road stretch, strengthening the subgrade with a geosynthetic material [3-5] or adding traditional stabilisers such as lime [6-8] and cement [9, 10] are options for dealing with weak subgrades. Numerous researchers are exploring the enhancement of subgrade soil strength through the use of various additives such as cement kiln dust (CKD) [2], plastic trash [11], fibre-reinforced fly ash [12], natural coir fibres [13], fly ash combined with fibres [14], and bentonite mixed with lime [15]. Biopolymers can enhance the properties of subgrade soil by improving its shear strength, reducing permeability, and increasing resistance to erosion, making it a sustainable alternative for soil stabilisation [16]. Xanthan gum biopolymer is highly effective in enhancing subgrade soil stabilisation by significantly improving the soil's shear strength, offering a sustainable solution for geotechnical engineering [17-20]. The use of guar gum biopolymer improves the strength of laterite soil, offering a more environmentally friendly and sustainable option compared to traditional soil additives [21-23]. During excavations in laterite soil, engineering problems like road failures, instability of slopes, landslides, cavity formation in tunnel works, and foundation settlement can occur [24].

A recent study has explored the potential of biopolymers, particularly chitosan, for soil stabilisation as environmentally friendly alternatives to conventional materials. Chitosan has been shown to improve the mechanical properties of sandy and expansive soils by increasing inter-particle cohesion [25, 26]. In earthen construction, chitosan-stabilized soil exhibited superior compressive and flexural strength compared to cement-stabilized samples [27]. For expansive soils, chitosan effectively reduced the plasticity index and increased the shrinkage limit, mitigating swelling potential [25]. These findings suggest that biopolymers, such as chitosan, offer promising sustainable solutions for soil stabilisation in various geotechnical applications. Chitosan, a biopolymer derived from shrimp shells, is utilised for soil stabilisation. It enhances soil particle interactions, improving mechanical properties and addressing issues like heavy metal absorption, soil erosion, and hydraulic conductivity. [28]. Low concentrations of chitosan significantly increased the shear

*Corresponding author.

Email address: bannemtech@gmail.com

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Morphometric evaluation of Manjara watershed, Latur district, Maharashtra, India : a GIS approach

Sahil Salvi¹ · Harish Tiwari² · Sudarshan Bobade¹Received: 26 August 2024 / Accepted: 3 January 2025
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Abstract

This study focuses on the morphometric characteristics of the Manjara basin in Latur district, Maharashtra, India, utilizing geospatial technologies. By employing orbiter imagery and terrain map, the research investigates the watershed's bifurcating stream network, focusing on morphometric aspects. The hydrologic network density, ranging from 2.812 to 2.942 km/km², indicates moderate runoff and infiltration rates, which imply balanced erosion and sediment transport processes. Key morphometric parameters evaluated include a bifurcation ratio of 1.28, suggesting minimal branching and a more linear network; a drainage density of 2.812, reflecting moderate stream channel density; a stream frequency of 14, indicating a highly interconnected network of streams; an elongation ratio of 0.746, suggesting a compact or rounded watershed shape; a relief value of 0.059, indicating minimal vertical elevation variation; an infiltration number of 39.36, suggesting higher runoff and lower infiltration; and a ruggedness number of 0.1659, indicating relatively low terrain roughness. These parameters are crucial for effective catchment planning and management, emphasizing the importance of high-quality input data, precise preparation, and appropriate mapping scales. These insights contribute to developing strategies for sustainable watershed management and mitigating potential environmental impacts.

Keywords GIS · Morphometric analysis · Manjara basin · Watershed management · Sustainable watershed management

Introduction

The application of geoinformatics in examining drainage basins is pivotal for effective catchment management. A comprehensive geomorphometric analysis helps understand the interrelationships among various watershed components [12, 21]. Despite extensive literature on the topic, there is no universally accepted classification for geomorphometric factors, which poses a challenge in assessing these factors clearly [12, 20]. This study emphasizes the importance of evaluating different geomorphometric parameters by providing detailed background information, analyzing each category thoroughly, and highlighting the variety of outcomes

and their significance. Beyond categorization and results, data quality, including preparation and mapping scales, is critical for accurate assessments [24]. A drainage basin, or watershed, encompasses all land areas receiving precipitation that drains into streams, lakes, or other water bodies [18]. Effective watershed management involves a holistic approach to erosion control and water quality preservation [1]. Comprehensive river basin management is essential for understanding groundwater potential, seasonal variations, and problems related to soil degradation due to flash overflows throughout high flows [6].

Despite its ecological and socio-economic importance, the watershed grapples with uncontrolled erosion, frequent flooding, and inefficient water resource management [27]. The absence of a comprehensive morphometric analysis limits the understanding of its geomorphological and hydrological dynamics [19, 28]. Thus, there is an urgent need for a detailed morphometric study to quantify parameters like linear, relief, and slope characteristics [26]. This research aims to pinpoint vulnerable areas prone to erosion, landslides, and flooding, offering crucial insights for effective land management and conservation strategies. By filling these

✉ Sahil Salvi
sahil.salvi@pccoer.in

¹ Civil Engineering Department, PCET's Pimpri Chinchwad College of Engineering & Research, Pune, Maharashtra, India

² PCET's Pimpri Chinchwad College of Engineering & Research, Pune, Maharashtra, India

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Geoinformatics-Driven Analysis for Watershed Management: Focus on the Manjara River Basin

Sahil Salvi*, Sudarshan Bobade, Harish Tiwari, Shubhangi Ambad, Jyoti Gaikwad, Pratiksha Rajput and Aarti Zadbuke

Department of Civil Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Pune - 412101, Maharashtra, India; sahil.salvi@pccoer.in

Abstract

This study investigates the morphometric attributes of the Manjara basin in Latur, Maharashtra, India, employing geospatial technology to assess the watershed's hydrological and geomorphological properties. Using satellite imagery and terrain maps, the research evaluates key morphometric parameters, including the bifurcation ratio (1.279), which suggests minimal branching and a more linear network. The drainage density of 2.743 km/km² indicates moderate runoff and infiltration rates, implying balanced erosion and sediment transport processes. A stream frequency of 14 reveals a highly interconnected network of streams, while an elongation ratio of 0.712 points to a compact or rounded watershed shape. Additional findings include a relief value of 0.057, showing minimal vertical elevation variation, an infiltration number of 39.360, suggesting higher runoff with reduced infiltration, and a ruggedness number of 0.1659, reflecting relatively low terrain roughness. The significance of the infiltration number and ruggedness number is in assessing surface runoff, groundwater recharge, erosion patterns, and watershed stability. These morphometric indicators are critical for understanding the watershed's hydrological behaviour, contributing to more effective catchment planning, flood management, and sustainable water resource use. The study's limitations include the reliance on remote sensing data, which may introduce errors in measurement accuracy, and the static nature of morphometric analysis, which may not fully capture temporal variations in hydrological processes. Future research should incorporate dynamic models and real-time data to enhance predictions of flood and drought risks under varying climate conditions. Despite these limitations, the results offer insightful information about how to design effective watershed planning strategies in the current context of mounting environmental issues.

Major Findings: The study reveals that the Manjara Watershed exhibits moderate drainage density, a compact shape, and minimal relief, indicating balanced hydrological processes. However, a high infiltration number suggests greater surface runoff and reduced groundwater recharge, while a low ruggedness number points to limited terrain roughness, influencing erosion and watershed stability.

Keywords: Geospatial Technologies, GIS, Morphometric Analysis, Sustainable Watershed Management

1.0 Introduction

The application of geoinformatics in analyzing drainage basins is vital for effective watershed management, as it helps in understanding the intricate relationships among

various watershed components¹. While considerable research has been conducted on morphometric analysis, the lack of a universally accepted classification system for geomorphometric factors presents a significant challenge in consistently evaluating these factors². For well-

*Author for correspondence



Water Quality Evaluation of Pawna River using QUAL2E Software

Sahil Salvi, Harish Tiwari, Sudarshan Bobade, Ranjeet Sabale, Sandhya Somwanshi*,
Sakshi Kshirsagar, Krushnkant Mulge and Sandhyarani Kolnurer

Department of Civil Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Pune - 412101, Maharashtra, India; somwanshisandhya7@gmail.com

Abstract

Pune, a rapidly expanding urban centre in Maharashtra, India, is experiencing significant industrial growth to cater to increasing regional demands while alleviating pressure on existing industrial hubs. The Pawana River, a key tributary of the Mula-Mutha River, flows through the Pimpri-Chinchwad Municipal Corporation area and serves as a vital water source for the city and its surrounding regions. However, over the past decades, anthropogenic activities such as industrial discharges and unregulated agricultural practices have adversely affected the river's water quality. This study investigates the water quality of the Pawana River using the QUAL2E model to analyze spatial variations in key parameters, including pH, alkalinity, hardness, turbidity, and chlorides. Laboratory analysis of samples collected from multiple locations along the river revealed that chemical parameters such as pH, alkalinity, hardness, and chlorides comply with IS 10500:2012 standards, indicating general suitability for consumption and ecological health. However, turbidity levels were consistently higher than permissible limits across all sampling locations, highlighting a critical concern. Elevated turbidity threatens aquatic ecosystems by inhibiting photosynthesis, disrupting habitats, and complicating water treatment processes, thereby posing risks to both ecological and public health. The results emphasize the necessity of identifying and mitigating sources of turbidity through targeted interventions and continuous water quality monitoring. The QUAL2E model proved effective in assessing the impacts of pollution sources and serves as a valuable tool for guiding sustainable water management strategies. This research underscores the urgency of proactive measures to preserve the ecological integrity and usability of the Pawana River.

Major Findings: The study highlights that while the Pawana River's pH, alkalinity, hardness, and chloride levels comply with IS 10500:2012 standards, turbidity consistently exceeds permissible limits, posing ecological and public health risks. The QUAL2E model effectively identifies pollution impacts, underscoring the need for targeted interventions and continuous monitoring to address turbidity sources and ensure sustainable water quality management.

Keywords: Industrial Impact, Pawna River, QUAL2E Model, Water Pollution, Water Quality

1.0 Introduction

The environmental impacts due to industrialization as well as agricultural growth have been overlooked and, regrettably, continue to be neglected in many regions worldwide. The exploitation of minerals and energy production has drastically transformed natural

landscapes and altered water flow in the basins of major rivers¹. Waste from factories and an industrial plant introduces hazardous substances into natural waterways, compromising water quality and its ability to sustain life². Rapid population growth has led to increased human waste reaching surface waters or accumulating in the ground, immediately contaminating the environment

*Author for correspondence

Integrated IoT System for Real-Time Air Quality Assessment in Diverse Environments

Sahil S Salvi*, Harish U Tiwari, Sudarshan S Bobade

Department of Civil Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, Maharashtra, India.

*Corresponding Author's Email: sahil.salvi@pccoer.in

Abstract

In response to escalating concerns over air pollution and its adverse health impacts, we present a comprehensive real-time Air Quality Monitoring System utilizing the Internet of Things (IoT). By deploying a network of cost-effective sensors, this system can measure various pollutants such as CO₂, CO, smoke, and LPG, transmitting data for analysis to aid both authorities and the public in making informed decisions. The core of the system is the ESP32 microcontroller, which integrates sensors like DHT11, MQ135, MQ7, and MQ2 to gather environmental data. Real-time monitoring is facilitated by displaying data on an LCD screen and storing it on the cloud-based ThingSpeak platform for further analysis and visualization. The system's architecture is designed to be both efficient and accessible, utilizing Arduino IDE for code development and ThingSpeak for data handling. The hardware components include the ESP32 microcontroller, various gas sensors, an LCD display, and other essential electronics. The software setup involves configuring the Arduino IDE and ThingSpeak platform for seamless data transmission and visualization. In this research work, we deployed this system in multiple environments, including parking lot, chemical testing lab, and cloud kitchen, to monitor temperature, humidity, and pollutant levels. The results indicated significant variations in air quality across different settings, with the cloud kitchen showing the highest levels of pollutants due to the presence of various chemicals and equipment. Our analysis underscores the importance of continuous air quality monitoring and the system's potential to enhance indoor air quality management proactively.

Keywords: Air Quality Monitoring, Environmental Data Analysis, ESP32, IoT, ThingSpeak.

Introduction

Air pollution, particularly from vehicle emissions, poses significant health and environmental challenges. Addressing this issue requires the implementation of effective monitoring systems. A real-time Air Quality Monitoring System powered by the Internet of Things (IoT) is essential for this purpose (1). By strategically placing IoT sensors, various pollutants can be measured and the data transmitted for analysis. This enables authorities and the public to make informed decisions regarding air quality management (2). Compared to traditional monitoring stations, IoT-based systems are cost-effective, allowing for the establishment of a denser network of monitoring sites, thus improving data accuracy (3). Moreover, these systems can send alerts when pollution levels exceed predefined thresholds, facilitating prompt mitigation measures (4). Indoor air quality is another critical aspect affecting health. Pollutants such as smoke, LPG, and CO₂ can be detrimental, necessitating proper ventilation, maintenance, and monitoring (5). Modern devices

like indoor air quality monitors and air purifiers provide real-time data, enabling proactive control to ensure a safe indoor environment (6). IoT-based air pollution monitoring systems, utilizing various sensors and Arduino microcontrollers, aim to detect indoor pollutants and offer real-time air quality monitoring (7). Data is transmitted through mobile applications or web interfaces, allowing access to remote servers and platforms such as ThingSpeak (8). These technologies enhance environmental awareness and promote proactive measures to reduce air pollution, contributing to healthier living environments.

The proposed air pollution detection system utilizes a block structure with the ESP32 microcontroller at its core. The system includes various sensors like the DHT11 for humidity and temperature, MQ7 for carbon monoxide, MQ2 for detecting smoke and LPG, and MQ135 for measuring gases such as carbon dioxide. Real-time data is displayed on an LCD panel and stored on the cloud-based ThingSpeak Platform for visualization

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Bayesian Optimization For Parameter Tuning In Complex Ecological Models

Chetan S. Chavan^{1*}, Rajeshwar Goud Jangampally².

¹Assistant Professor, Department of Civil Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, Maharashtra.

²Associate professor, Department of ECE, Hyderabad Institute of Technology and Management, Hyderabad, Telangana.

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Keywords:

Bayesian Optimization,
Ecological Modeling,
Parameter Tuning,
Performance Metrics,
Model Selection,
Information Criteria

Abstract

This study investigates the application of Bayesian Optimization for Parameter Tuning in Complex Ecological Models. The research methodology encompasses data collection, model development, optimization techniques, and performance evaluation. Ecological models are developed based on established ecological principles and theoretical frameworks, aiming to simulate the dynamics of ecological systems. Bayesian Optimization is employed as the primary optimization technique, leveraging probabilistic surrogate models to guide the search for optimal parameter configurations. The performance of the ecological models is evaluated using predefined performance metrics such as accuracy, F1 score, RMSE, and MAE. Results demonstrate the effectiveness of Bayesian Optimization in improving the predictive accuracy and reliability of ecological models. Furthermore, the study evaluates the performance of different optimization techniques and compares their efficacy in parameter tuning. Statistical analysis is conducted to analyze the results and identify significant differences among variables. Overall, this study provides valuable insights into the optimization of ecological models and contributes to the advancement of ecological research and management practices. Through systematic evaluation and optimization, Bayesian Optimization enhances our understanding of complex ecological systems and informs conservation and management strategies.

1. Introduction

Bayesian optimization (BO) has emerged as a powerful technique for parameter tuning in complex ecological models, offering efficient and effective exploration of high-dimensional parameter spaces. In recent years, ecological modeling has witnessed a surge in complexity, driven by the need to capture the intricate dynamics of ecosystems and the interactions among various biotic and abiotic factors. As a result, traditional optimization methods often face challenges in adequately exploring the vast parameter spaces inherent in these models, leading to suboptimal performance and computational inefficiency (Jones et al., 1998). Bayesian optimization, rooted in probabilistic surrogate modeling and sequential model-based optimization, addresses these challenges by leveraging past evaluations to guide the search

for optimal parameter configurations (Brochu et al., 2010). This introduction serves as a literature survey, providing an overview of the application of Bayesian optimization in the context of parameter tuning for complex ecological models. The need for efficient parameter tuning techniques in ecological modeling is underscored by the increasing complexity of models and the growing availability of high-dimensional data. Ecological models aim to simulate the behavior of ecosystems, capturing the interactions among various components such as species populations, environmental variables, and anthropogenic influences (Clark et al., 2001). These models often involve a large number of parameters that govern the dynamics of the system, including growth rates, mortality rates, and interaction coefficients. Estimating these parameters accurately is crucial for model reliability and predictive performance (Bolker et al., 2009).

Mail address -chetanchavan1203@gmail.com

1



Total Quality Management & Six Sigma Methodology In Construction Industry

Rahul S Patil

Assistant Professor

Civil Engineering Department,

Pimpri Chinchwad College of Engineering & Research, Ravet, Pune ,India

Abstract: The construction industry in India faces increasing pressure to meet international quality standards and customer expectations. This study explores the application of Total Quality Management (TQM) and Six Sigma methodologies within the sector to enhance construction quality and project performance. It emphasizes TQM as a comprehensive philosophy involving continuous improvement, employee participation, and customer satisfaction across all project stages. Through a detailed case study of a construction project. The paper evaluates the quality of concrete work using Six Sigma performance metrics. The findings reveal disparities in quality perceptions among stakeholders and identify barriers such as inadequate training, communication gaps, and poor quality control practices. By integrating TQM principles with Six Sigma tools, the research advocates for a structured quality management framework, including stakeholder training, establishment of quality circles, and development of national bodies to promote quality awareness. The proposed model offers a practical approach for enhancing competitiveness and achieving defect-free construction outcomes.

Index Terms – TQM, SIX Sigma

1. Introduction

For the Indian construction industry which is aiming for global contracting in the global market and which is wishing to capture sizable international market share in the new millennium, how can the global capacities help these, unless their completed structures match the quality standards of competitors who have embraced total quality management (TQM)?

To stand today in the competition, what construction firms must strive today is not only for customer satisfaction but further for customer delight. Total Quality Management is a philosophy, which can bring about evolutionary change in construction industry by completion of construction projects with trouble free structures and longer life and thus help in becoming global.

Implementation of TQM philosophy can provide a solution, which is all encompassing. It aims at work culture, employee empowerment techniques and finally customer satisfaction. It is not limited to material testing or quality assurance of end product only but it aims at the process of quality planning, quality improvement and quality control at each and every phase. An engineer must understand the application of TQM to technical activities. TQM is the application of the scientific method to business. The complexity of modern business and technology requires a teamwork approach rather than each engineer doing his own thing, thus TQM needs to be applied to the business of the company and to engineering methods.



Tempo-spatial impact assessment of landuse land covers on slope stability through GIS modeling at Raigad district of Maharashtra

Sudarshan Bobade¹ · Arun Dhawale¹ · Vaibhav Garg²Received: 24 May 2023 / Accepted: 22 June 2024
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Abstract

Landslides are one of the disasters that cause human, property and other losses. Landslides occur on the sloppy terrain resulted by sudden movement of top surface. The topmost layer is very fertile and mostly used for agriculture purposes. Over the years due to flooding, heavy rains and natural calamities, the top surface of the earth gets washed away resulting in decrease in soil strength in the form of nutrients and fertility. The other main cause is deforestation because trees hold the top layer of the soil and prevent it from washing off along with the water flow. Due to rapid urbanization and over population settlements are being constructed on the slope terrain and infrastructure is being developed along the slopes which includes deforestation. This causes loosening of top soil layer and sudden movement of land masses resulting in landslides, mainly occurs in hilly regions and complex terrains with slope variations. When the landslides occur in human settlement areas it results in disastrous condition. In this research, four land slide prone areas in Maharashtra, India have been identified and analyzed to understand the role of topographic terrain on parameters affecting the landslides. Different DEM datasets—Advanced Land Observing Satellite-1 Phased Array type L-band Synthetic Aperture Radar, Shuttle Radar Topography Mission, Advanced Space borne Thermal Emission and Radiometer and CARTOSAT are used to analyze the variation in the elevation over the years. The results can be used to understand the slope variability which can be used for landslide mitigation plans.

Keywords DEM · Landslide susceptibility · ERS · Drainage · Hydrological analysis · Elevation changes

Introduction

Sudden movement of earth, rock or debris along the slope of a terrain can be referred as landslides. Landslides are mainly caused by earthquakes, rains, volcanoes and any other natural or anthropogenic activities which can result in instability in the slope. Mechanics related to initiation of landslide as a shear fracture phenomenon is very well explained in terms of stress state and the shear strength loss in [17]. Slow

moving landslides are very difficult to predict and analyze. A research has been done on such a slow moving landslide which occurred in Shuitianba village in Wanyuan County, Sichuan Province, China, on September 16, 2017. The reasons for the disaster after investigation was found out that rainfall, unplanned settlements and deforestation [8].

Landslides are a common phenomenon along the western slopes of Sahyadri ranges and isolated hills of coastal plains in Konkan region, Maharashtra, India [29]. Slope instability is one of the major factor which effects the triggering of landslides [33]. Low magnitude landslides can even cause damage to loss of property and lives. Areas in this region are also influenced by geo-environmental factors like structure, slope, roads aspect, drainage, etc. [4]. In Ratnagiri Coast, Maharashtra, morphometric characterization of watershed is done to understand the hydrological process, hydraulic properties of soil, terrain slopes and landscape type which facilitates in prioritization of watershed for sustainable development and management [24, 25] of natural resources [17].

✉ Sudarshan Bobade
bsudarshan8376@gmail.com
Arun Dhawale
awdhawale2009@gmail.com
Vaibhav Garg
vaibhav@iirs.gov.in

¹ PCET's Pimpri Chinchwad College of Engineering & Research Ravet, Pune, Maharashtra, India

² Water Resource Department, Indian Institute of Remote Sensing (ISRO), Dehradun, India

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Review on Application of Cat Eye Reflector for Pavements

Mayura Yeole¹, Shreeyash Kalbhor², Pranav Jagdale³, Sahil Pachpute⁴, Tejas Bhakare⁵

¹Assistant professor, PCCOER, Pune, India
^{2,3,4,5} Research Scholar PCCOER, Pune, India

ABSTRACT

Over-speeding is a major cause of road accidents worldwide. This study presents a cat-eye reflector system integrated with a tachometer to improve road safety. The system changes the reflector's colour based on vehicle speed—white for normal and red for speeding—providing a clear warning to drivers and pedestrians, especially in low-visibility conditions. Advancements like solar-powered LEDs and IoT integration enhance the system's effectiveness by improving visibility and offering real-time traffic updates. These reflectors are useful in urban streets, highways, and airports, guiding vehicles and reducing accidents. While promising, challenges like limited daytime visibility and weather durability need attention. Addressing these can make the system more reliable and impactful for safer roads.

Keywords: Cat-eye reflectors, Road safety, LIDAR technology, IoT integration.

INTRODUCTION

Car over-velocity accidents have been a persistent issue because the invention of motorized delivery. To deal with this problem, a novel cat-eye reflector machine integrated with a tachometer has been designed and implemented, aiming to enhance street protection through dynamic visible feedback based totally on car velocity. The system operates by way of converting the colour of the reflector in real-time: White for ordinary velocity and red when the car exceeds the speed limit.

This visual alert serves as a caution for both drivers and pedestrians, successfully combining traditional protection capabilities with active, real-time comments.

Key capabilities of the device consist of: -

- . Speedometer (tachometer) with cat's eye reflector.
- . Display important warning messages to help reduce accident-related incidents.
- . Encourage responsible behaviour.
- . Get better night protection with good visibility and fast tracking.
- . This new technology has the potential to reduce accident-related accidents and increase road safety, especially during certain stages of the night.

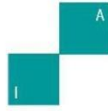
MATERIAL

Fixed velocity cameras are made to deal with difficult out of doors situations and work properly for a long time. The substances used to build them are picked for their strength, capability to withstand weather, and how well they perform: -

Camera Housing and shape: -

Substances: stainless steel, aluminium, or robust plastic.
Residences: climate-resistant, vandalism-resistant, effect-resistant. Mounting: Galvanized metallic or aluminium poles for stability.

1. Optical additives: - Lens: glass for clean pictures
Outer cover: Polycarbonate or acrylic for scratch and effect resistance
2. Inner Electronics: - Published circuit boards: Fiberglass



Distributed two phase intrusion detection system using machine learning techniques and underlying big data storage and processing architecture- HDFS

Abhijit Dnyaneshwar Jadhav^[1], Vidyullatha Pellakuri^[2], Ahire Prashant G. ^[3], Archana A. Chaugule^[4], Harish U. Tiwari^[4]

[1] Assistant Professor, Department of Computer Engineering, PCCOE&R, Ravet, Pune

[2] Associate Professor, Department of Computer Science & Engineering, Koneru Lakshmaiah Education Foundation, Guntur, A.P., India

[3] Associate Professor, Department of Computer Science and Engineering, Symbiosis Institute of Technology, Pune, India

[4] Professor, PCCOE&R, Ravet, Pune

Abstract It is crucial for organizations to secure their data in the internet era. The use of Intrusion Detection Systems (IDS) implies this security. Several researchers used various tools and methods to implement various IDS models. However, a few performance concerns that must be resolved are crucial from a security standpoint. The problems pertain to the IDS time efficiency referred as timeliness, accuracy as well as the fault tolerance. The proposed model of intrusion detection has two phases of detection. Every phase uses a different set of machine learning algorithms. Phase I employs Support Vector Machine (SVM) and k nearest neighbor (kNN), whereas Phase II uses Decision Tree and Naïve Bayes. This two phase detection takes care of reducing false positives and false negatives. To compensate the execution time of these four techniques, the big data environment—Hadoop Distributed File System (HDFS)—is utilized as the underlying storage and processing structure. With such arrangement of two phases, the model gives accuracy of 97.29% overall for known and unknown attacks. For known attacks it gives 99.49% and for unknown attacks it gives 96.28% accuracy in detecting intrusion. Also, the time efficiency is measured for training and testing of the model, for training with 10,000 records, it took 0.7 seconds which is very efficient as considered to existing systems. The detailed performance achievements are discussed in results section. Also, because of HDFS, it becomes distributed and fault tolerant intrusion detection system.

Keywords: Accuracy, HDFS, Intrusion Detection System, Machine Learning, Two Phase Intrusion Detection.

1 Introduction

The future of every business organization depends on its data, information, and resources; therefore, the security of these assets is crucial. For client communications and business building, such data is communicated frequently through the network within the organization or outside the organization. It is crucial to identify the sources or the information recipients to whom this information is communicated, whether are genuine and authenticated. If anything which is unknown, suspicious is present in the network, then it should be detected and that too well before the time that it damages business assets. An intrusion detection system, also known as a traffic monitoring system or network activities system, is the one that detects suspicious behavior and sends out notifications when it is found [1] [2]. In order to track authenticated connections and identify any unwanted, unauthorized, or malicious connection requests that could harm the company's data, information, or network, it is vital to keep an eye on every connection request that enters the network from outside the

Discrete variational autoencoders BERT model-based transcranial focused ultrasound for Alzheimer's disease detection

Kaushika Reddy Thipparthy ^a  , Archana Kollu ^b , Chaitanya Kulkarni ^c , Ashit Kumar Dutta ^d , Hardik Doshi ^e , Aditya Kashyap ^{f,j} , Kumari Priyanka Sinha ^g , Suresh Babu Kondaveeti ^h , Rupesh Gupta ⁱ 

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Highlights

- A tFUS-BERT model to encapsulate the linguistic representations of audio is proposed.⁴
- Proposed tFUS-BERT model demonstrated an accuracy of 76.06% with Wav2vec 2.0 and 71.83% with Hu-BERT.
- Model exhibited superior performance in capturing linguistic representations compared to traditional acoustic methods.
- Model attains 5.63% enhancement in accuracy compared to the baseline system.

Abstract

Research background

Alzheimer's Disease (AD) is a neurodegenerative condition marked by symptoms including aphasia and diminished verbal fluency. Researchers have employed phonetic attributes, fluency, pauses, and various paralinguistic traits, or derived aspects from transcribed text, to identify Alzheimer's disease.

Methods and methodology



Evolutionary optimization in VANET services: a comprehensive survey, challenges and futuristic approach

Madhuri Badole¹ · Anuradha Thakare¹ · Diego Oliva²

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Abstract

Intelligent vehicles promise the future of developing technology. Vehicular Ad-hoc Network (VANET) allows vehicles to communicate with one another and with the Roadside Units (RSU). VANET typically operates in various situations, such as Dynamic topology, high mobility, and a wide range of communication networks. Specific issues like scalability, packet loss, routing, data dissemination and sharing, energy loss, and security occur during VANET communication. Achieving a high data rate and low latency during transmission is complex. To improve the Quality of Service (QoS) in VANET, the mechanism to identify optimal data rate and optimal latency during the transmission of packets is the utmost importance. This article surveys nature-inspired and evolutionary algorithms that optimize different parameters to improve the VANET services. Evolutionary optimization techniques are proven to be best for finding optimal and near-optimal solutions by formulating single-objective and multi-objective functions based on Mean Routing Load, Packet Delivery Ratio, Throughput, End-to-End Delay, Control Packet Overhead. They allow for investigating an ample solution space, facilitating the identification of effective and flexible VANET communication solutions. The research gap and challenges in the existing scenario are well addressed. Further, some innovative ideas for future research are discussed.

Keywords Vehicular Ad-hoc Network (VANET) · Evolutionary algorithms · Optimization · Clustering algorithms

1 Introduction

With the technological advancement of automotive sectors and the wireless communication era, Vehicular Ad hoc Networks (VANETs) are becoming the most popular research area (Liang et al. 2015). Vehicles are used as nodes in VANETs, a subclass of Mobile Ad hoc Networks (MANET). The nature of the communication of vehicles in VANETs is mainly categorized into two groups: firstly,

communication amongst vehicles (V to V), and secondly, vehicle to the roadside units (V to R) (Hussein et al. 2017; Rasheed et al. 2017). Although there are many opportunities in VANET, it has two important challenges: the first one is the mobility of vehicles, which frequently changes the network topology also strongly influences the performance of the router and mainly affects VANET's functionality of efficiently exchanging the data exchange (Kumar et al. 2019; Rath et al. 2020). The second one is packet loss, which occurs due to traffic congestion because of many vehicles at a particular level. This situation occurs when new packets arrive, but the queue is full (Tilwari et al. 2019). Significantly, the vehicles in VANETs are constrained towards the topological network of the road during moving (Singh and Jain 2019); if the proper road data is offered, a prediction of the upcoming location of a vehicle is possible. VANETs have challenging features, like high mobility and a potentially large scale. Vehicles are much more dynamic due to the increasing speed, and their position changes continuously. Therefore, mobility and network topology are highly dynamic, so frequent

✉ Diego Oliva
diego.oliva@cucei.udg.mx

Madhuri Badole
madhuri.badole@gmail.com

Anuradha Thakare
anuradha.thakare@pccoepune.org

¹ Department of Computer Engineering, Pimpri Chinchwad College of Engineering, Pune 411044, India

² Depto. de Ingeniería Electro-Fotónica, Universidad de Guadalajara, CUCEI, Av. Revolución 1500, 44430 Guadalajara, Jalisco, México

Enhanced selective hyper chaotic encryption using deep neural network for hyperspectral images

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Abstract

Hyperspectral images are crucial for remote sensing, military applications, medical imaging, and satellite navigation systems. Maintaining the confidentiality, privacy, security, and intellectual property rights of the HSIs is essential. However, generalized traditional encryption methods are less secure and robust due to larger spectral bands, high variability in spectral bands, redundancy in spectral bands, and higher encryption time. This article presents selective hyperspectral image encryption based on a deep learning-based hyperchaotic image encryption algorithm that improves the security and robustness of the hyperspectral images. Here, a deep neural network is utilized to enhance the randomness of the hyperchaotic sequence key and improve encryption. The performance of the deep learning-based hyperchaotic image encryption is estimated on

RESEARCH

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IoT-driven ensemble machine learning model for accurate dissolved oxygen prediction in aquaculture

Rupali P. Shete¹, Amith Shekhar C.², Yogeshwari V. Mahajan³, Anupkumar M. Bongale^{4*} and Deepak Dharrao⁵*Correspondence:
Anupkumar M. Bongaleanupkumar.bongale@sitpune.
edu.in¹Symbiosis Institute of Technology,
Symbiosis International (Deemed
University), Lavale, Pune,
Maharashtra, India²Department of Computer Science
and Engineering, B N M Institute of
Technology, Bengaluru, India³Department of Computer
Engineering, Pimpri Chinchwad
College of Engineering and
Research, Ravet, Pune, India⁴Department of Artificial
Intelligence and Machine Learning,
Symbiosis Institute of Technology,
Symbiosis International (Deemed
University), Lavale, Pune,
Maharashtra, India⁵Department of Computer Science
and Engineering, Symbiosis
Institute of Technology, Symbiosis
International (Deemed University),
Lavale, Pune, Maharashtra, India**Abstract**

As the world demands sustainable protein sources the global food supply increasingly depends on aquaculture activities. Maintaining optimal water quality continues to pose ongoing difficulties. Fish health and production levels depend heavily on temperature control combined with proper pH values along with Dissolved Oxygen (DO) standards for optimal performance. Current water quality monitoring operations require long durations of manual work and delayed data analysis which reduces the speed of timely responses. The proposed research implements Internet of Things (IoT) technology along with ensemble Machine Learning (ML) model to improve DO and Water Quality Index (WQI) prediction accuracy. A series of IoT enabled sensors operated at 15-minute interval across multiple days gathered extensive dataset which measured temperature and pH levels and DO content. A comparison of five machine learning prediction methods which included Polynomial Regression and Support Vector Regression (SVR), Random Forest and Gradient Boosting and XGBoost is presented in this article. The proposed ensemble model achieved exceptional results because it generated R^2 values of 0.84 to 0.86 for DO measurements and WQI calculations approaching 0.91. The model's ability to detect non-linear patterns enables exact real-time predictions which enable quick proactive decisions that minimize fish mortality rates. Advanced machine learning when combined with IoT technology enables improved operational efficiency along with sustainability enhancements. The proposed methodology optimizes water management systems for Catla and Tilapia fish farmers to enhance yield production while promoting an environmentally sustainable aquaculture industry.

Keywords Biofloc systems, Water quality index (WQI), Dissolved oxygen (DO), Machine learning, Sustainable aquaculture, IoT, MQTT

1 Introduction

The farming of aquatic organisms through aquaculture occurs when fish breeders manage piscine specimens within tanks and ponds and offshore enclosures. The practice remains essential for meeting expanding worldwide seafood needs and protecting



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Gamified Therapy Platform in Hindi for Children with Misarticulation Issues

¹Deepa Mahajan, ²Komal Shingavi, ³Kajal Shingavi, ⁴Apurva Talekar

¹Faculty Member, ^{2,3,4}Student

¹Dept. of Computer Science

¹Pimpri Chinchwad College of Engineering and Research Pune, India

¹deepa.mahajan@pccoer.in, ²komalshingavi0302@gmail.com, ³kajalshingavi5522@gmail.com,
⁴apurvatalekar21@gmail.com

Abstract— Speech disorders, particularly misarticulation, significantly affect communication skills, learning, and social interactions. Traditional speech therapy methods often lack accessibility, engagement, and real-time feedback, limiting their effectiveness. This study proposes an AI-powered gamified speech therapy system that detects misarticulations in spoken words, provides personalized articulation exercises, and enhances user engagement through interactive learning techniques. The system utilizes Wave2Vec 2.0, a self-supervised deep learning model, to convert speech into text and applies Sequence Matcher to compare spoken vs. expected phonemes. By analyzing articulation accuracy, the system dynamically assigns adaptive exercises, reading tasks, and speech challenges, providing real-time feedback and progressive learning levels. A gamification-based approach enhances motivation, incorporating reward systems, speech-based challenges, and progress tracking to ensure continuous participation. Experimental analysis demonstrates that the proposed system improves articulation accuracy by 30-40% over four weeks, outperforming.

Keywords — Speech therapy, misarticulation detection, AI-driven speech processing, phoneme articulation, Wave2Vec, gamified learning, articulation exercises.

I. INTRODUCTION

The ability to communicate effectively is essential for social interaction, education, and professional success [1]. Misarticulation, a common speech disorder, affects an individual's ability to pronounce phonemes correctly, leading to difficulty in verbal expression and reduced confidence [2]. Speech therapy has traditionally been the primary method for treating misarticulation. However, conventional therapy methods rely on manual evaluation by speech therapists, making them costly, time-consuming, and inaccessible to many individuals [3], [4].

Modern advancements in Artificial Intelligence (AI) and speech recognition technology have enabled automated speech therapy solutions that provide real-time articulation assessment and personalized learning paths. Unlike conventional therapy, these systems utilize deep learning models to analyze phoneme-level articulation errors and assign customized speech exercises to improve pronunciation [5]. Gamification techniques have further enhanced therapy engagement, making speech correction more interactive and effective [6].

II. LITERATURE SURVEY

A. AI in Speech Therapy

The application of artificial intelligence (AI) in speech therapy has gained significant traction in recent years. Studies have demonstrated that machine learning models can effectively detect and assess articulation errors, providing an automated approach to traditional speech therapy [1].

Wave2Vec, a self-supervised learning model for speech processing, has shown remarkable accuracy in speech-to-text conversion, making it a robust foundation for phoneme analysis in speech disorder assessment [2]. Research has also emphasized the use of deep learning models for phoneme-level error detection, achieving higher accuracy than traditional feature-based methods [3].

Furthermore, AI-based speech therapy tools have been used to analyze misarticulations, categorize phoneme errors, and provide personalized training programs, ensuring efficient articulation improvement [4]. However, existing speech therapy platforms lack engagement, leading to lower user retention and reduced effectiveness.

B. Gamification in Speech Therapy

Gamification has proven to be an effective strategy to increase engagement and motivation in learning-based environments [5]. In educational technology, studies highlight that reward-based training models improve retention and participation rates [6].

In speech therapy, game-based interventions have been shown to enhance user engagement, leading to higher therapy adherence and improved speech articulation outcomes [7]. Research demonstrates that interactive exercises with immediate feedback encourage consistent practice, which is crucial for long-term improvement [8]. However, most gamified speech therapy platforms still rely on predefined exercises, limiting adaptability and personalization based on real-time articulation errors. Our study addresses this gap by dynamically adapting exercises based on phoneme analysis results.

C. Speech Recognition and Phoneme Matching Techniques

Recent advancements in speech recognition and phoneme analysis have significantly improved the accuracy of articulation disorder detection. Wave2Vec-based models have demonstrated state-of-the-art results in phoneme recognition, reducing word error rates in speech processing tasks [9]. Additionally, the Sequence Matcher algorithm has been successfully used to compare expected vs. spoken phonemes, detecting articulation errors with high precision [10]. Studies show that misarticulation detection improves when speech recognition is combined with phoneme-level comparisons, rather than relying solely on word-based

AI-Driven Multimodal Fusion of Neuroimaging and Speech Analysis for Early Detection of Alzheimer's Disease Biomarkers

Dr. Sarita Sushil Gaikwad^{1*}, Mrs. Nilam Ajay Jadhav², Mrs. Shital Gajbhiye³, Mrs. Bhavana Badhane⁴, Avani Ray⁵, Hemlata Suresh Gaikwad⁶, Trupti TukaramTekale⁷, Tejaswini Hanumant Gavhane⁸

¹JSPM's Rajarshi Shahu College of Engineering's Polytechnic.

³Dr D.Y. Patil Institute of Technology, Pimpri, Pune.

^{2,4,5,6,7,8} Pimpri Chinchwad College of Engineering & Research, Ravet, Pune.

*Corresponding Author:

Dr. Sarita Sushil Gaikwad,

JSPM's Rajarshi Shahu College of Engineering's Polytechnic.

¹Email ID: sarita.g1611@gmail.com, Email ID: rscoepoly@jspmrscoe.edu.in, ²Email ID: nilam.jadhav@pccoer.in,

³Email ID: shital.gajbhiye@dypvp.edu.in, ⁴Email ID: bhavana.bhadane@pccoer.in, ⁵Email ID: ray.avani@pccoer.in,

⁶Email ID: hemlata.gaikwad@pccoer.in, ⁷Email ID: trupti.tekale@pccoer.in, ⁸Email ID: tejaswini.gavhane@pccoer.in

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ABSTRACT

Alzheimer's Disease (AD) is a progressively debilitating neurodegenerative disorder and is frequently diagnosed at advanced stages due to the lack of reliable, efficient early-stage biomarkers. Existing diagnostic techniques, including cerebrospinal fluid (CSF) analysis and positron emission tomography (PET), are invasive, costly, and not accessible in low-resource environments. Although structural and functional neuroimaging (MRI/fMRI) and speech analysis have individually been demonstrated to hold promise in the detection of AD, their potential to work synergistically is largely unexplored. To our knowledge, this study is the first to present a hybrid artificial intelligence (AI) framework that combines convolutional neural networks (CNNs) for neuroimaging analysis and transformer-based natural language processing (NLP) for speech pattern evaluation to detect early AD biomarkers with high sensitivity and specificity.

MRI/fMRI scans were extracted from the Alzheimer's Disease Neuroimaging Initiative (ADNI) dataset, and we collected a novel speech dataset comprising verbal fluency, picture description, and spontaneous speech from both AD patients, mild cognitive (MCI) subjects, and healthy controls. Our multimodal fusion model uses both a 3D CNN extractor for neuroimaging data and a fine-tuned BERT transformer for linguistic and paralinguistic features of speech (e.g. semantic coherence, syntactic complexity, and pause frequency). An attention-based fusion layer assigns dynamic weights to the contributions of imaging and speech modalities, which optimizes biomarker detection.

The experimental results showed that our model could accurately differentiate early AD from MCI with an accuracy of 92.3% (AUC: 0.96), where a prominent improvement was found in the classification performance as compared with unimodal approaches (MRI to AD: 82.1% accuracy; speech to AD: 76.5% accuracy). The model especially screened hippocampal atrophy and lexical repetition as the most discriminative ones. Longitudinal validation in a 3-year follow-up cohort showed a strong correlation between AI-predicted risk scores and clinical progression based on decline in Mini-Mental State Examination (MMSE) scores ($r=0.85$, $p<0.001$).

This study contributes:

1. **A novel multimodal AI framework** for early AD detection using non-invasive, cost-effective data.
2. **Empirical validation** of speech and neuroimaging fusion, surpassing unimodal benchmarks.
3. **Clinical interpretability** through saliency maps and attention weights, aligning with known AD pathology.



A Self-Sovereign Identity Framework for Context-Aware De-Centralized Identifier Creation and Credential Verification

Shailaja N. Lohar,^{1,*} Sachin D. Babar² and Parikshit N. Mahalle³

Abstract

Digital Identity is a key concept in the digital era. It is very important as it impacts how we interact, transact, and secure our information online. Several systems, like Federated and User-centric, are the basis for digital identity management. We must enhance this identity for data security and integrity. It is necessary for strengthening an identity system. A digital Identity concept known as Self-Sovereign Identity allows users to fully own their identification related data without depending on central authority. It is a strong contender for an efficient identity management system. SSI's strengths are its full ownership and selective disclosure of user credentials, without a third party verification. SSI uses Decentralized Identifiers as unique Identifiers. It uses encrypted identity proof via Verifiable Credentials. A peer-to-peer distributed file system called the InterPlanetary File System (IPFS) makes it possible to store and share data in a decentralized, content-addressable way. Verifiable credentials are stored on IPFS, which eliminates the need for centralized servers and provides decentralized, permanent, and tamper-resistant storage. This work also uses zk-SNARKs to selectively disclose identity-related information. This paper proposes a new Digital Identity Management framework. It is based on SSI methodology and principles. The work has the Blockchain as its core network. It gives strong security and integrity to the user identity data. Also, the proposed approach is validated against state-of-art Identity management systems.

Keywords: Digital identity management; Blockchain; De-centralized identity; Metamask; Smart contract; User-centric authentication.

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Article type: Original research.

1. Introduction

Identifying and verifying individuals, organizations, or entities—whether in the physical or digital world—typically involves three key elements: claims, proofs, and verification as shown in Fig. 1. These fundamental components ensure the uniqueness, authenticity, and security of identities. In digital contexts, managing proofs associated with identity claims is particularly complex and is traditionally handled by various Identity Management (IdM) systems. With the exponential growth of internet users, concerns about the effectiveness, security, and privacy of Digital Identity Management Systems have intensified. Conventional identity systems, especially those based on centralized architectures, have been

increasingly exposed to vulnerabilities such as data breaches, unauthorized access, lack of user control, and insufficient interoperability. These limitations undermine user trust and raise significant privacy risks.

In response to these challenges, Self-Sovereign Identity (SSI) has emerged as a transformative paradigm. Introduced by Christopher Allen,^[1] SSI shifts control of identity from centralized authorities to individuals themselves. It empowers users to create, own, and manage their digital identities independently. Central to this shift is the use of decentralized technologies, especially blockchain,^[2] which align naturally with the principles of SSI due to their properties such as immutability, tamper resistance, elimination of central points of failure, and enhanced transparency.

Blockchain-based identity management systems have already demonstrated potential in addressing many of the shortcomings of traditional models. Among these innovations, Decentralized Identifiers (DIDs) and Verifiable Credentials (VCs) play a pivotal role. DIDs are unique identifiers generated and managed independently of centralized registries,

¹Smt. Kashibai Navale College of Engineering (affiliated to Savitribai Phule Pune University (SPPU)), Vadgaon Budruk, Pune, Maharashtra, 411041, India

²STES's Sinhgad Institute of Lonavala, Pune, Maharashtra, 410401, India

³Department of Artificial Intelligence and Data science, Vishwakarma Institute of Technology, Pune, Maharashtra, 411037, India

*Email: shailaja.lohar@gmail.com (S. N. Lohar)

A Smart Waste Management: an Adaptive Algorithm for Classification of Degradable and Non-Degradable Waste using Machine Learning Model

Dr. Manohar K. Kodmelwar¹, Chudaman D. Sukte², Dr. Anand Daulatabad³, Shailaja Nitin Lohar⁴, Amarnath Chadchankar⁵, Suhas Chavan⁶, Chandrakant D. Kokane⁷

¹Vishwakarma Institute of Information Technology, Pune, Maharashtra, India. manohar.kodmelwar@viit.ac.in

²Assistant Professor, Department of Information Technology, Vishwakarma Institute of Information Technology, Maharashtra, India. rajeshsukte@gmail.com

³Department of Humanities, Nutan Maharashtra Institute of Engineering & Technology, Talegaon(D), Pune, Maharashtra, India. anand5777@gmail.com

⁴PCET's Pimpri Chinchwad College of Engineering & Research, Pune Maharashtra, India. shailaja.lohar@pccoer.in

⁵Savitribai Phule Pune University, Pune, Maharashtra, India. amarnathchadchankar@gmail.com.

⁶Department of Computer Engineering, Vishwakarma University, Kondhwa, Pune, Maharashtra, India. chavan.suhas18@gmail.com/suhas.chavan@vupune.ac.in

⁷Nutan Maharashtra Institute of Engineering & Technology, Talegaon(D), Pune, Maharashtra, India. cdkokane1992@gmail.com.

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Abstract:

Urban waste management poses significant challenges due to the growing volume and complexity of waste generated in cities. Effective classification of waste into degradable and non-degradable categories is critical for optimizing waste disposal, promoting recycling, and mitigating environmental impacts. This report presents a comprehensive exploration of an adaptive machine learning algorithm for image-based waste classification, designed to enhance municipal waste management systems. The proposed approach integrates advanced image processing techniques with machine learning models, such as Convolutional Neural Networks (CNNs) and their efficient variants, to classify waste with high accuracy. A citizen reporting interface allows users to capture and upload waste images, which are processed in real-time by a centralized system. The adaptive algorithm incorporates preprocessing steps, feature extraction, and model inference to deliver actionable insights, enabling municipal authorities to deploy appropriate waste collection mechanisms promptly. Through a detailed literature review, the report examines existing methodologies, benchmarks their performance, and identifies key challenges, including data quality, scalability, and integration with urban infrastructure. Case studies from global implementations illustrate the transformative potential of AI-driven waste management systems. Furthermore, the report outlines future directions, such as leveraging advanced deep learning architectures, real-time deployment using edge computing, and expanding classification to include hazardous and recyclable waste categories. This work contributes to the growing field of smart waste management by demonstrating how machine learning can address critical urban challenges. By fostering collaboration between technology and sustainability, the proposed framework lays the foundation for cleaner and more sustainable cities.

Keywords: Machine Learning, Waste Classification, Image Processing, Convolutional Neural Networks (CNNs), Smart Waste Management



Research Article

Efficient hybrid approach for feature extraction using metaheuristic algorithm and majority voting in social media networks

Sonali LUNAWAT^{1,*}, Jyoti RAO², Pramod PATIL²

¹Dr. D. Y. Patil Institute of Technology, Pimpri, Pune, 411018, India; PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, 412101, India

²Dr. D. Y. Patil Institute of Technology, Pimpri, Pune, 411018, India

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Data Mining; Gannet Optimization Algorithm; Machine Learning; Metaheuristic Algorithm; Majority Voting

ABSTRACT

Social media networking sites introduce specific difficulties to the researchers dealing with high-dimensional data. Particularly, this holds true when trying to find a typical users. Irrelevant or redundant features can significantly reduce classifier accuracy, increasing prediction time which in turn diminishes overall model effectiveness. In this respect, feature selection techniques usually are applied to mitigate such obstacles via removing irrelevant features, which in turn increases computational efficiency, improves accuracy, and applies simpler models. However, traditional methods of feature selection are computationally expensive and often come with reduced accuracy in classification since the redundant features may not have been removed-error-prone and generally filter and wrapper-based. While hybrid approaches are more efficient, they sometimes fail to consider interactions between features effectively, which can be complex. We identify the shortcomings of these representatives and propose an optimal hybrid approach that integrates GOA with Majority Voting. Then, the two-step process starts with a feature filter based on an information-theoretic measure that selects 24 features with existing approach out of 79 for the phishing dataset in order to capture the co-evolutionary behavior. GOA follows the second step by applying our hybrid approach selection top 10 most optimal features from GOA, keeping in consideration both maximum relevance and minimum redundancy. The strength of this hybrid approach lies in its versatility, which has been applied successfully across different datasets. We achieved an accuracy of 99.7% on the Phishing dataset, outperforming ten benchmark feature selection methods. This yielded accuracy, which outperformed some of the results of in-fashion classifiers for the KDD dataset, WSN-DS dataset, CICIDS2017 dataset. Obviously, these results assure that this optimized feature set enhances not only the accuracy but also reduces prediction time significantly, hence being very efficient for real-world applications in social media analytics and beyond. This not only advances the state-of-art in feature selection but also sets the ground for further research on how to optimize classifier performance in various domains. The advantages of our hybrid approach not only come from accuracy improvements but also from computational efficiency, making it a practically applicable powerful tool in high-dimensional data analysis.

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*Corresponding author.

*E-mail address: sonali.lunawat@pccoer.in

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Journal of the Learning Sciences

Harnessing the Power of Knowledge



Full Length Article

Blockchain Medicine – ePharmacy: A Mobile Application Leveraging Hybrid Blockchain to Solve Challenges in the Pharmaceutical Supply Chain

Mahadevi S. Namose^a, Dr. Govind R. Suryavanshi^b, Dr. Bajirao S. Shirole^c,
Dr. Rahul M Mulajkar^d, Amit B. Kasar^{e*}, Chaitali Shewale^f, Dr. Risil Chhatrala^g

^{a,e}Assistant Professor, International Institute of Information Technology, Pune, Maharashtra, India

^bAssistant Professor, Pimpari Chinchwad College of Engineering & Research Ravet, Pune, Maharashtra, India

^cAssociate Professor, Sanghavi College of Engineering, Nashik, Maharashtra, India

^dProfessor, Jaihind College of Engineering Kuran, Narayangaon–Junnar Road, Maharashtra, India

^fAssistant Professor, VIIT, Kondhwa Budruk, Pune, Maharashtra, India

^gAssociate Professor, International Institute of Information Technology, Pune, Maharashtra, India

ARTICLE INFO

ABSTRACT

Keywords:

Blockchain
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Counterfeit Medicine
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Distributed Ledger
Mobile Platform
Digital Code

A mobile platform that incorporates Blockchain-based currency could provide an innovative solution for future medicine purchases. This research focuses on the design and implementation of a "ePharmacy"—a digital platform for medicine based on hybrid blockchain technology. We introduce the concept of crypto medicine, which removes the need for third parties in the buying and selling of medications. The proposed design incorporated the mobile application with the NEM blockchain, where manufacturers create digital medicines using NEM's blockchain namespace. Each pharmaceutical product is linked to the NEM cryptocurrency (XEM) and marked with a QR code. This proposed prototype model (an intelligent detector) activates the smart contract that connects all stakeholders in the pharmaceutical supply chain. The proposed mobile platform is successfully incorporated with the NEM cryptocurrency by assigning XEM to each medication, allowing all transactions to be tracked on the blockchain from

*Corresponding Author.

Email address: amit.kasar1982@gmail.com

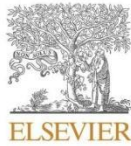
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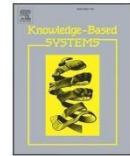
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Cluster-based multicast optimized routing in VANETs using elite knowledge-based genetic algorithm

Madhuri Husan Badole^{a,*}, Anuradha D. Thakare^{a,b}

^a Research Scholar, Department of Computer Engineering, Pimpri Chinchwad College of Engineering, Pune 411044, India

^b Professor, Department of Computer Engineering, Pimpri Chinchwad College of Engineering, Pune 411044, India

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Genetic algorithm
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ABSTRACT

The advancement of autonomous and driver-assistance technology has greatly improved the experience of driving. With the growing use of vehicles, there is a greater need for effective communication among them to ensure both applications in Vehicular Ad-hoc Networks (VANETs) for safety and non-safety. VANETs commonly prioritize multicast communication to efficiently use computational resources and achieve a desirable Quality of Service (QoS). However, the dynamic nature of VANETs, marked by high mobility and frequent topology changes, presents significant challenges in establishing and sustaining multicast communication. To ensure that sensing data from all target points is reliably sent to the base station, it is crucial to address the important factors of energy balancing, load balancing, connectivity, and coverage. These factors play a vital role in achieving a balanced and efficient transmission system. In this research paper, clustering-based multicast routing is proposed that utilizes an enhanced Genetic Algorithm Elite Knowledge Sharing Genetic Algorithm (EKSGA) to choose cluster heads. The EKSGA identifies the top 5 % performers with the highest fitness score and generates a new population by exchanging genetic information, aiming to establish a population with the greatest potential for optimal fitness. The performance assessment of the suggested protocol demonstrates significant enhancements in network lifetime and throughput compared to various existing protocols, including LEACH, DEEC, p-WOA, DDEEC, ECBLTR, and GA with improvements ranging from 2.4 % to 22 % in network lifetime and from 3.2 % to 23.2 % in throughput for a system consisting of 500 nodes with energy level set at 0.1 J for rounds 300. Additionally, the proposed approach utilizes the existing population to generate a more fit population, thereby reducing the need for excessive iterations and computational overhead.

1. Introduction

In developing nations, there has been a noticeable rise in the number of vehicles, particularly cars, due to their affordable prices. Unfortunately, this surge in vehicles has led to an increase in road accidents and traffic congestion [1]. These incidents can primarily be attributed to the absence of effective communication among vehicles. To address this issue, a network known as VANET (vehicular ad-hoc network) has become a potential remedy, enabling communication between vehicles. The Link-layer communication in VANET, known as IEEE 802.11p, [2] facilitates the transfer of data among fast-moving vehicles within the authorized frequency range of 5.9 GHz (5.850–5.925 GHz) [3,4]. The range of vehicular communication is around 100–1000 m, and there are two communication media available: Road-side units (RSUs) and on-board units (OBUs). While RSUs are fixed infrastructure that are

positioned on streets or intersections and function as access points [59], OBUs are mounted on vehicles for facilitating the information update, and directing driving without infrastructure [60]. An example of a specific kind of ad-hoc network is the VANET which distinguishes itself through characteristics such as a greater degree of mobility, a dynamic topology, frequent data interchange, a large network size, predictable movement, and plenty of battery power limited to the road, and ample storage capacity [5]. Three connection types, namely Infrastructure to Infrastructure (I2I), Vehicle to Infrastructure (V2I), and Vehicle to Vehicle (V2V), are often offered by VANETs [6]. The present system becomes an Intelligent Transportation System (ITS) through the effective delivery of urgent or time-sensitive packets [7]. Variations in vehicle density, high vehicle mobility, and dynamic topology are the main problems that VANET experiences frequent link failure and network fragmentation [8]. Establishing connections and exchanging

* Corresponding author.

E-mail addresses: madhuribadole@gmail.com (M.H. Badole), anuradha.thakare@pccoepune.org (A.D. Thakare).

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Hyperspectral remote sensing image watermarking using discrete wavelet transform and forensic based investigation archimedes optimization

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Earth Science Informatics

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Abstract

Rapid advancement in satellite communication over the last decade have resulted in the widespread use of remote sensing images. Additionally, as satellite image transmission over the Internet has increased, secrecy concerns have also arisen. As a result, digitally transmitted images must have great imperceptibility and confidentiality. Multispectral images consist of multiple bands. It is very challenging to select the important spectral band for watermarking so that the structural and visual quality of the satellite Image can be retained. This work proposes an innovative blind watermarking model based on a hybrid optimization strategy performed with the following two processes: the embedding process and the extraction process. A novel hybrid optimization named FBIAO algorithm,

<https://link.springer.com/article/10.1007/s12145-024-01394-4>

1/11

¹Shivganga Udhan²Bankat Patil³Suvarna Patil⁴Sneha Kanawade⁵Priyadarshani
Doke⁶Deepali Hajare

Machine intelligence based early prediction methods for Cardiovascular Diseases (CVDs)



Abstract: - Exploring early indications of heart disease is challenging in today's society. It may lead to death if not detected early. Early identification of cardiac disease in remote, rural, and semi-urban locations in developing nations can be greatly aided by an accurate decision support system (DSS). To assist in heart-related disease detection at an early stage, this system offers a DSS which uses artificial learning techniques using the patient's clinical details. A hybridized class balancing methodology using the chi2 feature selection algorithm, random oversampling, and undersampling techniques were used to find the suitable features from the presented dataset. Standard scalar approaches have also been utilized for data preprocessing. In the last stage of developing the suggested Artificial Intelligence (AI) system, the system used support vector machines (SVM), naive Bayes, random forest classifiers, logistic regression, and improved Artificial Neural Network (ANN) classifiers. Tests were conducted on the Python-based simulation environment to evaluate the proposed system. Evaluation of the system is completed using the Cleveland heart disease dataset by the machine repository at UCI. A 96.74% accuracy rate was reached, which is better than some previously published models for heart-related disease prediction.

Keywords: Machine Learning, Prediction, cardiovascular disease, ANN, feature extraction.

I. INTRODUCTION

Cardiovascular disease (CVD) has long been considered as the most serious and deadly of all human diseases. In middle and old life, males are more likely to develop CVD than women [1], with similar health issues detected in children [2][3]. Healthcare systems around the world are under strain and in risk as a result of growing cardiovascular disorders and their related high death rates.

As per WHO report, the heart-related disease accounts for 33 percent of all deaths worldwide. CVD is predicted to affect 18.9 million lives in 2022, or 32% of all fatalities worldwide. A heart attack or stroke killed 85 % of these people. [4][5]. According to research, more than 26 million people worldwide are affected by CVD, with more than 3 million new patients being detected yearly. CVD kills half of all patients within two years after diagnosis, and around 3% of total healthcare spending is spent on treating it [6]. Multiple tests are required to accurately predict cardiovascular disease. The medical staff's lack of competency may result in inaccurate forecasts. [7].

Early diagnosis can be difficult [8]. It can be difficult to treat heart disease surgically, especially in developing countries where skilled medical workers and diagnostic equipment are scarce [9]. Authors have compared machine learning methods for predicting Coronary Artery Diseases by constructing pooled area curves (PUC) [10]. Researchers have predicted diabetes and heart diseases using Machine Learning models [11].

The public can compare prediction models using heart disease datasets, which are available online. Data from large databases can be utilised to develop the best prediction model using artificial intelligence and machine learning. The need to reduce mortality from CVD has been stressed in recent research looking at adults and children. Although the available medical datasets are unreliable and redundant, preparation is required [12]. The accuracy of prediction models is enhanced by selecting the most relevant features. It is critical to use the appropriate ML techniques to create reliable forecasting system [13].

^{1,2}Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, India

^{1,3,4,5,6}Dr. D.Y.Patil Institute of Engineering Management and Research Akurdi

¹shivganga168@gmail.com, ²patilbankat@gmail.com ³suvarnapat@gmail.com, ⁴sneha.kanwade@gmail.com,

⁵priyadarshani.doke@dypiemr.ac.in, ⁶deepali.hajare@dypiemr.ac.in

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HearingHands : Amplifying the Voices of Deaf Community

Deepak T. Mane^{1*}, Devata R. Anekar², Yogeshwari V. Mahajan³, Vinod S. Mahajan⁴, Veena M. Kadam⁵, Maqsood Ahmed Ansari⁶

^{1,2}Vishwakarma Institute of Technology, Bibwewadi, Pune-411037, Maharashtra, India

³Pimpri Chinchwad College of Engineering & Research, Pune- 412101, Maharashtra, India

⁴Bharat Sanchar Nigam Ltd. Rajgurunagar, Pune-410505, Maharashtra, India

⁵CRG solutions Pvt Ltd., Parvati, Pune-411009 Maharashtra, India

⁶JSPM Narhe Technical Campus, Pune-411041, Maharashtra, India

^{1*}dtmane@gmail.com

²devata.aneekar@vit.edu,

³yogeshwari.mahajan@pccoer.in

⁴vsamahajan70@rediffmail.com

⁵kadamveena1234@gmail.com

⁶maqans@gmail.com

Correspondence author: dtmane@gmail.com

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ABSTRACT

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Natural language, sign language employs several modes of expression for everyday communication. Researchers have paid less attention to ISL interpretation than other forms of sign language. This paper introduces an automatic technique for translating manual letter movements into Hindi sign language. Because it works with pictures of bare hands, the user may interact with the device naturally. System gives deaf individuals the chance to interact with hearing people without the use of an interpreter. This paper goal is to develop techniques and a system for automatically recognizing Hindi sign language. The creation of a Hindi Sign Language database is the initial stage in this system. The most important stage in any hand gesture recognition system is hand segmentation since higher recognition rates may be attained with better segmented output. To improve identification rates, the suggested system additionally incorporates reliable and effective hand segmentation and tracking algorithms. Using a large sample set, it has been shown to be feasible to recognise 43 different words from the Standard Hindi sign language. We want to be able to convert certain very basic parts of sign language into text in the suggested system and vice versa in Hindi. In this paper, we present a number of new features and prospective advancements: The emphasis on real-time systems that recognize and interpret sign language motions from live video input is one noteworthy advance. With the use of this feature, people who use sign language and others can communicate instantly without any delays or middlemen. Integration of Speech Synthesis and Hand Gesture Recognition: This innovative approach to communication accessibility combines speech synthesis and hand gesture recognition technology. The paper provides a comprehensive solution for promoting engagement and understanding between the deaf community and others who communicate primarily through spoken language by translating gestures from sign language into intonation-rich speech.

Keywords: Image Capturing, Pre-processing, Feature Extraction, Classification, Pattern Recognition/Matching.

INTRODUCTION

Individuals with hearing and speech disabilities face communication challenges, and for Deaf and Dumb (D&M) people, communication is primarily achieved through sign language. Sign language involves the nonverbal exchange

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Transformer Based Sentiment Analysis of Russia-Ukraine War using BERT Model

^{1*}Deepak T. Mane, ²Devata R. Anekar, ³Yogeshwari V. Mahajan, ⁴Vinod S. Mahajan, ⁵Veena M. Kadam, ⁶Maqsood Ahmed Ansari

^{1,2}Vishwakarma Institute of Technology, Bibwewadi, Pune-411037, Maharashtra, India

³Pimpri Chinchwad College of Engineering & Research, Pune- 412101, Maharashtra, India

⁴Bharat Sanchar Nigam Ltd. Rajgurunagar, Pune-410505, Maharashtra, India

⁵CRG solutions Pvt Ltd., Parvati, Pune-411009 Maharashtra, India

⁶JSPM Narhe Technical Campus, Pune-411041, Maharashtra, India

^{1*}dtmane@gmail.com

²devata.aneekar@vit.edu,

³yogeshwari.mahajan@pccoer.in

⁴vmahajan70@rediffmail.com

⁵kadamveena1234@gmail.com

⁶maqans@gmail.com

Correspondence author: dtmane@gmail.com

ARTICLE INFO	ABSTRACT
Received: 02 Oct 2024	Sentiment analysis is an essential part of gaining deeper insights into particular tweets. Here, we analyse the inclinations that reflect user opinions and their sentiments regarding the tweets about the Russia and Ukraine war. Taking data from social media, we use sentiment analysis to gain insight into the wide range of public opinion. In this paper, we proposed customized Bidirectional Encoder Representations from transformers (BERT) natural language processing model to gauge the tone of the tweets about the war. A proposed model for sentiment analysis is fine-tuned on a dataset related to the Russia- Ukraine war. Proposed model to classify sentiments in domain specific texts to ensure accurate and context aware sentiment predictions. Our unique approach leverages BERTs contextual language understanding model to study Russia- Ukraine relations. The model achieved an accuracy of 94.73% on the fitted dataset. Everyone benefits from this research, and the public as it gives them a better understanding of public opinion. Experiment results shows that the performance of the proposed model is better than the existing approaches.
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	<p>Keywords: Russia-Ukraine War, Natural Language, Machine Learning, Bidirectional Encoder Representations from transformers (BERT).</p>

INTRODUCTION

The Russo- Ukrainian War began in 2014 when Russia annexed the Crimea region of eastern Ukraine from Ukraine. The action set off a chain of events that has led to ongoing conflict between Ukrainian forces and pro- Russian separatists in eastern Ukraine. many communities are struggling with the loss of loved ones and the destruction of their homes as a result of war and the constant threat of violence. Many people suffer serious psychological consequences such as depression, anxiety and post- traumatic stress disorder. The long- term consequences of conflict pose significant challenges for those directly affected and their communities. conflict also strains social relations and deepens social divisions and affects vital services such as education and health care. it is important to understand how public opinion on this conflict is evolving and how the public is responding to the news and social media coverage of the conflict in order to by analyzing public opinion on this topic we aim to reveal the complex dynamics that influence peoples attitudes toward important global events. we show that public opinion can be

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MACHINE LEARNING IN MARKET FORECASTING: TRENDS, CHALLENGES, AND FUTURE PATHWAYS IN PREDICTION MODELS

Dr. Yogeshwari Vinod Mahajan

Asst. Professor, Dept. Of Comp. Engg. PCCOER, Pune, Maharashtra, India

Dr. Vinod Shamrao Mahajan

BSNL Pune, Maharashtra, India

Dr. Umesh S. Bhadade

Vice-Principal, L.R. Tiwari COE, Meera Bhayandar, Mumbai, India

Dr. Satpalsing Rajput

Asst. Prof. Deptt. Of Comp. Engg., VIT, Pune, Maharashtra, India.

Dr. Vishal Ratansing Patil

Associate Professor, CSE(AIML) department, Vishwakarma Institute of Technology, Pune, Maharashtra, India

ABSTRACT

Machine learning (ML) techniques have emerged as promising tools for enhancing market forecasting compared to traditional methods. This research conducts a systematic literature review to delineate current trends and future trajectories in ML-driven stock market prediction studies. Peer-reviewed journal articles spanning the last twenty years were classified into four primary categories: artificial neural networks, support vector machines, genetic algorithms in conjunction with other methods, and hybrid or alternative AI approaches. Each category underwent scrutiny to unveil commonalities, distinctive perspectives, constraints, and areas necessitating further exploration. The outcomes furnish valuable insights and suggestions for forthcoming research endeavours in this field.

Keywords: Stock market forecasting, Machine learning, Artificial neural networks, Support vector machines, Genetic algorithms, Hybrid AI approaches, Systematic literature review, Future research directions.

I. INTRODUCTION

The realm of stock market forecasting stands as a cornerstone in modern finance, with investors constantly seeking effective strategies to navigate the dynamic landscape of equity markets. Over the past two decades, the integration of machine learning (ML) techniques has emerged as a promising avenue for enhancing the accuracy and reliability of stock market predictions. This burgeoning field of research has witnessed significant advancements, driven by the exponential growth of available financial data and the evolution of sophisticated ML algorithms.

With the global equities market surpassing \$85 trillion in 2019, the stakes for accurate market predictions have never been higher (Pound, 2019). Traditional approaches to market analysis, relying on basic statistical methods and human intuition, have proven insufficient in harnessing the vast volumes of data and complex interrelationships inherent in financial markets. Consequently, there has been a paradigm shift towards leveraging ML



RESTORATION OF MOTION-BLURRED HAZY IMAGES USING PSF VARIABLES AND LOG SPECTRUM ANALYSIS

Dr. Yogeshwari Vinod Mahajan

Asst. Professor, Deptt. Of Comp. Engg. PCCOER, Pune, Maharashtra, India

Dr. Vinod Shamrao Mahajan

BSNL Pune, Maharashtra, India.

Dr. Umesh S. Bhadade

Vice-Principal, L.R. Tiwari COE, Meera Bhayandar, Mumbai,
Maharashtra, India

Dr. Satpalsing Rajput

Asst. Prof. Deptt. Of Comp. Engg., VIT, Pune, Maharashtra, India

Dr. Vishal Ratansing Patil

Associate professor, CSE(AIML) department, Vishwakarma Institute of
Technology, Pune, Maharashtra, India.

ABSTRACT

This paper aims to propose a method for restoring moving hazy images, which is critical in the identification and tracking of defaulters. In hit-and-run cases, images of defaulters or vehicle numbers often become blurred due to motion between the target and the camera. Restoring such kinetic blurred images requires a strong understanding of the Point Spread Function (PSF), defined by haze direction and haze length. The paper suggests a method to determine PSF variables from blurry, noisy images by analyzing the log spectrum. These variables are then used to restore the image, effectively reducing natural and artificial blur.

Keywords: Point Spread Function (PSF), Hazy Images, Reestablished Images.

I. INTRODUCTION

Reestablishment of kinetic hazy image is a pro in demand technique. The kinetic blur parameter identification plays an significant job in the image reestablishment. In this research paper, we present the hazy variable identification algorithm in linear motion blur. The variables to be calculated are the length and direction. The Fourier spectrum of the picture degenerated by linear motion blur has frequent repetitions of zeros. The proposed blueprint detects those repetitions by minimizing the association between the Fourier spectrum of hazy image and a detecting function. The trial and error comparisons show that our planned blueprint has strength against noise than other two methodology.

A New Era in Fintech and Insurtech using AI

Vaishnavi Kavade¹, Dr. Vinayak Kottawar², Pratik Chopade³, Pooja Baravkar⁴ Pranjali Bahalkar⁵

¹Department of AI & DS

D.Y. Patil College Of Engineering Akurdi, Pune, India

vaishnavikavade44@gmail.com

²Department of AI & DS

D.Y. Patil College Of Engineering Akurdi, Pune, India

vkgottawar@dypcoeakurdi.ac.in

³Department of Computer Engineering

Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, India

pratik.chopade87@gmail.com

⁴Department of AI & DS

Dr. D Y Patil Institute of Technology, Pimpri, Pune, India

pooja.baravkar@dypvp.edu.in

⁵Department of AI & DS

Dr. D Y Patil Institute of Technology, Pimpri, Pune, India

pranjali85bahalkar@gmail.com

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Abstract-

The domain of artificial intelligence, which is frequently abbreviated as AI, is presently experiencing a profound and transformative phase characterized by its substantial capacity to modify and redefine the core practices and operational methodologies employed within both the financial and insurance industries, thereby establishing entirely new frameworks and avenues for innovation as well as enhanced efficiency. Although it is true that the individuals who engage with these sophisticated technological advancements are not simply passive observers or uninvolved participants within this rapidly evolving environment, there nevertheless persists a significant degree of reluctance and skepticism concerning the authenticity and reliability of these groundbreaking innovations, which could potentially impede their widespread acceptance and integration into everyday practices. This research investigation is designed to delve into and scrutinize the foundational beliefs, assumptions, and perceptions that surround the concepts of

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Hybrid machine learning models for solving complex optimization problems in information systems

Sandip Desai *

Department of Electronics & Telecommunication Engineering

Yeshwantrao Chavan College of Engineering

Nagpur 441110

Maharashtra

India

Neha Amol Rahul †

School of Management

Ramdeobaba University

Nagpur 440013

Maharashtra

India

Vaishali Latke §

Department of Computer Engineering

PCET's Pimpri Chinchwad College of Engineering and Research

Ravet

Pune 412101

Maharashtra

India

Trupti Deshmukh ‡

Department of Computer Engineering

Dr. D. Y. Patil Institute of Technology

Pimpri

Pune 411018

Maharashtra

India

* E-mail: sad.ycce@gmail.com (Corresponding Author)

† E-mail: rahulna@rknc.edu

§ E-mail: vaishali.latke@pccoer.in

‡ E-mail: trupti.deshmukh@dypvp.edu.in

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Measuring Endodontic Working Length Using Artificial IntelligenceVaishali Latke¹, Dr. Vaibhav Narawade²¹Research Scholar, Department of Computer Engineering,

Ramrao Adik Institute of Technology,

D Y Patil Deemed to be University, Nerul, India

vai.latke21@dypatil.edu²Professor, Department of Computer Engineering,

Ramrao Adik Institute of Technology,

D Y Patil Deemed to be University, Nerul, India

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The objective of an endodontic treatment is to eliminate infection and inflammation caused by microbes within root canal and the Periapical region of the tooth. This involves cleaning, shaping, disinfecting, and closing the canals to the proper working length. With traditional image processing methods, it is difficult to precisely measure the root canal length. This retrospective clinical study evaluates a self-created dataset of X-ray images of teeth, annotated by medical technicians with defined root canal measurements, was used as input for the system. To measure the endodontic working length the proposed system involves several steps which include high-resolution dental image acquisition, pre-processing and reducing noise through Gaussian filtering and improving contrast with histogram equalization, Image cropping, Segmentation using Thresholding methods and edge detection with Canny algorithms, Bounding box to get tooth height and calculation of measurement of root canal length by measuring the distance along the skeleton from the entrance to the apex, with curvature analysis algorithms. The results of proposed measurement are validated with review by dental professionals and found that system shows 86.51 % of accuracy. The use of artificial intelligence for root canal measurement significantly advances dental diagnostics. By automating the measurement process, the Artificial Intelligence (AI) system enhances accuracy, efficiency, and reproducibility, ultimately contributing to improved patient outcomes.

1. INTRODUCTION

Dental infections are notoriously painful and commonly affect many individuals. Effective treatment of these severe infections necessitates the elimination of bacteria [1]. Endodontic treatment is a crucial method for addressing these infections and alleviating the associated pain. Success of a root canal treatment depends largely on the accurate determination of endodontic working length. However, determining and maintaining the working length of a root canal system is a very challenging task. Improper working length determination may result in failure of the therapy and the patient may even lose the tooth. Hence, accurate determination of working length is essential to achieve optimal healing and success of the endodontic treatment.

Initially, dental professionals relied solely on tactile sensation and radiographic imaging to estimate the working length. Manual tactile sensation and intraoral imaging are the conventional and most commonly used



Unpaired recurrent learning for real-world video de-hazing

Prashant W. Patil ^a  , Santosh Nagnath Randive ^b, Sunil Gupta ^c, Santu Rana ^c, Svetha Venkatesh ^c, Subrahmanyam Murala ^d

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Highlights

- Lightweight video de-hazing approach without any additional prior information.
- Proposed a mixed multi-level attentive feature extraction for robust feature learning.
- Proposed a recurrent feature alignment module for temporally consistent video restoration.
- Extensive analysis on real-world and synthetic de-hazing databases with SOTA methods.

Abstract

Automated outdoor vision-based applications have become increasingly in demand for day-to-day life. Bad weather like haze, rain, snow, *etc.* may limit the reliability of these applications due to degradation in the overall video quality. So, there is a dire need to pre-process the weather-degraded videos before they are fed to downstream applications. Researchers generally adopt synthetically generated paired hazy frames for learning the task of video de-hazing. The models trained solely on synthetic data may have limited performance on different types of real-world hazy scenarios due to significant domain gap between synthetic and real-world hazy videos. One possible solution is to prove the generalization ability by training on unpaired data for video de-hazing. Some unpaired learning approaches are proposed for single image de-hazing. However, these unpaired single image de-hazing approaches compromise the performance in terms of temporal consistency, which is important for video de-hazing tasks. With this motivation, we have proposed a lightweight and temporally consistent architecture for video de-hazing tasks. To achieve this, diverse receptive and multi-scale features at various input resolutions are mixed and aggregated with multi-kernel attention to extract significant haze information. Furthermore, we propose a recurrent multi-attentive feature alignment concept to maintain temporal consistency with recurrent feedback of previously restored frames for temporal consistent video restoration. Comprehensive experiments are conducted on real-world and synthetic video databases (REVIDE and RSA100Haze). Both the qualitative and quantitative results show significant improvement of the proposed network with better temporal consistency over state-of-the-art methods for detailed video restoration in hazy weather. Source code is available at: <https://github.com/pwp1208/UnpairedVideoDehazing> 

Introduction

Fog, snow, rain, and haze are different types of adverse weather conditions that often degrade the quality of videos recorded for computer vision applications such as video surveillance, traffic monitoring, and autonomous driving. These applications routinely

Lightweight progressive recurrent network for video de-hazing in adverse weather conditions

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Abstract

Automated outdoor vision-based applications have witnessed a growing demand in everyday life. These applications, ranging from surveillance and traffic management to environmental monitoring and autonomous systems, utilize computer vision and imaging technologies to automate various processes. However, adverse weather conditions such as fog, snow, rain, and haze can severely impair video quality, limiting the performance of automated applications. Therefore, the pre-processing techniques like video de-hazing can improve visibility, ensuring that downstream applications have better performance and reliability. Further, the existing methods rely on computationally heavy networks for the task of video de-hazing. In this work, a lightweight ($\sim 0.24M$ parameters) progressive recurrent network for video de-hazing is proposed. In that, a multi-kernel feature block is proposed that addresses the challenge of varying haze intensities within frames, allowing the network to adapt and selectively emphasize features based on local haze characteristics. Additionally, a multi-receptive edge extraction block is proposed that enhances edge information by leveraging features learned with different receptive fields, capturing both local and global information. Experimental analysis on various video de-hazing datasets proves the significance of the proposed method over state-of-the-art methods for video de-hazing task. *Testing code is provided in the supplementary material.*

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Research Article

Sewage water management and healthcare monitoring in IoT using Optimized deep residual network

Dipali Shende & Yogesh S. Angal

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ABSTRACT

The Internet of Things (IoT) is termed as the interconnection of different smart objects with respect to devices. In this research, two different application scenarios are considered to show the efficiency of the Deep Residual Network (DRN) through multicast routing. The entities involved in the process are IoT nodes, IoT heads, and base stations (BS). The nodes are allowed to capture the information, and the collected data are routed to BS through the head node. The process of routing is made using the CrowWhale optimisation algorithm that enables to transfer the data packets from IoT nodes to BS. In the sewage water management system, entering sewage water into fresh water is detected by DRN which is trained using an optimisation algorithm. In the healthcare system, heart disease prediction is done using DRN to detect normal and abnormal cases more effectively. The adopted CrowWhale-ETR+DRN offered energy, accuracy and sensitivity as 82.54, 0.967, and 0.978 with 100 nodes for the environmental protection dataset. The energy, accuracy, and sensitivity obtained by the proposed model are 83.232, 0.964, and 0.974 using 100 nodes for the heart disease dataset, respectively.

KEYWORDS:

Sewage water management healthcare monitoring internet of things (IoT)
 multicast routing deep residual network (DRN)

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An efficient fault diagnosis model using Lappet Falco optimisation based on a deep neural network for the VSI under varying load conditions

Vaishali Baste, Dipali Shende, Seema Idhate and Arya Deshpande

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ABOUT

Abstract

Numerous industrial applications employ three-phase converters that are based on insulated-gate bipolar transistors (IGBTs). However, the functioning and safety of power electronic devices and loads can be considerably impacted by IGBT faults. Maintaining high-power quality and system availability requires timely and accurate detection of power inverter failures. Constantly monitoring the failures in three-phase voltage source inverter (VSI) has greatly improved maintenance efficiency and stability. Hence, the developed research employs the discrete wavelet transform (DWT) and Lappet Falco optimised deep neural network (LFO-DNN) model to create an open circuit fault detection model for the VSI circuit. Data collection involves extracting features such as three-phase voltage, current, speed, and torque from erroneous data. The DNN classifier trained on these features uses the average three-phase current value to identify faulty switches. The VSI acting as a load with variable frequency reference is connected to a three-phase induction motor. The proposed Lappet Falco optimisation accurately yields impressive results in terms of prediction accuracy of 96.34%, precision of 96.34%, recall of 96.24%, F1 measure of 94.23%, MSE of 3.66, and specificity of 95.28%, demonstrating high efficiency for both 90% training and a k-fold value of 10.

Keywords

voltage source inverter, VSI, insulated-gate bipolar transistors, IGBTs, open circuit fault, deep neural network, DNN, Lappet Falco optimisation, LFO, discrete wavelet transform, DWT

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A novel two-way feature extraction technique using multiple acoustic and wavelets packets for deep learning based speech emotion recognition

Kishor B. Bhangale¹ · Mohanaprasad Kothandaraman²

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Abstract

Affective computing is crucial in various Human–Computer Interaction (HCI) and multimedia systems for comprehensive emotional assessment and response. The existing Speech Emotion Recognition (SER) provides limited performance due to inadequate frequency and time domain representation, poor correlation in global and local features, and contextual dependencies of components. The traditional SER techniques often result in poor accuracy due to spectral leakage, low-frequency resolution problems, and poor depiction of emotional speech’s pitch, intonation, and voice timbre. This paper presents a novel two-way feature extraction (TWFR) based SER system using 2D-CNN and 1D-CNN to improve the distinctiveness of emotional speech. The first set of features, a 2-D representation of the wavelet packet decomposition (WPD) coefficients, is given to a 2-D Deep Convolution Neural Network (DCNN). The second set of features comprises various time-domain, spectral, and voice-quality features given to 1D-DCNN. The features from the last layer of 2D-DCNN and 1D-DCNN are concatenated and provided to a fully connected layer, followed by a softmax classifier for SER. The results of the TWFR-based SER scheme are assessed on EMODB and RAVDESS datasets based on recall, precision, accuracy, and F1-score. The proposed TWFR-based SER shows an overall accuracy of 98.48% for EMODB and 98.71% for RAVDESS datasets. The proposed TWFR-based SER helps improve the speech’s pitch, intonation, and voice timbre in the spectral and time domain for SER and outpaces the current state of the arts.

Keywords Affective computing · Deep convolution neural network · Deep learning · Speech emotion recognition · Speech recognition · Speech analysis · Wavelet transform

✉ Mohanaprasad Kothandaraman
kmohanaprasad@vit.ac.in

¹ Vellore Institute of Technology, Chennai 600127, India

² Vellore Institute of Technology, Chennai, India

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Comparison of dual isolated converters with flyback converters for bidirectional energy transfer

Rahul Mapari¹, Kishor Bhargale¹, Sunil Somnath Kadlag², Rakesh Shrivastava³

¹Department of Electronics and Telecommunication Engineering, Pimpri Chinchwad College of Engineering and Research, Pune, India

²Amrutvahini College of Engineering (AVCOE), Sangamner, India

³Department of Electrical Engineering, Govindrao Wanjari College of Engineering and Technology, Nagpur, India

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ABSTRACT

This article demonstrates a proposed technique for improving single-stage rectifiers' power factor (PF) and controlling the load voltage in response to grid voltage and load changes. To alleviate the above problem, this article offers a novel bi-directional continuous switching pulse width modulation (CSPWM) and sinusoidal pulse width modulation (SPWM) based converter that can improve PF and reduce harmonics. This converter is evaluated based on two cases, Case I: CSPWM-based rectification and SPWM-based inversion scheme, and Case II: Rectification and inversion, both operations using the SPWM scheme. The proposed control scheme uses two Bi-directional IGBTs and two diodes, which are bridgeless, do not need a transformer, and are free from the output current sensor. The suggested scheme is simulated using MATLAB/Simulink and implemented on DSPic33FJ64mc802 platforms to validate the effectiveness of the proposed approach using two cases for a 1 KW system. The suggested control scheme provides improved PF, good voltage regulation, and depreciation in harmonics and total harmonic distortions (THD) compared to existing systems that enhance converter performance.

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Corresponding Author:

Rahul Mapari
Department of Electronics and Telecommunication Engineering
Pimpri Chinchwad College of Engineering and Research
Ravet, Pune, Maharashtra, India
Email: rahul.mapari@pccoer.in

1. INTRODUCTION

Most AC-DC power conversion applications need stabilized direct current (DC) output voltage with better steady state and transient response. The capacitor filter-based rectifier is simple and cheap; however, it degrades the supply voltage quality, compromising the response of other loads linked to it and producing other issues [1], [2]. Power electronics researchers have been inventing new ways for a superior efficacy interface since the mid-1980s to achieve these mandated standards. PF correction (PFC) circuits are the collective name for these new circuits. Power converters are essential for microgrids, smart grids, electric vehicles, industrial machinery, and commercial products [3]-[5].

A single-switch rectifier circuit is the most straightforward scheme for hysteresis current control where the band is increased [6], [7]. The two switches rectified have significantly improved over the traditional single ones [8], [9]. The typical AC-DC converter (rectifiers) use diodes but suffer from poor power quality, more considerable voltage distortions, inferior PF at primary input, low effectiveness, and bulky nature of alternating current (AC) and DC filters [10]. The Vienna rectifier generates a DC voltage across the two switches linked to the primary side of the transformer, which is represented by [11]-[13]. Even

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Novel 2-D Wavelet-Based Spectral-Temporal Representation for Deep Learning Based Stress Detection Using EEG Signal

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Abstract

A huge growth in global competition and relentless lifestyle leads to mental stress that affects the physical and mental health of people. Stress makes the brain more sensitive and may lead to a variety of illnesses affecting a person's physical, mental, and behavioural health. Since electroencephalogram (EEG) signals are the most straightforward, portable, and economical way to capture brain signals, they are widely employed for mental stress detection and emotion identification. Over the last ten years, a several of deep learning (DL) based stress detection methods have been used. However, inadequate intra-class disparity, insufficient distinguishing traits, poor temporal representation, and inappropriate channel selection restrict the systems' efficacy. In order to improve temporal representation, feature distinctiveness, and intra-inter class disparity, this research describes the use of deep convolutional neural networks (DCNNs) with 2-D wavelet packet transform (WPT) for mental stress detection. Additionally, it employs enhanced Spider Monkey Optimization (ISMO) with two competitive learning strategies—replacement of weak member (RWM) and spiralizer elite learning (SEL)—to improve the diversity of SMO solutions, algorithmic convergence, and the algorithm's search space by striking a balance between exploration and exploitation. The ISMO-WPT-DCNN outperforms the prior state of the arts with an accuracy of 97.54%, recall of 0.99, precision of 0.95, and F1-score of 0.97 for stress detection on the public Database for Emotion Analysis using the Physiological Signals (DEAP).

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DESIGN AND ANALYSIS OF SPIN-BASED LOGIC GATES FOR ENHANCING COMPUTATIONAL EFFICIENCY

PRITI JAGATSING RAJPUT^{1,2}, SHEETAL U. BHANDARI¹, GUL FAROZ AHMAD MALIK³

¹Department Of Electronics & Telecommunication Pimpri Chinchwad College Of Engineering, Pune, India.

²Department Of E&Tc Pimpri Chinchwad College Of Engineering & Research, Ravet, Pune, India.

³Department Of Electronics & Instrumentation Technology, University Of Kashmir, Srinagar, Jammu And Kashmir, 190006, India.

Email: ¹priti.Rajput21@Gmail.Com, ²sheetal.Bhandari@Pccoepune.Org, ³gfaroizam@Gmail.Com

ABSTRACT

Spin transistors (Spin-FETs) are a promising way to solve problems with non-volatility, speed, and power consumption in standard CMOS technology. The Spin-FET electrical model using InAs channel material with 800 nm and 820 nm channel lengths is briefly explained in this paper. Spin-FET local geometry can be used to execute digital logic functions according to the experimental analysis. The local geometry of the spin transistor is designed using the Datta-Das concept and the spin injection and detection theory. It is implemented using the Verilog-A language on a Cadence platform. Transient and DC analysis for various channel lengths have been used to validate the results. The power consumption and capacitance of the complementary spin-FET and conventional CMOS have also been compared. This permits the inverter and buffer gate to function with a complimentary spin-transistor. In contrast to other research, our study presents XNOR and XOR gates that are built using a single gate SFET control input technique. However, our design improves computational efficiency by using a novel technique to regulate spin-based logic gates.

Keywords — *Spin-FET Modeling, Local Geometry, Beyond CMOS Technology, Single Gate Spin-FET, Logic Gates, Complementary Spin-FET.*

1. INTRODUCTION

The researchers pay more attention to finding alternatives for low power consumption in conventional CMOS. The International Technology Roadmap for Semiconductors [1], [2] emphasizes the quest for innovative technologies that can replace complementary metal-oxide-semiconductor (CMOS) technology with lower power consumption and variability. One of the most promising solutions to the power problem beyond current CMOS technology is spintronics, which harnesses the magnetic property of electrons for information processing[3], [4]. In the last 20 years, there has been much interest in research into spin-FET, a fundamental spin-based device described by Datta and Das [5], [6]. The fundamental idea behind a spin-FET is to regulate the spin current passing through a semiconductor channel by applying an additional electric field. Several groups had previously conducted experiments to realize this spin-FET[7], [8]. The potential of implementing such a device is also provided by several theoretical derivations [9], [10].

The objective of this research is to model and design a single-gate spin-based logic device that provides low energy consumption with limited delay and retains logic states without refresh cycles. The device works for low-power

applications as well as nonvolatility. In this research, the electrical model has been developed for local geometry spin-FET to study the functionality of digital circuits using single gate spin-FET, which can be utilized for the digital design and modeling of logic circuits based on complementary spin-FETs using Computer Assisted Design (CAD) tool. Based on the Datta-Das theory[11] the theoretical derivations have been modeled using the Verilog-A language. Spin-FET channels were optimized with respect to the type of material used at the channel region. The DC analysis shows the variation in channel length and junction polarization, which gives optimal output voltage. However, the transient analysis proves the function works digitally for Ghz frequency. The local geometry model of spin-FET was used to perform a static simulation by creating a physical circuit. The parameters taken for the



Article

A Novel Optimized Hybrid Deep Learning Framework for Mental Stress Detection Using Electroencephalography

Maithili Shailesh Andhare ^{1,2,*}, T. Vijayan ¹, B. Karthik ¹ and Shabana Urooj ^{3,*}

¹ Department of Electronics Communication Engineering, Bharath Institute of Higher Education and Research, Chennai 600073, India; tvij16@gmail.com (T.V.)

² Department of Electronics and Telecommunication Engineering, Pimpri Chinchwad College of Engineering and Research Ravet, Pune 412101, India

³ Department of Electrical Engineering, College of Engineering, Princess Nourah bint Abdulrahman University, P.O. Box 84428, Riyadh 11671, Saudi Arabia

* Correspondence: maithili.andhare@pccoer.in (M.S.A.); smurooj@pnu.edu.sa (S.U.)

Abstract

Mental stress is a psychological or emotional strain that typically occurs because of threatening, challenging, and overwhelming conditions and affects human behavior. Various factors, such as professional, environmental, and personal pressures, often trigger it. In recent years, various deep learning (DL)-based schemes using electroencephalograms (EEGs) have been proposed. However, the effectiveness of DL-based schemes is challenging because of the intricate DL structure, class imbalance problems, poor feature representation, low-frequency resolution problems, and complexity of multi-channel signal processing. This paper presents a novel hybrid DL framework, BDDNet, which combines a deep convolutional neural network (DCNN), bidirectional long short-term memory (BiLSTM), and deep belief network (DBN). BDDNet provides superior spectral-temporal feature depiction and better long-term dependency on the local and global features of EEGs. BDDNet accepts multiple EEG features (MEFs) that provide the spectral and time-domain features of EEGs. A novel improved crow search algorithm (ICSA) was presented for channel selection to minimize the computational complexity of multichannel stress detection. Further, the novel employee optimization algorithm (EOA) is utilized for the hyper-parameter optimization of hybrid BDDNet to enhance the training performance. The outcomes of the novel BDDNet were assessed using a public DEAP dataset. The BDDNet-ICSA offers improved recall of 97.6%, precision of 97.6%, F1-score of 97.6%, selectivity of 96.9%, negative predictive value NPV of 96.9%, and accuracy of 97.3% to traditional techniques.

Keywords: deep convolutional neural network; human behavior; deep belief network; deep learning; long short-term memory; stress detection



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1. Introduction

Mental stress is an inexorable issue faced by human beings irrespective of age, religion, ethnicity, region, and gender. Mental stress affects and limits an individual's ability to disrupt daily routines [1]. In psychology, stress combines the perception of stress or a situation with the body's response to it. Stress is generally triggered when an individual encounters adverse conditions, such as mental, physical, or emotional stressors. The stressors were grouped into internal and external. Internal stressors depend on individual perceptions, thoughts, and personalities. External stressors include relationship problems; financial difficulties; work pressure; and professional, political, and religious pressures [2].

RESEARCH

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Person identification using novel local triangular binary pattern-based texture descriptor

Arti Tekade^{1,2*}, T. Vijayan¹, B. Karthik¹ and Anurag Mahajan³

*Correspondence:
 arti.tekade@gmail.com

¹Department of Electronics and Communication, Bharath Institute of Higher Education and Research, Chennai, India

²Department of Electronics and Tele-Communication, Pimpri Chinchwad College of Engineering and Research College Ravet, Pune, India

³Department of Electronics and Tele-Communication, Symbiosis Institute of Technology, Pune Campus, Symbiosis International (Deemed University), Pune, India

Abstract

Human authentication is a crucial part of most computer vision automation systems. Conventional fingerprint, iris, face, or palm print-based systems cannot identify individuals when their external biometric components are destroyed, such as by severe burns, rashes, or wounds. The main elements of any person authentication system are non-forgery, security, resilience, and privacy. The local texture descriptor is vital in describing hand radiographic images' texture. This paper presents the novel local triangular binary pattern based texture descriptor to provide a local texture description of the hand radiographic images. The performance of the proposed descriptor is assessed using different machine learning classifiers such as K-nearest neighbor (KNN), support vector machine (SVM), radial basis function-SVM (RBF-SVM), classification tree (CT), and random forest (RF) for authentication of the 20 users based on hand radiographs. The suggested system provides an overall accuracy of 84.17% for KNN, 90% for SVM, 91.35% for RBF-SVM, 92.50% for CT, and 96.67% for RF for the 20 users for the In-house hand radiographic dataset.

Keywords: Person authentication, Forensic science, Forensic hand radiography, Local binary pattern, Support vector machine

1 Introduction

Using computational techniques, authentication automatically determines the correct person based on attributes stored in computer systems. These features include hand prints, iris, leg prints, and face pictures. Natural disasters such as fires, tsunamis, severe accidental rashes, and traumas can cause damage to these biometric components, making it more challenging to identify the person. Hand bones may be utilized in situations like these to confirm an individual's identification, since burns, rashes, cuts, etc., do not easily damage them. The ante-mortem (AM) and post-mortem (PM) hand X-ray images that are stored in the database are often contrasted in forensic hand X-ray-based person recognition [1].

Biometric systems may function in several modes or just one mode. Unimodal biometric systems are less trustworthy, less secure, and have limited usability. Still, multimodal



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Commercial Automation Using RTOS-Based Architecture**Dr. Dipali Shende^{1*}, Vaishali Baste², Shital More³**¹ Assistant Professor, Department of E & TC, PCCOER, Ravet, India² Assistant Professor, Department of E & TC, SKNSCOE, Vadgaon, India³ Assistant Professor, Department of E & TC, SIT Lonavala, India***Corresponding Author****E-mail Id:- dipali.shende@pccoer.in****ABSTRACT**

The primary objective of this research is to introduce an RTOS-based architecture for data transmission between the host region and the industry area. RTOS is a process that takes place between hardware and software. It proposes a model which is used to monitor (Host Area) the different physical values in industrial plants and its assembling environment (Industry Area) by adding the functionality of an RTOS. In an electronics manufacturing facility, temperature control, security, and other factors are crucial. If an accident occurs, productivity will suffer. With the aid of the Wireless Module, a system built with an ARM processor, and a part of a Real Time Operating System (RTOS) based on Linux, this project seeks to address this issue by remotely monitoring the temperature and other physical parameter levels of various plant areas. Here in addition to detection of any faults, the preventive action is also taken by using the control system mechanism. These things will make the industry to operate properly by preventing the accidents in real time and to increase the level of production.

Keywords:- ARM-Advanced RIS C Machines; RTOS-Real Time Operating System; RTLinux-Real Time Linux; VB-Visual Basic

INTRODUCTION

The RTOS-implemented system has the capacity to multitask for task monitoring and task control. By modifying the kernel, the system can also add more apps. Therefore, system updates are also feasible as needed.[1][7] The most recent ARM Controller offers more advanced applications nowadays. The system can be connected through the wireless sensor network for monitoring remote area.

Due to warmth and humidity, the electronics industry and others have recently experienced significant problems. These problems include increased board oxidation and bridging, faulty soldering joints, and solder component flaws. Through these parameters, the

environment, in particular a few devices like desiccators and solder paste refrigerators for storing paste and bare PCBs, respectively, also has to be controlled. In order to increase a machine's efficiency, several factories try to keep the temperature under control. However, doing so can result in unanticipated accidents, poor product quality, and other problems.

Microcontroller-based interfaces and the monitoring and control system they enable are more expensive and less effective.[2][8] Also the response of the system is late which may sometimes lead to catastrophe. That means a real time response is missing part. Considering all these parameters the cost, efficiency,



Speech Emotion Recognition Using Generative Adversarial Network and Deep Convolutional Neural Network

Kishor Bhangale¹ · Mohanaprasad Kothandaraman¹

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Abstract

Speech emotion recognition (SER) has recently increased because of vast innovations in human–computer interaction and affective computing. In recent years, numerous deep learning-based schemes presented for SER have shown significant improvement over the traditional machine learning approaches. Most deep learning-based faced SER systems face challenges due to data imbalance problem that occurs due to unequal samples in the database. The input to two-dimensional CNN uses traditional MFCC for SER. It degrades the quality of deep attributes because of the higher variance, frequency resolution problem and spectral leakage problem of traditional MFCC. This paper proposed the novel Multi-taper Mel Frequency Logarithmic Spectrogram to enrich the Deep Convolutional Neural Network effectiveness for SER. Further, Generative Adversarial Network is used for speech emotion data augmentation during training to deal with data scarcity problems in SER. The performance of the proposed SER scheme is validated using the Berlin EmoDB and RAVDESS datasets. The proposed method provides SER accuracy of 96.65% and 97.12% for the EmoDB and RAVDESS dataset, respectively, and significantly improves over the recent techniques.

Keywords Data augmentation · Deep learning · Deep convolutional neural network · Generative adversarial network · Multi-taper Mel frequency spectrogram · Speech processing · Speech emotion recognition

✉ Mohanaprasad Kothandaraman
kmohanaprasad@vit.ac.in
Kishor Bhangale
kishorbarasu.bhangale2019@vitstudent.ac.in

¹ SENSE, VIT, Chennai, India

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Enhanced Network Classification of Brain Tumors Using the Transfer Learning Model and Aquila Optimization-Based Metaheuristics

Ms.Pallavi Gulabrao Patil, Dr. Pharindra Kumar Sharma

Research Scholar

Department of Computer Science and Engineering Nirwan University
Jaipur - 303305, Rajasthan, India pallavi.patil@nirwanuniversity.ac.in

Sharma Assistant Professor

Department of Computer Science and Engineering Nirwan University
Jaipur - 303305, Rajasthan, India iacs@nirwanuniversity.ac.in

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Abstract— Brain tumor classification is a challenging task due to the complexity of tumor characteristics, in tumor shapes, and limitations in image acquisition techniques in CNN. In this study, the Transfer Learning (TL) model is used to improve network classification accuracy and performance when applied to images of brain tumors. Also, to enhance the optimal result in classification, the TL hyperparameters are fine-tuned by the AQ-based Metaheuristics strategy. The results showed that, in terms of accuracy, sensitivity, and specificity, the proposed method performed better than other popular existing methods with a high exactness of 97.14 percent. The proposed method is evaluated and tested in brain tumor MRI dataset image.

Brain tumor classification is a challenging task due to the complexity of tumor characteristics, tumor shape variability, and limitations in imaging technology. This study used the Transfer Learning (TL) model to improve network classification accuracy and performance using brain tumor imaging. In addition, in order to enhance the optimal classification result, the TL hyperparameters are regulated by the Metaheuristics strategy based on the optimization of the Aquila. The results showed that the proposed method was more accurate, sensitive, and specific than the existing popular methods, with a high accuracy of 97.14 percent. The proposed method is evaluated and tested on the images of brain tumor MRI datasets.

Index Terms— Aquila Optimizer (AO), Convolutional Neural Networks (CNN), Transfer Learning (TL),

I. INTRODUCTION

In this paper, the novel work is proposed to perform a classification which is the second proposed work of this thesis. In this suggested study, the Transfer Learning (TL) model is used to improve network classification accuracy and performance when applied to images of brain tumors. Also, to enhance the optimal result in classification, the TL

hyperparameters are fine-tuned by the Aquila Optimization-based Metaheuristics strategy. Therefore, the performance of the AO-based TL classification is better than the traditional DL models. This chapter is contributed as follows: i) the TL basics and its working are presented, ii) the hyperparameters of TL method are explained, iii) the TL model is presented for brain tumor MRI image classification. This section carries out a discussion of four popular DL methods



Deep learning-based blood cell classification from microscopic images for haematological disorder identification

Nalini S. Jagtap¹ · Varsha Bodade² · Vijayalaxmi Kadroli² · Hemant Mahajan³ · Preeti P. Kale⁴ · Priya Pise⁵ · Amruta Hingmire⁶

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Abstract

Biomedicine struggles with blood-related disorders, although blood cells can reveal signs. Automatic health diagnosis and monitoring using artificial intelligence (AI) can save time and money compared to lab-based diagnoses. Many Machine Learning (ML) and Deep Learning (DL) methods have been designed. Due to its automation, precision, and reduced mistakes, DL-based methods are popular for research. However, existing DL-based schemes have encountered issues such as intra and inter-class variabilities, computational inefficiency, and other conventional problems of DL. To overcome these issues, a unique technique is presented for automated blood cell categorization from input microscopic images to accurately predict haematological disorders. The model is known as Improved Haematological Diseases Classification using DL (IHDC-DL). IHDC-DL classifies haematological diseases using raw microscopic blood cell images. The IHDC-DL model microscopic image pre-processing, EfficientNet-based feature engineering techniques, and classification. The unique pre-processing method addresses microscopic image intra- and inter-class variability. Optimized layer designing in a pre-defined EfficientNet DL model increases autonomous feature engineering and classification by reducing computational inefficiency. We implement the IHDC-DL model using two blood cell research datasets to compare it to state-of-the-art. The simulations show that the IHDC-DL model outperforms the state-of-the-art in classification and computing efficiency. According to the simulation findings, compared to recently presented methodologies, the suggested IHDC-DL model increased overall blood cell classification accuracy by 2.78% and decreased total processing time by 19.23%.

Keywords Blood cells · Deep learning · Haematological diseases · Microscopic images

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QMWT: Design of an Improved EEG Classification Model via Q-Learning Based Processing of Multispectral Wave Traits

Dr. Pranjali A. More¹ Dr. Sonali M. Sonavane² Dr. Anita S. Mahajan³ Dr. Yogendra Patil⁴
 Mrs. Shwetal K. Patil⁵ Mrs. Trupti T. Tekale⁶

¹ Anantrao Pawar College of Engineering and Research, Parvati, Pune, Maharashtra, India
 pranjali.amore@gmail.com

² G H Raisoni College of Engineering and Management, Pune, Maharashtra, India
 sonali.sonavane@raisoni.net

³ Ajeenkya D. Y. Patil School of Engineering, Lohgaon, Pune, Maharashtra, India
 anitadapke@gmail.com

⁴ Marathwada Mitra Mandals Institute of Technology, Lohgaon, Pune, Maharashtra, India
 patyogendra@gmail.com

⁵ Marathwada Mitra Mandals Institute Of Technology Lohgaon, Pune, Maharashtra, India
 patilshwetal.1311@gmail.com

⁶ Pimpri Chichwad College of Engineering and Research, Ravet, Pune, Maharashtra, India
 trupri.tekale@pccoer.in

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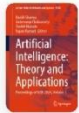
Abstract

Electroencephalogram (EEG) signals represent various wave patterns that assist in identification of normal & abnormal brain activities. These wave patterns consist of alpha waves, which indicate relaxation phases, beta waves, that indicate normal brain rhythms & can be disturbed due to cortical & other damages, delta waves, which are dominant in infants during sleep, & theta waves, which represent irregular metabolic & hydrocephalus activities in adults. A combination of these waves is capable of representing multiple brain conditions for both adolescents & adults. Various models have been proposed by researchers to analyze these signals, and most of them work on single or bi-domain features, which limits their classification performance. Most of these models are also static, and do not incorporate continuous feedback & incremental processes. Due to which their precision & recall performance is either constant or reduces w.r.t. newer evaluations. To overcome these limitations, this text proposes design of a novel EEG classification model that uses Q-Learning for classification of multispectral feature sets. The model extracts Mel Frequency Cepstral Coefficients (MFCC), and iVector features from raw EEG data, which assists in multispectral representation of these signals. The extracted features are classified via Q-Learning based Recurrent Neural Network (RNN) classifier, that combines Gated Recurrent Unit (GRU), and Long-Short-Term Memory (LSTM) based feature sets. Due to extraction of MFCC, the GRU & LSTM Models are able to identify power spectral variation, cepstral variations, spectrogram patterns, DCT (Discrete Cosine Transform) variations, etc. While, due to iVector, entropy variations are recognized and processed for better accuracy levels. Thus, both LSTM & GRU Models assist in augmenting extracted features, which improves feature variance for better classification performance. Results of these classifications are feedback into the training set via a correlation-based analysis layer, that assists in

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Data Validation Using Decomposition Technique for Data Transfer Network

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pp 13–30 | [Cite this conference paper](#)

**Artificial Intelligence: Theory
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(AITA 2024)

Maya P. Shelke , Madhuri Kethari, Aparna Mete, Trupti Tekale & Renuka Patil



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Abstract

The intricacy and various phases of information move organizations can make it hard to confirm information uprightness, fulfillment, and requesting. Disintegration can address this test by separating the information move network into more modest, more reasonable parts. The motivation behind this article is to propose a strategy for checking information uprightness, culmination, and requesting in a summed up information move network utilizing decay. The methodology includes separating the organization into more modest parts, characterizing the information stream among them, and creating testing strategies for every part. To guarantee information respectability, fulfillment, and requesting, checksums, robotized tests, and different techniques might be utilized. Testing techniques for every part can be consolidated to foster a general testing system for the information move organization. In this strategy, uprightness of information move organizations can be checked and kept up with after some time. As well as giving a valuable instrument to guaranteeing information exactness and culmination, the proposed approach can be applied to a large number of information move organizations.

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Survey Paper: Fine-Grained Sentiment Analysis Using Attention Mechanisms in Machine Learning and Deep Learning

Priyanka Pravin Patil

Research
Scholar at School of Computer & System Sciences
JNU, Jaipur, Rajasthan
Asst. Professor, PCCOER Ravet
✉ priyanka.pawar51@gmail.com

Sunil Gupta

Professor & HOD
School of Computer & System Sciences
JNU, Jaipur, Rajasthan
✉ sunilg95@rediff.co

ABSTRACT

Fine-grained sentiment analysis has gained significant attention in natural language processing (NLP) due to its ability to capture nuanced sentiment, such as emotional shades and aspect-level sentiments. Recent advancements in machine learning (ML) and deep learning (DL) have leveraged attention mechanisms to improve the performance of these tasks. Attention mechanisms enable models to focus on the most relevant parts of input text, enhancing their ability to perform tasks like aspect-based sentiment analysis and fine-grained classification. This survey paper discusses recent techniques, algorithms, and challenges in fine-grained sentiment analysis using attention mechanisms, highlighting studies from 2019 to 2024. The review also identifies gaps in current research and suggests potential directions for future studies.

KEYWORDS : *Telmisartan, First order derivative, UV- Spectrophotometry, Validation.*

INTRODUCTION

Sentiment analysis involves determining the emotional tone expressed in a piece of text. While traditional sentiment analysis focuses on classifying text as positive, negative, or neutral, fine-grained sentiment analysis seeks to classify sentiments with higher precision, accounting for subtle differences such as intensity, sarcasm, or mixed emotions. Fine-grained sentiment analysis becomes more complex when dealing with multiple aspects, where different segments of text convey distinct sentiments about different aspects of a subject. For example, in a product review, one part may praise the quality, while another may criticize the price. To address these challenges, attention mechanisms have become a crucial component in enhancing model performance, enabling the model to focus on the relevant aspects of input data. This paper reviews the state-of-the-art approaches in fine-grained sentiment analysis using attention

mechanisms in both machine learning and deep learning models. The focus is on recent studies that utilize attention mechanisms for aspect-based sentiment analysis, emotional shade identification, and nuanced sentiment classification.

FINE-GRAINED SENTIMENT ANALYSIS TECHNIQUES

2.1 Attention Mechanisms in Sentiment Analysis

Attention mechanisms allow models to prioritize certain words or phrases in a sentence based on their importance for the given task. This approach is particularly effective for sentiment analysis, as the sentiment of a sentence may not always be conveyed by the overall context but rather by specific words or phrases. Attention mechanisms help improve the focus of the model, leading to more accurate sentiment predictions

Algorithms Leveraging Attention Mechanisms

Table 1 Research paper Analysis of techniques to find out sentiment

Sr. No	Year	Title of study	Algorithm/Technique	Data set /Source	Gap Analysis
1	2024	Dual-Perspective Fusion Network for Aspect-Based Multimodal Sentiment Analysis	dual-perspective fusion network(DPFN)with local and global sentiment	Twitter datasets	Sentiment-related information from different modalities.



Biodiesel Blends: A Sustainable Solution for Diesel Engine Performance Improvement

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Rama Bhadri Raju Chekuri³,
Govindarajan Murali⁴, Prajakta Pawar¹, Abhishek Raosaheb Patil⁵, Shital Yashwant Waware¹
and Rahul Shivaji Yadav⁶

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Sagi Rama Krishnam Raju Engineering College, Bhimavaram - 534204, Andhra Pradesh, India

⁴Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur - 522502, Andhra Pradesh, India

⁵Department of Mechanical Engineering, Shivganga Charitable Trust, Sangli's Vishveshwarya Technical Campus, Miraj - 416420, Maharashtra, India

⁶Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

Abstract

Recent studies have highlighted the significant potential of biodiesel as a sustainable and environmentally friendly alternative to conventional diesel, which has been in widespread use for decades. This research focused on a detailed experimental analysis of the performance characteristics of a diesel engine using biodiesel blends derived from sunflower, palm, and corn oils. The engine was tested under varying load conditions at a constant speed, with key performance parameters such as torque, brake power, Brake Specific Fuel Consumption (BSFC), brake thermal efficiency, total fuel consumption, and exhaust temperature meticulously recorded and analysed. The results showed that all biodiesel blends outperformed pure diesel in terms of BSFC, exhaust temperature, and brake thermal efficiency, offering clear economic benefits over traditional diesel. Moreover, a significant reduction in nitrogen oxide (NO_x) emissions was observed with biodiesel blends, underlining their environmental advantages. These findings add to the growing evidence supporting biodiesel as a viable energy sustainability and environmental protection solution. The study's outcomes have the potential to shape future policies aimed at reducing carbon emissions and encouraging cleaner combustion technologies in diesel-dependent sectors, marking an essential step toward sustainable energy aligned with global environmental objectives.

Major Findings: Biodiesel blends derived from sunflower, palm, and corn oils demonstrated superior performance compared to pure diesel, with enhanced brake thermal efficiency, lower BSFC, and reduced exhaust temperatures. Significant reductions in NO_x emissions highlight biodiesel's potential as a sustainable and environmentally friendly alternative to conventional diesel, aligning with global energy and environmental goals.

Keywords: Biodiesel, Diesel Engine, Emission, Fuel Consumption, Performance, Renewable Energy, Sustainable Fuel, Thermal Efficiency

*Author for correspondence



Impact of PCM on Heat Dissipation from IC Chips

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Mayuri Tushar Deshmukh³,
Prashant Ashok Patil¹, Swapnil S. Chaudhari⁴, Arjun Arun Kadam⁵, Ashadevi Sopan Dolas⁶,
Rupesh Gangadhar Mahajan⁷, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri - 411018, Pune, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Electronics and Telecommunication Engineering Department, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

⁴Department of Computer Engineering, Marathwada Mitramandal's Institute of Technology, Lohgaon, Pune - 411047, Maharashtra, India

⁵Department of Mechanical Engineering, Arvind Gavali College of Engineering, Satara - 415015, Maharashtra, India

⁶Department of Chemistry, Rayat Shikshan Sanstha's Karmaveer Bhaurao Patil College (Empowered autonomous), Sector-15-A, Vashi, Navi Mumbai - 400703, Maharashtra, India

⁷Department of Computer Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri - 411018, Pune, Maharashtra, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

Abstract

This study systematically investigates the thermal performance of nine Integrated Circuits (ICs) arranged in symmetric and asymmetric configurations on a substrate board. The analysis considers two scenarios: with and without the incorporation of Phase Change Material (PCM). The ICs were subjected to varying heat flux levels to assess their thermal behavior under different operating conditions. Results indicate that the temperature of the ICs is significantly influenced by factors such as IC size, positional arrangement, and the magnitude of the applied heat flux. The study also examines the role of the non-dimensional geometric distance parameter (λ), which varies with both IC size and location on the substrate. At a specific λ value of 0.19, notable temperature reductions were observed. Without PCM, temperature reductions of 18.79% and 26.48% were recorded at airflow velocities of 3 m/s and 5 m/s, respectively. The integration of PCM led to further enhancements, achieving reductions of 23.58% at 3 m/s and 32.47% at 5 m/s. These findings underscore the effectiveness of PCM in improving thermal management by efficiently absorbing and dissipating heat. Further statistical analysis revealed a strong correlation between the non-dimensional temperature parameter (θ) and λ , with a coefficient of determination (R^2) of 0.97 and a Root Mean Square (RMS) error of 0.012%. Higher λ values consistently correlated with lower peak IC temperatures, suggesting that increasing the spatial separation between heat-generating components enhances heat dissipation and overall thermal performance. These

*Author for correspondence



Investigating the Impact of Oxygenated Additives on Exhaust Emissions from Unleaded Gasoline Vehicles

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Prachi Narendra Raut³, Ashadevi Sopan Dolas⁴, Govindarajan Murali⁵, Sagar Arjun Dalvi⁶, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁷

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Chemistry, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

⁴Department of Chemistry, Rayat Shikshan Sanstha's Karmaveer Bhauroao Patil College (Empowered autonomous), Sector-15-A, Vashi, Navi Mumbai - 400703, Maharashtra, India

⁵Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt), Andhra Pradesh - 522502, India

⁶Department of Mechanical Engineering, Abhinav Education Society's College of Engineering and Technology (Degree), Wadwadi, Satara - 412801, Maharashtra, India

⁷Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

Abstract

The rapidly increasing global population, combined with a corresponding increase in power plants, factories and automobiles, has led to a significant decline in air quality. This issue first came to the forefront in the Los Angeles basin during the late 1940s, primarily due to the region's high population density and unique meteorological conditions. The combination of industrial and vehicular emissions with the prevalent fog resulted in the formation of smog. In response to this growing concern, California began implementing emission standards in the 1960s. Researchers have explored various methods to mitigate emissions from internal combustion engines. One such approach involves the utilisation of oxygen-containing additives to enhance gasoline performance and reduce harmful emissions. This study aims to determine the potential of Dimethyl Carbonate (DMC) as an additive in reducing emissions. To achieve this objective, an experimental setup was established using a multi-cylinder, four-stroke spark ignition engine to test fuel blends containing DMC.

Major Findings: The findings of this investigation revealed that gasoline blended with DMC exhibits lower levels of Carbon Monoxide (CO) and Hydrocarbon (HC) emissions compared to standard unleaded gasoline. However, the impact of DMC on Nitrogen Oxide (NOx) emissions appears to be negligible.

Keywords: Air Pollution, Dimethyl Carbonate (DMC), Emission Standards, Exhaust Emissions, Fuel Additives, Internal Combustion Engine, Oxygenated Additives, Smog

*Author for correspondence



Passive Cooling of EV Batteries Using Phase Change Material: A Simulation Study

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Sagar Arjun Dalvi³, Pallavi Vishnu Kharat⁴, Nilesh Ambaji Jadhav⁵, Varsharani Dilip Shelkande⁶, Govindarajan Murali⁷, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Abhinav Education Society's College of Engineering and Technology (Degree), Wadwadi, Satara - 412801, Maharashtra, India

⁴Civil Engineering Department, Ajeenkya D Y Patil School of Engineering, via Lohegaon, Charoli Budruk, Pune - 412105, Maharashtra, India

⁵Department of Mechanical Engineering, Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁶Department of Electronics and Telecommunication Engineering, Dr D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

⁷Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar - 411052, Maharashtra, India

Abstract

The escalating global concerns regarding environmental degradation and climate change are accelerating the shift towards renewable energy sources. Traditional gas-powered vehicles, significant contributors to air pollution and global warming are being increasingly replaced by Electric Vehicles (EVs) as a more sustainable transportation solution. However, one significant challenge associated with EVs is the thermal management of their batteries. To address this issue, this study employed computer simulations to evaluate a passive cooling system for EV batteries, utilising a special material known as a Phase Change Material (PCM). The system's performance was assessed under three different power discharge rates. The results demonstrated that the PCM-based cooling system effectively reduced the maximum temperature increase in the battery by 1-2% compared to an unprotected battery. This indicates that the system efficiently dissipates heat from the battery, thereby improving its overall performance and lifespan.

Major Findings: 1. Effective Thermal Management: The study demonstrates the effectiveness of a PCM-based cooling system in reducing the maximum temperature rise in lithium-ion battery cells, particularly under high discharge rates. 2. Improved

*Author for correspondence

Simulation and analysis of heat transfer in counter-flow helical double-pipe heat exchangers using CFD

Anant Sidhappa Kurhade , Gulab Dattarao Siraskar, Parimal Sharad Bhambare, Govindarajan Murali, Sushil Vijaykumar Deshpande, Pushparaj Sunil Warke

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
Abstract

Heat exchangers play a vital role in industrial applications by facilitating efficient thermal energy exchange between two distinct fluid streams. These fluids are separated by a solid barrier, which prevents mixing, conserves energy and reduces operational costs. To enhance the efficiency of heat exchangers, wire inserts are often incorporated into the fluid paths. These inserts increase turbulence, improve fluid mixing, and boost heat transfer rates, making the system more effective. In this study, a counter-flow helical double-pipe heat exchanger was analyzed using Computational Fluid Dynamics (CFD) through the simulation software Ansys CFX. The simulations were conducted for cold fluid temperatures ranging from 12°C to 22°C and hot fluid temperatures between 32°C and 52°C, with Reynolds numbers varying from 5×10^3 to 45×10^3 to capture a broad spectrum of flow behaviors. The CFD model demonstrated excellent agreement with experimental results, achieving high correlation coefficients of 0.96 for the hot fluid and 0.95 for the cold fluid. This high level of accuracy validates the robustness of the model in predicting real-world heat transfer dynamics. The inclusion of wire inserts within the cold fluid flow path played a critical role in enhancing heat exchanger performance. By inducing turbulence, the wire inserts disrupted the thermal boundary layer, allowing for greater heat transfer between the hot and cold streams. This resulted in a substantial improvement in heat transfer rates, reaching a 25% increase under optimized conditions. This also led to an improved temperature difference between the fluid at the inlet and outlet, optimizing the thermal performance of the

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Turbulence model comparison and optimal geometry identification in trapped vortex combustors: A RANS-based study

Gulab Dattrao Siraskar, Anant Sidhappa Kurhade  Govindarajan Murali, M. Arul Prakash, N. Bharathiraja, Dipa Dattatray Dharmadhikari, and Shital Yashwant Waware

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Abstract

This study presents a detailed numerical investigation of the flow dynamics and



Enhancement in Heat Transfer with Nanofluids in Double-Pipe Heat Exchangers

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Milind Manikrao Darade³,
Govindarajan Murali⁴, Tejasvini Rahul Katkar⁵, Suhas Prakashrao Patil⁶, Girish Anant Charwad⁷,
Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Civil Engineering Department, ABMSP's Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁴Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur District - 522502, Andhra Pradesh, India

⁵Department of Electronics and Telecommunication Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

⁶Department of Mechanical Engineering, Arvind Gavali College of Engineering, Satara - 415015, Maharashtra, India

⁷Department of Applied Art, Bharati Vidyapeeth's College of Fine Arts, Pune - 411043, Maharashtra, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar - 411052, Maharashtra, India

Abstract

This study investigates the potential of using nanofluids, specifically those composed of water and Titanium Dioxide (TiO₂) nanoparticles, to enhance the thermal performance of a double-pipe copper heat exchanger. By incorporating varying concentrations of TiO₂ nanoparticles (0.1%, 0.3% and 0.5%) into water, the researchers aimed to improve the fluid's thermal conductivity and viscosity. The experimental results demonstrated that the addition of TiO₂ nanoparticles led to a significant increase in the overall heat transfer rate. The highest heat transfer rate was achieved at a nanoparticle concentration of 0.3%, indicating an optimal balance between enhanced thermal properties and potential flow resistance. However, a slight decrease in heat transfer rate was observed at a concentration of 0.5%, suggesting that higher concentrations may not necessarily lead to further improvements. The study further revealed a substantial 23% improvement in the efficiency of the heat exchanger when using the 0.3% TiO₂ nanofluid. This enhancement is attributed to the improved thermal conductivity of the nanofluid, which allows for more efficient heat transfer between the hot and cold fluids. In conclusion, the findings of this research strongly suggest that TiO₂/water nanofluids can significantly enhance the performance of double-pipe heat exchangers. By carefully optimising the nanoparticle concentration and flow conditions, it is possible to achieve substantial gains in thermal efficiency while minimising potential drawbacks such as increased pressure drop.

Major Findings: This study explored the use of TiO₂/water nanofluids to enhance heat transfer in a double-pipe heat exchanger. The addition of TiO₂ nanoparticles significantly improved heat transfer, with an optimal concentration of 0.3% leading to a 23% increase in efficiency. However, higher concentrations, while improving thermal conductivity, may lead to increased pressure drop, potentially offsetting the benefits.

*Author for correspondence



Failure Investigation of the Driving Shaft in an Industrial Paddle Mixer

Sukhadip Mhankali Chougule^{1,2}, Govindarajan Murali^{1*} and Anant Sidhappa Kurhade^{3,4}

¹Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India; muralinitt@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

⁴School of Technology and Research, Dr. D. Y. Patil Dnyan Prasad University, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

Abstract

This study focuses on the failure analysis and structural evaluation of the shaft in a double-shaft paddle mixer, a vital component in industrial mixing processes used in food processing, fertilizer production, and pharmaceutical manufacturing. The mixer is designed to blend materials of different densities, sizes, and viscosities efficiently through a centrally mounted horizontal shaft that rotates inside a cylindrical chamber. The system includes paddles for agitation, feed openings for material input, and a discharge valve for controlled output. A primary concern in this research is the mechanical failure of the driving shaft, which transmits power from the motor via a gear drive. Structural weaknesses and failure mechanisms were investigated by analysing system pressure, bending moments, and externally applied forces. Stress distributions were computed to identify critical failure locations that could compromise the shaft's integrity. A three-dimensional (3D) model of the shaft was developed using Pro-E software to enhance accuracy. Finite Element Analysis (FEA) was performed using ANSYS 13.0 to determine stress distribution, deformation, and failure-prone regions under operational loads. The numerical results were cross-verified with theoretical calculations based on ASME design codes to validate the structural adequacy. A shaft prototype was fabricated and tested under actual operating conditions to confirm the computational findings further. Experimental results closely matched FEA predictions, proving the effectiveness of the proposed design modifications. The optimised shaft exhibited increased durability, improved structural integrity, and enhanced performance. This research underscores the importance of virtual simulations before manufacturing, demonstrating how predictive analysis minimises failure risks. The study contributes to cost-efficient, time-saving design improvements, reducing material waste while ensuring the reliability of industrial mixing systems. These findings have broad implications for improving durability and efficiency in mechanical systems.

Major Findings: The study identifies excessive bending moments, torsional stress, material fatigue, and improper loading conditions as primary causes of shaft failure. A FEA using ANSYS 13.0 was conducted, and results were validated through experimental testing, confirming the reliability of design modifications. The optimised shaft design enhances durability, structural integrity, and operational efficiency, reducing failure risks and improving industrial mixing performance.

Keywords: Bending Moment, Failure Analysis, Finite Element Analysis (FEA), Gear Drive, Shaft Design, Structural Evaluation

*Author for correspondence



Finite Element Analysis and Design Optimization of a Paddle Mixer Shaft

Sukhadip Mhankali Chougule^{1,2}, Govindarajan Murali^{1*} and Anant Sidhappa Kurhade^{3,4}

¹Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India; muralinitt@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

⁴School of Technology and Research, Dr. D. Y. Patil Dnyan Prasad University, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

Abstract

Mixing operations play a vital role in various industrial processes, with the structural integrity of mixer shafts being crucial for optimal performance and reliability. This study investigates the design, modeling, and Finite Element Analysis (FEA) of a paddle mixer shaft, comparing two configurations—one with stiffeners and one without. The shaft assembly, including components such as the pipe, end shafts, stiffeners, and paddles, was modeled using Pro-E software, while ANSYS 13.0 was used for FEA to assess stress distribution, deformation, and structural performance under applied loading conditions. A static analysis was conducted, considering self-weight, gravity, and applied pressure of 0.77 MPa, with uniform boundary conditions applied to both configurations. The results indicate that the stiffened paddle shaft exhibited lower maximum stress (105.26 MPa) and deformation (1.5 mm) compared to the shaft without stiffeners (173.05 MPa stress and 2.1 mm deformation). Theoretical calculations confirmed that stress values remained within permissible limits for Stainless Steel (SS), making the stiffened shaft the preferred design. Additionally, the study explores potential weight reduction by replacing SS with carbon/epoxy composite materials, demonstrating significant weight savings while maintaining structural integrity. Manufacturing processes, material specifications, and experimental validation through hydrostatic and load trials confirmed the reliability of the selected design. The trials showed an 8% deviation between experimental and simulated deformation, reinforcing the accuracy of the FEA approach. This research underscores the importance of structural reinforcement in paddle mixer shafts and provides valuable insights into design optimization, material selection, and performance validation. Future studies could explore further weight reduction using advanced composites, ensuring both durability and cost-effectiveness.

Major Findings: The study revealed that the stiffened paddle shaft exhibited superior structural performance, with lower maximum stress (105.26 MPa) and deformation (1.5 mm) compared to the unstiffened shaft (173.05 MPa stress and 2.1 mm deformation), highlighting the effectiveness of stiffeners in enhancing structural integrity. Experimental validation through a hydrostatic test at 7.7×10^{-2} MPa showed an 8% deviation between Finite Element Analysis (FEA) predictions and experimental results, confirming the accuracy of the simulation approach. Additionally, the study explored the potential of replacing stainless steel with carbon/epoxy composites, demonstrating significant weight reduction while maintaining mechanical strength and durability, offering insights into future lightweight design optimizations.

Keywords: ANSYS, Composite Materials, Design Optimization, Experimental Validation, Finite Element Analysis, Manufacturing, Paddle Mixer Shaft, Structural Reinforcement

*Author for correspondence



Harnessing the Power of Plastic Waste: A Sustainable Approach to Fuel Production

Anant Sidhappa Kurhade^{1*}, Pallavi Vishnu Kharat², Sukhadip Mhankali Chougule³,
Milind Manikrao Darade⁴, Madhuri Mohanrao Karad⁵, Govindarajan Murali⁶,
Girish Anant Charwad⁷, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Civil Engineering Department, Ajeenkya D. Y. Patil School of Engineering, via Lohegaon, Charoli Budruk, Pune - 412105, Maharashtra, India

³Department of Mechanical Engineering, Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

⁴Civil Engineering Department, Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁵Department of Electronics and Telecommunication Engineering, Dr D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

⁶Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India

⁷Department of Applied Art, Bharati Vidyapeeth's College of Fine Arts, Pune - 411043, Maharashtra, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar - 411052, Maharashtra, India

Abstract

The rapid pace of economic growth has placed immense strain on our planet's resources. Our current reliance on fossil fuels, such as oil, gas, and coal, is unsustainable and poses significant environmental risks. Fortunately, a multitude of renewable energy alternatives, including biomass, hydropower, and wind energy, offer promising solutions. In addition to energy production, effective waste management is crucial. The surge in industrial and consumer activity has led to a dramatic increase in waste generation, particularly plastic waste. The widespread use of plastics, due to their versatility and affordability, has resulted in a global plastic crisis. In 2019 alone, a staggering 299 million tons of plastic were produced worldwide, a significant increase from previous years. Despite recycling efforts, a substantial amount of plastic waste ends up in landfills and oceans, causing severe environmental damage. It is estimated that between 10 and 20 million tons of plastic pollute our oceans annually, leading to the accumulation of over 5 trillion plastic particles. Our project aims to address this pressing issue by developing a sustainable solution to convert plastic waste into valuable biofuel. Through a process known as pyrolysis, we can extract oil and diesel from unsorted and dirty plastic, producing a product called Plastic Pyrolyzed Oil (PPO). This biofuel can be sold at competitive prices, making it a viable alternative to traditional fossil fuels. Both plastics and petroleum-derived fuels are primarily composed of hydrocarbons, making them chemically similar. By harnessing the power of pyrolysis, we can break

*Author for correspondence

Dynamic simulation and performance evaluation of vibratory bowl feeders integrated with paddle shaft mechanisms

Sukhadip Mhankali Chougule^{1,2}, Govindarajan Murali^{1*} ,
 Anant Sidhappa Kurhade^{3,4} 

¹ Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt), 522502, Andhra Pradesh, India

² Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, 412101, Maharashtra, India

³ Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune, 411018, Maharashtra, India

⁴ School of Technology and Research, Dr. D. Y. Patil Dnyan Prasad University, Pimpri, Pune, 411018, Maharashtra, India

* Corresponding author's e-mail: muralinitt@gmail.com

ABSTRACT

Vibratory bowl feeders play a crucial role in automated manufacturing by efficiently orienting and transporting parts. This study investigates the performance of a vibratory bowl feeder through both experimental and simulation-based analysis. The system's efficiency was evaluated at different frequencies ranging from 47 Hz to 79.75 Hz, comparing actual and simulated results for parts per minute and time required to process 200 parts. The findings reveal discrepancies between actual and simulated outputs, with the actual parts per minute ranging from 30 to 160, while simulation results varied from 40 to 200. Similarly, the time for processing 200 parts decreased from 15.3 minutes at 47 Hz to 2.2 minutes at 79.75 Hz, whereas the simulated time ranged from 7.8 to 1.0 minutes. Dynamic simulation and FEA-based performance analysis were conducted to optimize the shaft design of a double shaft paddle mixer, enhancing durability and efficiency in industrial mixing applications. The study highlights the potential of advanced simulation tools in optimizing vibratory feeder performance, enabling real-time adjustments for improved efficiency. Future enhancements include the integration of machine learning and control adaptability to refine operational accuracy and adaptability.

Keywords: vibratory bowl feeder, automation, assembly, sorting, orientation, material handling, dynamic simulation.

INTRODUCTION

Automation plays a crucial role in optimizing manufacturing and assembly operations in the modern industrial sector. Effective material handling and component feeding systems contribute to higher production rates, reduced reliance on manual labor, and enhanced product uniformity. Among various automation solutions, vibratory bowl feeders are instrumental in precisely feeding and orienting small mechanical components, such as nuts and bolts, ensuring smooth integration into automated assembly lines. Manufacturers often face challenges in efficiently handling

and feeding small components in automated systems. The key issues include high costs associated with multiple feeder systems, frequent jamming, and misalignment due to improper part orientation, excessive noise and vibration-induced wear, irregular feed rates leading to production slow-downs, and limited flexibility in accommodating different component shapes and sizes. Addressing these challenges necessitates the development of a versatile and optimized vibratory bowl feeder that enhances precision, minimizes operational expenses, and reduces downtime. A vibratory bowl feeder uses controlled vibrations to move components along a spiral track, systematically



Green Adsorbents for Heavy Metal Removal: A Study on Zinc Ion Uptake by *Tinospora cordifolia* Biocarbon

Prachi Narendra Raut^{1*}, Ashadevi Sopan Dolas², Sukhadip Mhankali Chougule³,
Milind Manikrao Darade⁴, Govindarajan Murali⁵, Shital Yashwant Waware⁶ and
Anant Sidhappa Kurhade⁶

¹Department of Chemistry, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; raut.prachee@gmail.com

²Department of Chemistry, Rayat Shikshan Sanstha's Karmaveer Bhaurao Patil College (Empowered Autonomous), Sector-15-A, Vashi, Navi Mumbai - 400703, Maharashtra, India

³Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

⁴Civil Engineering Department, Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁵Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India

⁶Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

Abstract

Heavy metal pollution in water bodies poses a significant threat to human health. Exposure to heavy metals like lead, mercury, cadmium, and arsenic can lead to severe health issues. To address this pressing environmental concern, this study investigates the potential of *Tinospora cordifolia* as a low-cost biosorbent for heavy metal removal. By examining the influence of factors like pH (5.0), adsorbent dose (3.0 g), and contact time (150 minutes), the study aims to optimize the biosorption process. The findings demonstrate the effectiveness of *Tinospora cordifolia* in removing heavy metals from wastewater, highlighting its potential as a sustainable and environmentally friendly solution for water purification. Furthermore, activated carbon derived from *Tinospora cordifolia* was found to be highly efficient in removing Zn(II) ions from synthetic wastewater. This biosorption technique is not only effective but also straightforward and rapid, offering a powerful approach to mitigate heavy metal contamination. The promising results of this study support the potential for further application of *Tinospora cordifolia*-based activated carbon in water purification efforts, especially in the treatment of zinc and potentially other heavy metals. The study targeted zinc (Zn II) ions in synthetic wastewater. The results showed that activated carbon derived from *Tinospora cordifolia* was highly effective in removing zinc, especially under optimal conditions.

Major Findings: *Tinospora cordifolia* proved to be an effective and low-cost biosorbent for removing heavy metals from wastewater. Optimal conditions for maximum metal removal were identified, including a pH of 5.0, an adsorbent dose of 3.0 g, and a contact time of 150 minutes. Activated carbon derived from *Tinospora cordifolia* exhibited high efficiency in removing Zn(II) ions from synthetic wastewater.

Keywords: Adsorption, Heavy metals, Pollution, *Tinospora cordifolia*, Zinc

*Author for correspondence

Predicting Heat Transfer Enhancement with Twisted Tape Inserts Using Fuzzy Logic Techniques in Heat Exchangers

Anant Sidhappa Kurhade^{1*}, Gulab Dattarao Siraskar², Milind Manikrao Darade³, Jyoti R. Dhumal⁴, Chaitrali Surendra Kardile⁵, Ramdas Biradar⁶, Suhas Prakashrao Patil⁷ and Shital Yashwant Waware¹

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Civil Engineering Department, Nagnathappa Halge College of Engineering, Parli Vaijnath - 431515, Maharashtra, India

⁴Department of Computer Engineering, Sinhgad Institute of Technology, Kusgaon(Bk), Lonavala, Pune - 410401, Maharashtra, India

⁵Department of Computer Engineering, Dr. D. Y. Patil Institute of Technology Pimpri, Pune - 411018, Maharashtra, India

⁶School of Engineering and Technology, PCET's Pimpri Chinchwad University, Sate, Pune - 412106, Maharashtra, India

⁷Department of Mechanical Engineering, Arvind Gavali College of Engineering, Satara - 415015, Maharashtra, India

Abstract

Fuzzy logic, introduced by Lotfi Zadeh in 1965, is a powerful method for modelling complex experiments. This study utilizes fuzzy logic to simulate and predict heat transfer in a double-pipe heat exchanger equipped with wavy inserts. The inserts, in the form of twisted tapes, have varying twist ratios ($TR=9, 7, 6$). The study investigates a range of Reynolds numbers (Re) from 6000 to 18000, with friction factors ranging from 0.03620 to 0.08231, and Nusselt numbers (Nu) between 66.13 and 253.28. The results for different twist ratios are compared to the ideal case. The experimental results indicate that the highest heat transfer occurs with a twist ratio of 6, leading to a significant increase of 162% in the Nusselt number and a 36.21% rise in the friction factor compared to the ideal scenario. In the fuzzy logic framework, the input variables are the twist ratio (Tr), temperature, and Reynolds number (Re), while the output variables are the friction factor (f) and Nusselt number (Nu). The study demonstrates that the Mamdani fuzzy inference system is an exceptionally effective tool for predicting experimental outcomes, given its low error rate. Upon analysing the data, it is observed that the graphs plotting the Nusselt number versus Reynolds number and friction factor versus Reynolds number, derived from both experimental data and the fuzzy logic model, exhibit nearly identical trends with a margin of error of just 3%. This high level of accuracy underscores the reliability of the fuzzy logic model in replicating the experimental results.

Keywords: Fuzzy Logic, Heat Transfer, Mamdani Inference System

*Author for correspondence



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Computational Study on Thermal Management of IC Chips with Phase Change Materials

Anant Sidhappa Kurhade^{1,*}, Parimal Sharad Bhambare², Gulab Dattrao Siraskar³, Swati Mukesh Dixit⁴, Pramod S. Purandare⁵, Shital Yashwant Waware¹

- ¹ Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology Pimpri, Pune, 411018, Maharashtra, India
² Department of Mechanical and Industrial Engg, College of Engineering, National University of Science and Technology, Muscat, Oman
³ Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, 412101, Maharashtra, India
⁴ Department of Electronics and Telecommunication Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune, 411018, Maharashtra, India
⁵ Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune, 411052, Maharashtra, India

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ABSTRACT

This paper introduces an implicit transient numerical formulation for a novel passive thermal management system designed to cool heterogeneous IC chips on a substrate board using minichannels. The design incorporates phase change materials (PCM) within minichannels placed around the IC chips' periphery. The PCM absorbs latent heat through direct conduction from the substrate board, facilitating its phase transition from solid to liquid, thereby enhancing the system's thermal cooling performance. The study evaluates three configurations: a system without PCM, a system with minichannel-coupled PCM, and an optimized single minichannel near the heat source. Additionally, the effectiveness of different PCMs, including paraffin wax, N-Eicosane, and ATP 78, is assessed. Results show that N-Eicosane PCM provides superior cooling, reducing the system temperature from 53.234°C in the generic model to 51.520°C. This represents a significant temperature drop of 1.714°C compared to the generic model, with additional reductions of 0.5°C and 1.35°C when compared to paraffin wax and ATP 78 PCM, respectively.

1. Introduction

The rapid expansion of the electronics industry and efforts to optimize space have led to smaller component sizes, resulting in increased heat generation and posing challenges to device reliability. Innovative cooling solutions are crucial for optimizing thermal management, which is essential for device performance and longevity, preventing failures due to elevated operational temperatures. This study focuses on evaluating the effectiveness of heat sinks in dissipating heat from IC chips, which is vital for maintaining optimal operating temperatures. By investigating heat sink-driven cooling strategies, this research aims to enhance the overall thermal management of integrated circuits. The study examines the cooling efficiency and potential temperature reduction achieved

* Corresponding author.

E-mail address: a.kurhade@gmail.com (Anant Sidhappa Kurhade)

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Green Adsorbents for Heavy Metal Removal: A Study on Zinc Ion Uptake by *Tinospora cordifolia* Biocarbon

Prachi Narendra Raut^{1*}, Ashadevi Sopan Dolas², Sukhadip Mhankali Chougule³,
Milind Manikrao Darade⁴, Govindarajan Murali⁵, Shital Yashwant Waware⁶ and
Anant Sidhappa Kurhade⁶

¹Department of Chemistry, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; raut.prachee@gmail.com

²Department of Chemistry, Rayat Shikshan Sanstha's Karmaveer Bhaurao Patil College (Empowered Autonomous), Sector-15-A, Vashi, Navi Mumbai - 400703, Maharashtra, India

³Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

⁴Civil Engineering Department, Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁵Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India

⁶Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

Abstract

Heavy metal pollution in water bodies poses a significant threat to human health. Exposure to heavy metals like lead, mercury, cadmium, and arsenic can lead to severe health issues. To address this pressing environmental concern, this study investigates the potential of *Tinospora cordifolia* as a low-cost biosorbent for heavy metal removal. By examining the influence of factors like pH (5.0), adsorbent dose (3.0 g), and contact time (150 minutes), the study aims to optimize the biosorption process. The findings demonstrate the effectiveness of *Tinospora cordifolia* in removing heavy metals from wastewater, highlighting its potential as a sustainable and environmentally friendly solution for water purification. Furthermore, activated carbon derived from *Tinospora cordifolia* was found to be highly efficient in removing Zn(II) ions from synthetic wastewater. This biosorption technique is not only effective but also straightforward and rapid, offering a powerful approach to mitigate heavy metal contamination. The promising results of this study support the potential for further application of *Tinospora cordifolia*-based activated carbon in water purification efforts, especially in the treatment of zinc and potentially other heavy metals. The study targeted zinc (Zn II) ions in synthetic wastewater. The results showed that activated carbon derived from *Tinospora cordifolia* was highly effective in removing zinc, especially under optimal conditions.

Major Findings: *Tinospora cordifolia* proved to be an effective and low-cost biosorbent for removing heavy metals from wastewater. Optimal conditions for maximum metal removal were identified, including a pH of 5.0, an adsorbent dose of 3.0 g, and a contact time of 150 minutes. Activated carbon derived from *Tinospora cordifolia* exhibited high efficiency in removing Zn(II) ions from synthetic wastewater.

Keywords: Adsorption, Heavy metals, Pollution, *Tinospora cordifolia*, Zinc

*Author for correspondence

*Author for correspondence



Impact of PCM on Heat Dissipation from IC Chips

Anant Sidhappa Kurhade^{1*}, Gulab Datttrao Siraskar², Mayuri Tushar Deshmukh³,
Prashant Ashok Patil¹, Swapnil S. Chaudhari⁴, Arjun Arun Kadam⁵, Ashadevi Sopan Dolas⁶,
Rupesh Gangadhar Mahajan⁷, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri - 411018, Pune, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Electronics and Telecommunication Engineering Department, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

⁴Department of Computer Engineering, Marathwada Mitramandal's Institute of Technology, Lohgaon, Pune - 411047, Maharashtra, India

⁵Department of Mechanical Engineering, Arvind Gavali College of Engineering, Satara - 415015, Maharashtra, India

⁶Department of Chemistry, Rayat Shikshan Sanstha's Karmaveer Bhaurao Patil College (Empowered autonomous), Sector-15-A, Vashi, Navi Mumbai - 400703, Maharashtra, India

⁷Department of Computer Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri - 411018, Pune, Maharashtra, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

Abstract

This study systematically investigates the thermal performance of nine Integrated Circuits (ICs) arranged in symmetric and asymmetric configurations on a substrate board. The analysis considers two scenarios: with and without the incorporation of Phase Change Material (PCM). The ICs were subjected to varying heat flux levels to assess their thermal behavior under different operating conditions. Results indicate that the temperature of the ICs is significantly influenced by factors such as IC size, positional arrangement, and the magnitude of the applied heat flux. The study also examines the role of the non-dimensional geometric distance parameter (λ), which varies with both IC size and location on the substrate. At a specific λ value of 0.19, notable temperature reductions were observed. Without PCM, temperature reductions of 18.79% and 26.48% were recorded at airflow velocities of 3 m/s and 5 m/s, respectively. The integration of PCM led to further enhancements, achieving reductions of 23.58% at 3 m/s and 32.47% at 5 m/s. These findings underscore the effectiveness of PCM in improving thermal management by efficiently absorbing and dissipating heat. Further statistical analysis revealed a strong correlation between the non-dimensional temperature parameter (θ) and λ , with a coefficient of determination (R^2) of 0.97 and a Root Mean Square (RMS) error of 0.012%. Higher λ values consistently correlated with lower peak IC temperatures, suggesting that increasing the spatial separation between heat-generating components enhances heat dissipation and overall thermal performance. These

*Author for correspondence



A Comprehensive Evaluation of Recent Studies Investigating Nanofluids Utilization in Heat Exchangers

Shital Yashwant Waware¹, Sukhadip Mhankali Chougule², Rahul Shivaji Yadav³, Ramdas Biradar⁴, Prashant Patil⁵, Kashinath Haribhau Munde⁶, Nitin Babanrao Kardekar⁷, Ajitkumar Gulab Nimbalkar³, Anant Sidhappa Kurhade^{1,*}, Govindarajan Murali⁸, Sandeep Sadashiv Kore⁹

- ¹ Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune, 411018, Maharashtra, India
² Department of Mechanical Engineering, Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, 412101, Maharashtra, India
³ Department of Mechanical Engineering, Marathwada Mitra Mandal's College of Engineering, Karvenagar, Pune, 411052, Maharashtra, India
⁴ School of Engineering & Technology, PCET's Pimpri Chinchwad University, Sate, 412106, Pune, Maharashtra, India
⁵ Department of Mechanical Engineering, Abhinav Education Society's College of Engineering & Technology, Satara, 412801, Maharashtra, India
⁶ Department of Mechanical Engineering, KES Rajarambapu Institute of Technology, Lohagaon, Pune, 411047, Maharashtra, India
⁷ Department of Mechanical Engineering, Bhivarabai Sawant College of Engineering and Research, Pune, 411041, Maharashtra, India
⁸ Department of Mechanical Engineering Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt) Andhra Pradesh 522502, India
⁹ Department of Mechanical Engineering, BRAC's Vishwakarma Institute of Information Technology, Pune, 411048, Maharashtra, India

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ABSTRACT

This comprehensive review critically examines recent research concerning the application of nanofluids in heat exchangers. The utilization of nanofluids, which are colloidal suspensions of nanoparticles in a base fluid, has garnered significant attention in enhancing heat transfer performance. Various studies have explored the potential benefits and challenges associated with incorporating nanofluids into heat exchanger systems. Through a systematic analysis of recent literature, this review assesses the effectiveness of nanofluids in improving heat transfer efficiency and overall performance of heat exchangers. Key parameters such as nanoparticle concentration, size, and type are thoroughly evaluated to understand their influence on heat transfer characteristics. Additionally, factors such as stability, flow behavior, and thermal conductivity enhancement are scrutinized to provide a comprehensive understanding of nanofluid behavior in heat exchangers. The review also addresses potential limitations and areas requiring further investigation to optimize the utilization of nanofluids in heat exchanger applications. By synthesizing recent findings, this review aims to contribute to the advancement of knowledge in the field of heat exchanger technology and nanofluid applications. Ultimately, the insights provided in this review offer valuable guidance for researchers and engineers seeking to enhance heat transfer processes through the implementation of nanofluid-based heat exchangers. Nanofluids offer advantages like enhanced thermal conductivity and tailored properties, promising optimized heat exchanger designs, leading to energy efficiency and reduced costs. However, challenges remain, such as nanoparticle dispersion and cost-effectiveness, necessitating further research for refinement. Interdisciplinary collaboration is crucial for advancing nanofluid

* Corresponding author.

E-mail address: a.kurhade@gmail.com

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The Impact of Circular Holes in Twisted Tape Inserts on Forced Convection Heat Transfer

Anant Sidhappa Kurhade^{1*}, Gulab Datttrao Siraskar², Swapna Swapnil Jawalkar³, Tushar Gadekar³, Parimal Sharad Bhambare⁴, Ramdas Biradar⁵, Rahul Shivaji Yadav³, Shital Yashwant Waware¹ and Chaitalee Naresh Mali⁶

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar, Pune - 411052, Maharashtra, India

⁴Department of Mechanical and Industrial Engineering, College of Engineering, National University of Science and Technology, Muscat, Oman

⁵School of Engineering and Technology, PCET's Pimpri Chinchwad University, Sate, Pune - 412106, Maharashtra, India

⁶Department of Chemistry, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

Abstract

This study investigated heat transfer and friction characteristics in a forced convection system using wavy twisted tape inserts with circular holes. The inserts, with twist ratios (TR) of 8.5, 7.5, and 6.5, were placed inside a test pipe to create turbulent flow. The tapes measured 700 mm in length and 18 mm in width, while the test pipe had an outer diameter of 35 mm and an inner diameter of 30 mm, with a test section length of 700 mm. Airflow rates were adjusted to achieve different bulk mean temperatures. Experimental data were used to develop new correlations for the Nusselt number and friction factor. The Reynolds number (Re) ranged from 4,000 to 14,000. Comparisons between the wavy twisted tape inserts with varying twist ratios and pitches and a smooth tube showed that the highest heat transfer rate was achieved with a twist ratio of 6.5.

Keywords: Heat Exchanger, Heat Transfer Rate, Nusselt Number, Reynold Number, Twist Ratio

1.0 Introduction

In thermal systems, particularly heat exchangers, enhancing heat transfer while maintaining or minimizing pressure drop is crucial for efficiency. Heat transfer enhancement techniques have become increasingly important in various industrial applications, particularly

those involving fluid flow and heat exchange processes. One effective method to augment heat transfer is the use of twisted tape inserts within pipes or ducts. These inserts create turbulence and promote fluid mixing, leading to improved heat transfer rates. The use of wavy twisted tapes, in combination with circular holes, is expected to further enhance heat transfer performance compared to

*Author for correspondence



Passive Cooling of EV Batteries Using Phase Change Material: A Simulation Study

Anant Sidhappa Kurhade^{1*}, Gulab Dattrao Siraskar², Sagar Arjun Dalvi³, Pallavi Vishnu Kharat⁴, Nilesh Ambaji Jadhav⁵, Varsharani Dilip Shelkande⁶, Govindarajan Murali⁷, Shital Yashwant Waware¹ and Rahul Shivaji Yadav⁸

¹Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India; a.kurhade@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Abhinav Education Society's College of Engineering and Technology (Degree), Wadwadi, Satara - 412801, Maharashtra, India

⁴Civil Engineering Department, Ajeenkya D Y Patil School of Engineering, via Lohegaon, Charoli Budruk, Pune - 412105, Maharashtra, India

⁵Department of Mechanical Engineering, Anantrao Pawar College of Engineering and Research, Parvati, Pune - 411009, Maharashtra, India

⁶Department of Electronics and Telecommunication Engineering, Dr D. Y. Patil Institute of Technology, Pimpri, Pune - 411018, Maharashtra, India

⁷Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India

⁸Department of Mechanical Engineering, Marathwada Mitramandal's College of Engineering, Karvenagar - 411052, Maharashtra, India

Abstract

The escalating global concerns regarding environmental degradation and climate change are accelerating the shift towards renewable energy sources. Traditional gas-powered vehicles, significant contributors to air pollution and global warming are being increasingly replaced by Electric Vehicles (EVs) as a more sustainable transportation solution. However, one significant challenge associated with EVs is the thermal management of their batteries. To address this issue, this study employed computer simulations to evaluate a passive cooling system for EV batteries, utilising a special material known as a Phase Change Material (PCM). The system's performance was assessed under three different power discharge rates. The results demonstrated that the PCM-based cooling system effectively reduced the maximum temperature increase in the battery by 1-2% compared to an unprotected battery. This indicates that the system efficiently dissipates heat from the battery, thereby improving its overall performance and lifespan.

Major Findings: 1. Effective Thermal Management: The study demonstrates the effectiveness of a PCM-based cooling system in reducing the maximum temperature rise in lithium-ion battery cells, particularly under high discharge rates. 2. Improved

*Author for correspondence



Failure Investigation of the Driving Shaft in an Industrial Paddle Mixer

Sukhadip Mhankali Chougule^{1,2}, Govindarajan Murali^{1*} and Anant Sidhappa Kurhade^{3,4}

¹Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur (Dt) - 522502, Andhra Pradesh, India; muralinitt@gmail.com

²Department of Mechanical Engineering, PCET's Pimpri Chinchwad College of Engineering and Research, Ravet, Pune - 412101, Maharashtra, India

³Department of Mechanical Engineering, Dr. D. Y. Patil Institute of Technology, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

⁴School of Technology and Research, Dr. D. Y. Patil Dnyan Prasad University, Sant Tukaram Nagar, Pimpri, Pune - 411018, Maharashtra, India

Abstract

This study focuses on the failure analysis and structural evaluation of the shaft in a double-shaft paddle mixer, a vital component in industrial mixing processes used in food processing, fertilizer production, and pharmaceutical manufacturing. The mixer is designed to blend materials of different densities, sizes, and viscosities efficiently through a centrally mounted horizontal shaft that rotates inside a cylindrical chamber. The system includes paddles for agitation, feed openings for material input, and a discharge valve for controlled output. A primary concern in this research is the mechanical failure of the driving shaft, which transmits power from the motor via a gear drive. Structural weaknesses and failure mechanisms were investigated by analysing system pressure, bending moments, and externally applied forces. Stress distributions were computed to identify critical failure locations that could compromise the shaft's integrity. A three-dimensional (3D) model of the shaft was developed using Pro-E software to enhance accuracy. Finite Element Analysis (FEA) was performed using ANSYS 13.0 to determine stress distribution, deformation, and failure-prone regions under operational loads. The numerical results were cross-verified with theoretical calculations based on ASME design codes to validate the structural adequacy. A shaft prototype was fabricated and tested under actual operating conditions to confirm the computational findings further. Experimental results closely matched FEA predictions, proving the effectiveness of the proposed design modifications. The optimised shaft exhibited increased durability, improved structural integrity, and enhanced performance. This research underscores the importance of virtual simulations before manufacturing, demonstrating how predictive analysis minimises failure risks. The study contributes to cost-efficient, time-saving design improvements, reducing material waste while ensuring the reliability of industrial mixing systems. These findings have broad implications for improving durability and efficiency in mechanical systems.

Major Findings: The study identifies excessive bending moments, torsional stress, material fatigue, and improper loading conditions as primary causes of shaft failure. A FEA using ANSYS 13.0 was conducted, and results were validated through experimental testing, confirming the reliability of design modifications. The optimised shaft design enhances durability, structural integrity, and operational efficiency, reducing failure risks and improving industrial mixing performance.

Keywords: Bending Moment, Failure Analysis, Finite Element Analysis (FEA), Gear Drive, Shaft Design, Structural Evaluation

*Author for correspondence

	<p>Conference Publications (A.Y. 2024-25)</p>	
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Netflix Recommendation System by Genre Categories Using Machine Learning

Publisher: **IEEE** [Cite This](#) [PDF](#)

Sharda Sumedh Thete ; Ramdas Popat Jare ; Minal Jungare ; Gauri Bhagat ; Sonal Durgule ; Vishal Borate [All Authors](#)

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 - II. Related Work
 - III. Proposed Methodology
 - IV. Result and Discussion
 - V. Conclusion
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Abstract:
The ascent of web-based features, customized content suggestion is one of the basic elements improving client commitment and maintenance. This paper presents a thorough investigation of the Netflix proposal framework, which puts together its forecasts with respect to AI and cooperative separating from conduct information about the watchers' inclinations. It consolidates the two methods into a half breed way to deal with make customized proposals. It further sharpened the framework utilizing the technique of Singular Value Decomposition with upgraded exactness for proposals pertinent to the watcher. This is acknowledged by dynamism by which it is feasible to learn through the models that the watchers' preferences change over the long haul by include designing and procedures in light of profound learning. Consequently, there is arrangement with genuine watcher inclinations at the more exact level. This exploration shows and portrays how these procedures efficiently pursue further developing watcher fulfillment, and consequently fundamentally contribute towards the upper hand of an organization like Netflix, inside the exceptionally cutthroat streaming business sector. The review gives prime thoughts and rules to advance into future headway in regards to the proposal framework in streaming stages.

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Artificial Neural Network and Regression Analysis Techniques for Campus Load Forecasting

1st Deepshikha Shrivastava
Assistant Professor, Electrical Engineering
Pimpri Chinchwad College Of Engineering and Research
Pune, India
deepshikha.shrivastava@pccoer.in

2nd P. Goswami
Associate Professor, General Engineering-Electrical
Institute Of Chemical Technology
Mumbai, India
p.goswami@ictmumbai.edu.in

Abstract—The process of estimating future electrical load requirements through the analysis of historical consumption data is termed electrical load forecasting. This paper presents a medium-term load forecasting study utilizing a dataset obtained from the Pimpri Chinchwad College of Engineering and Research, Pune, India. The study encompasses a comparative analysis of two distinct forecasting methodologies detailed herein.

The dataset, despite its uniqueness, was subjected to two analytical approaches: regression analysis and Artificial Neural Network (ANN) models. These were chosen to ascertain their efficacy in generating reliable medium-term load forecasts. The evaluation of these methods was primarily based on two statistical metrics: Mean Absolute Percentage Error (MAPE) and Root Mean Square Error (RMSE).

The outcomes of the comparative analysis delineated a marked superiority of the ANN model, which exhibited lower error rates with MAPE and RMSE values at 0.0285 and 1.124, respectively. The ANN's robustness in handling diverse load data patterns significantly contributed to its enhanced performance over the traditional regression approach.

The findings reinforce the ANN model's higher accuracy and reliability in medium-term load forecasting. Consequently, this model provides a superior framework for electric load prediction, which is crucial for efficient energy management and planning.

The superior performance of the ANN model advocates for its integration into future research and application within power system design. This study serves as a benchmark for advancing load forecasting methodologies, promoting enhanced accuracy and reliability. Further research could explore the integration of more complex algorithms and hybrid models to push the boundaries of forecasting accuracy. Enhancements in data quality, variability, and volume could also potentially refine the forecasting outputs. These advancements will be pivotal for developing adaptive, robust, and efficient power systems capable of meeting dynamic demands and operational challenges.

Index Terms—Load forecasting, Artificial Neural Network, regression analysis

I. INTRODUCTION

Electrical load forecasting, defined as the process of predicting future energy requirements based on historical consumption data, plays a pivotal role in the operational and planning phases of power systems. This practice is essential across various temporal scales - from hours to years - and is driven by the necessity to bridge the gap between energy supply and demand, especially apparent during peak demand periods like summertime. With the world gravitating towards a deregulated industry structure, the pivotal importance of efficient resource

utilization, maximized operational profits, and enhanced service delivery has never been more pronounced. Transparent price determination remains a central goal, significantly influenced by adept load and price forecasting. Given the increasing urgency to address global warming, there is a compelled shift towards integrating renewable energy resources, which introduces additional complexity and variability in load forecasting [1].

Despite substantial advancements, several key challenges in load forecasting persist. Current models often grapple with capturing the dynamic interplay of factors such as urbanization, economic shifts, and environmental unpredictability [7], [8]. Additionally, existing methods still struggle with the non-storability characteristics of electric power, which substantially affects price due to its immediate dependence on fluctuating demand. This paper focuses on medium-term load forecasting by employing and comparing two distinct methodologies: regression analysis and ANNs. The study utilizes a unique dataset collected by from the Pimpri Chinchwad College of Engineering and Research, Pune, India, encompassing various characteristics not previously integrated into predictive analytics at this scale. The methods are evaluated using statistical metrics such as MAPE and RMSE [2].

The novelty of this research lies in its comparative approach that delineates the effectiveness of sophisticated models like ANNs against traditional regression techniques in handling the complexities of medium-term load forecasting [3]. This analysis not only adds depth to the existing academic discourse but also enhances understanding of method-specific performance nuances in real-world settings [4], [5].

The key contributions are:

1) **Open-Source Implementation:**

The system's open-source nature is crucial as it allows for broader adoption, adaptation, and continuous improvement by a community of developers and researchers. This transparency promotes trust and collaboration, essential for academic and practical advancements.

2) **Integration of ANN for Load Forecasting:**

Applying Artificial Neural Networks (ANN) for load forecasting represents a significant technical advancement. ANN's ability to learn and model non-linear

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A critical review of nanotechnology in various fields of engineering

Priti R. Ghutepatil; Sarika Khapare; Rujuta Barve Joshi;
Kamalkishor G. Maniyar 

† Author & Article Information

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In recent years, nanotechnology has been explored with great interest due to its usage in various fields like physics, chemistry, material science, medical and engineering. The nanotechnology is emerged as major research area for researchers. The nanotechnology fabricates, characterizes and handles the materials at nanoscale. Nanotechnology applications commonly include industrial, medical and energy applications. Reducing the particle size to a nano-scale enhances several properties of the materials for example, durability, strength, ductility, density of the construction materials, buoyancy, ruggedness, storage efficiency of Li batteries etc.

Topics

[Mechanical properties](#), [Nanotechnology](#), [Batteries](#), [Engineers](#), [Review](#)

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Correlation Study Between Water Yield and Consumptive Use by SWAT Model: A Case Study of Darewadi, Maharashtra



Arun W. Dhawale , Harish U. Tiwari, Sudarshan S. Bobade ,
and Ranjeet S. Sabale 

Abstract In arid and semi-arid areas water management is essential for maintaining a sufficient and dependable water supply. As India has uneven distribution of rainfall and also due to climate change the rainfall pattern is greatly affected. As results many places in India suffers from water scarcity issues. Hence, it is more important to have the correlation between water available and its consumptive use. Therefore, this study is devoted to estimate the water available in the Darewadi basin and its usage. To achieve the defined goal this study engages two powerful tools namely SWAT (Soil and Water Assessment Tool) and Modified Penman Method (MPM). To process the SWAT model, the meteorological data from IMD Pune was used for period (2000–2020). The SWAT model is calibrated and validated using SUFI-II algorithm in SWAT-CUP. The methodology was adopted as, MPM results and the actual evapotranspiration values obtained from the SWAT model were compared. The findings indicate that the average curve number for study area is 79, and evapotranspiration was 561 mm. The maximum crop water demand was observed at 2009 and it was 561 mm, similarly water yield for year 2009 is 457.39 mm and Precipitation for year 2009 was 470.2 mm. Additionally, it was found that the research area experiences salinization since the rate of evaporation is higher than the rate of precipitation. This study helps with future water demand predictions and management, as well as the identification of potentially salinized areas. The study's conclusions can be used by researchers and decision makers to manage and distribute water resources in a sustainable way.

Keywords Modified Penman method · SWAT · Water budget · Surface water · Irrigation

A. W. Dhawale (✉) · H. U. Tiwari · S. S. Bobade · R. S. Sabale
PCET's, Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, India
e-mail: awdhawale2009@gmail.com

H. U. Tiwari
e-mail: principal@pccoer.in

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Impact of LULC on Hydrological Settings of Savitri River Watershed at Raigad, Maharashtra Using SWAT Model

| Conference paper | First Online: 02 December 2024

| pp 199–216 | [Cite this conference paper](#)




**Soft Computing and Geospatial
Techniques in Water Resources
Engineering**

(HYDRO 2023)

Sudarshan Sampatrao Bobade , Harish Umashankar Tiwari, Arun Wamanrao Dhawale & Ranjeet Satish Sabale

 Part of the book series: [Lecture Notes in Civil Engineering](#) ((LNCE, volume 397))

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[International Conference on Hydraulics, Water Resources and Coastal Engineering](#)

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Abstract

The management of water resources relies on accurate predictions of hydrological parameters. In addition, the efficacy of any hydrological model is dependent on the precision of the input data. Researching the effects of LULC on the Savitri River's hydrology in Raigad, Maharashtra, is the primary goal of this project. In order to achieve this, a trustworthy agro-hydrological model called SWOT (Soil and Water Assessment Tool) will be employed. The research project relied on meteorological data provided by IMD Pune for the years 2000–2020. We utilised ArcSWAT's maximum likelihood image classification method to categorise the LULC data from the Bhuvan website into five different land use patterns. Following delineation, the 580 sq. km. study area is processed using the SWOT model, which results in the division of the entire area into 42 sub-basins and 212 HRUs. From 2003–2010, the SWOT model is calibrated using data collected from HDUG group Nasik and used in the SWAT-CUP tool. From 2011 to 2015, the model is validated. To determine how sensitive the work is, statisticians use the NSE and R2 metrics. We discovered that the NSE values in validation were 0.78 and in calibration they were 0.74. The R2 values for validation and calibration are 0.84 and 0.81, respectively, in the same vein. The SWOT model is supported by the combined observed and simulated data, which show a high degree of fitness. The results show that there was a 5% drop in undeveloped land and an 8% conversion of farmland to housing between 2000 and 2020. The study found that when homes and infrastructure are built, the LULC pattern changes. This changes bring about scary things like flash floods, more runoff, less infiltration, and lower groundwater tables. Landslides and sedimentation in bodies of water are also caused by these scenarios. Policymakers and water managers can use the study's findings to better plan for sustainable agriculture and water resource management, and to mitigate the effects of changed LULC.

Application of the Arc-SWAT Model to Assess Climate Change and Land Use/Cover Change Impacts on Water Balance Components of the Pawana River Basin, Maharashtra



Ranjeet Sabale , Sudarshan Bobade , Arun Dhawale , Raju Narwade, and Harish Tiwari

Abstract As a result of the burgeoning population, rapid urbanization, and climate change, water resources are under tremendous pressure. Water scarcity, secondary soil salination, waterlogging, and lowered groundwater levels are alarming situations that require immediate intervention to control their effects and plan sustainable water resources. Thus, the purpose of this study is to model and assess the hydrological impacts of land-use change and land-cover loss on the Pawana basin in the state of Maharashtra. The efficient hydrological model must be used to achieve the goals, which is why SWAT (Soil and Water Assessment Tool) was used in this investigation. Data from metrology was analysed for the SWAT model between 2000 and 2020. The India Meteorological Department in Pune provided the meteorological data, while the HDUG group in Nasik provided the hydrological data. The results of the SWAT model were calibrated and validated using the SWAT-CUP tool and the SUFI II algorithm. Following processing, it was found that there is a good degree of fitness between the simulated and observed data, indicating that the SWAT model is accepted. The Statistical parameters like NSE and R^2 were used to assess the sensitivity of the work. The observed R^2 value was 0.80, while the NSE was 0.78. In order to simulate the water balance components for the Pawana basin, downscaled Global Climate Models (GCMs) data were used, along with hypothetical LULC change and management scenarios, to compare future scenarios (2030–2100) to a baseline period (1974–2004) under RCP-4.5 and RCP-8.5. Lastly, it was shown that while precipitation over the study basin exhibits substantial variety, average temperature over the basin is increasing across all GCMs. These findings will help organizations and stakeholders working in the water resources area to adapt and implement the correctives action for alleviating the negative effects of LULC and climate change on water supplies.

R. Sabale (✉) · S. Bobade · A. Dhawale · H. Tiwari
PCETs, Pimpri Chinchwad College of Engineering & Research, Ravet, Pune, India
e-mail: ranjeetsabale7363@gmail.com

R. Narwade
Civil Engineering Department, Pillai Hoc College of Engineering and Technology, Mumbai, India

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EC 3097

An Efficient Method for Bridge Condition Assessment from dynamic response of a passing vehicle Based on KNN-SVM Approach

Uppara Raghu Babu¹, Ankit Kumar², Amit Kumar Sharma³, Dr.Kookutla Ramesh⁴, Kirubakaran D⁵, Chetan S. Chavan⁶

¹Associate Professor, Department of Civil Engineering, Srinivasa Ramanujan Institute of Technology, Anantapur, Andhra Pradesh, India,

²Associate Professor, Department of Computer Science and Engineering, Chandigarh University, Mohali, Punjab, India,.

³Assistant Professor, Department of Civil Engineering, Graphic Era deemed to be University, Dehradun, Uttarakhand, India,

⁴Professor and Dean(R&D), Sree Dattha Institute of Engineering and Science, Sheriguda, Hyderabad, India,

⁵Professor & Head, Department of EEE, St. Joseph's Institute of Technology, OMR, Chennai, India

⁶Assistant Professor, Department of Civil Engineering, Dr. D. Y. Patil Institute of Technology, Pimpri, Pune, India.

Abstract: Bridges are so important to transportation networks and because funding for bridge management is limited, it is essential to prioritize rehabilitation procedures. Careful bridge evaluations aim to prevent unnecessary operations, like costly strengthening or repairs. All bridge maintenance indifference or delay in action, on the other hand, might lead to future costs or destroyed assets. Important parts include preprocessing, training the model, and feature selection. Using the normalization method in preprocessing helps to decrease the amount of false positives created by real changes to the system. With a filter-method strategy, the MRMR algorithm selects the most valuable characteristics for classification tasks. The proposed approach chose the KNN-SVM framework for training the model. Conversely, it gets rid of KNN and SVM altogether. The data indicates a success rate of 97.23 percent.

Keywords— Bridge Condition Rating, Damage Recognition, Support Vector Machine.

Impact of Climate Variability on Crop Yield in Pune District: A Comprehensive Study

Amar M. Chipade¹, Chetan Chavan¹, Tanaya Nerlekar¹, Akshay D Barkale², Chetan P. Mane³

¹Department of Civil Engineering, Dr. D.Y. Patil Institute of Technology, Pimpri, Pune.

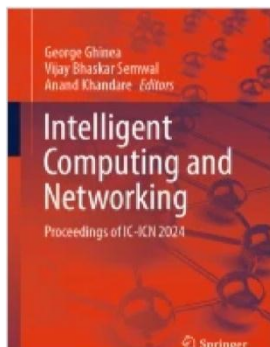
²Water Resources Department, Government of Maharashtra, India

³Department of Civil engineering, RMD Sinhgad school of Engineering, Warje, Pune

Abstract. Since the Industrial Revolution, deforestation, agricultural practices, and human emissions of greenhouse gases from the burning of fossil fuels are responsible to global warming and climate change. Higher temperatures, altered rainfall patterns, shifts in the frequency and distribution of meteorological events including droughts, storms, floods, and heat waves, sea level rise, and resulting effects on human and ecological systems are only a few of the observed and projected changes in the climate. One of the biggest environmental problems the world is now experiencing is climate change. The paper investigates how three important crops and farmer livelihoods in the State of Maharashtra are impacted by climate change. Due to climate change, farmers in Central and Eastern Maharashtra are already facing challenges. The research highlights the existing issues and potential hazards faced by farmers in the state based on an examination of climate data (combining historical climate data analysis and future estimates), farmer interviews, and secondary literature assessments. The study's findings are meant to enable adaptation plans that would reduce farmer susceptibility to climate change in Pune district of Maharashtra. Determining which mitigation techniques farmers may use will depend on their understanding of the current situation and their awareness of the specific threats the future holds. Also this study's objective was to discover how accessible soya bean, and Crops of wheat were severely impacted by local weather patterns within each of its major development phases.

1 Introduction

Crops are vulnerable to their surroundings. Plants require air, water, and sunshine to thrive on a large scale, but other variables that influence plant growth are far more complex. Factors such as sunlight, cloud cover, wind, rainfall, dust, soil moisture, soil nutrients, humidity, and temperature are examples of biotic (non-living) elements that impact normal plant growth. Soil microbial communities, pollinators, seed dispersal agents, insects, fungus, and animals, including humans, are examples of biologic (life) elements. Because they cannot move, plants are dependent on the environment and climate in which they are situated. In current agricultural systems, humans may influence a number of biotic and



Authors: Archana Kollu, Mohan Raparathi, Sarath Babu Dodda, Srihari Maruthi, Ms Neha Bhatt
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Abstract

This chapter delves into the performance analysis of medical image fusion using wavelet techniques, a critical area in medical diagnostics. It begins by defining image fusion and its applications in medical imaging, highlighting the importance of multi-modal image fusion for enhancing spatial resolution and preserving spectral information. The chapter then explores the various levels of image fusion, including pixel, feature, and decision levels, and discusses the challenges and methods associated with each. A significant focus is on the wavelet transform, introduced as an extension of Fourier theory, and its application in combining images, analyzing textures, detecting features, and compressing data. The methodology section provides a detailed explanation of the Discrete Wavelet Transform (DWT) and Continuous Wavelet Transform (CWT) in the context of medical image fusion. The chapter also presents results and discussions based on experiments conducted on medical image datasets, showcasing the visual and quantitative analysis of fused images using different wavelet transforms. The conclusion emphasizes the potential of wavelet transforms in medical imaging, particularly in compressing large image files and reducing unnecessary traffic. Overall, this chapter offers a thorough examination of wavelet techniques in medical image fusion, making it a valuable resource for professionals seeking to advance their understanding and application of these methods in diagnostic imaging.

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Chapter

Combination kernel support vector machine based digital twin model for prediction of dyslexia in distributed environment

By H. Kareemullah (</search?contributorName=H.Kareemullah&contributorRole=author&redirectFromPDP=true&context=ubx>), Adam Quraishi (</search?contributorName=AadamQuraishi&contributorRole=author&redirectFromPDP=true&context=ubx>), G.C. Prashant (</search?contributorName=G.C.Prashant&contributorRole=author&redirectFromPDP=true&context=ubx>), Mohammad Shabaz (</search?contributorName=MohammadShabaz&contributorRole=author&redirectFromPDP=true&context=ubx>), Archana Kollu (</search?contributorName=ArchanaKollu&contributorRole=author&redirectFromPDP=true&context=ubx>), Mukta Sandhu (</search?contributorName=MuktaSandhu&contributorRole=author&redirectFromPDP=true&context=ubx>)

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ABSTRACT

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Advanced Stealth Protection for Android Devices

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Govind Suryawanshi ; Soham Patil ; Krishna Sharma ; Aditya Gore ; Amey Joshi [All Authors](#)

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Abstract

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Abstract:

As mobile devices become essential tools in daily life, their vulnerability to malware and phishing attacks has surged, particularly within the Android ecosystem. Current security frameworks predominantly rely on static or dynamic detection techniques, each with inherent limitations. Static analysis involves examining an application's code and permissions to identify potential threats. However, this method often falls short against obfuscated malware and zero-day exploits that can dynamically alter their behavior to avoid detection. Conversely, dynamic analysis captures an application's behavior during runtime, but it is constrained by the requirement for real-world user interaction and can miss threats that do not exhibit malicious behavior in controlled environments. To address these limitations, this project introduces an innovative Android security application that integrates both static and dynamic detection mechanisms through a robust cloud-based architecture. The application employs the DL-AMDet architecture for deep learning-based malware detection, utilizing a combination of CNN-BiLSTM for static feature analysis and deep autoencoders for dynamic feature extraction. Additionally, it implements advanced phishing detection algorithms for both website URLs and SMS messages, utilizing machine learning techniques tailored for URL classification and SMS pattern recognition. By harnessing cloud resources, the system not only enhances performance and scalability but also provides comprehensive security coverage that adapts to emerging threats. This hybrid approach ultimately aims to fortify the Android user experience against increasingly sophisticated cyber threats.

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A Review of Various Deep Learning Approaches for Placement Prediction

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Minal Bodke ; Vishnu Tiwari ; Jayesh Wadhvani ; Trapti Gorbade ; Rohan Soundane **All Authors**

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Abstract

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- II. Literature Survey
- III. Research Gap
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- V. Conclusion and Future Scope

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Abstract:

In recent years, predictive analysis for student placement has attracted a lot of attention, and machine learning approaches have shown to be useful in enhancing decision-making and accuracy in higher education. This review paper provides a conceptual framework to improve student placement predictions by using deep learning models with self-attention mechanisms. The aim of this model is to tackle problems related to feature importance selection, imbalanced datasets, and complex data patterns. We suggest a multi-tiered strategy that combines deep learning's ability to identify complex correlations in instructional datasets with ensemble learning techniques for reliable performance. Predictive quality will be thoroughly examined through the use of performance indicators such as accuracy, precision, recall, and F1 score in the evaluation of the models. It is anticipated that this strategy will give educational institutions more accurate forecasting instruments, revealing important factors influencing students' employability while guaranteeing decision-makers can understand the data. This framework intends to make a contribution to the expanding field of educational data mining and placement prediction by improving existing approaches.

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Malware Detection using Machine Learning Models for Static and Dynamic Analysis

Shivganga Gavhane¹, Chaitanya Nerkar, Pratik Patil², Tejas Varpe³, Karan Vadnere⁴
Computer Department Pimpri Chinchwad College of Engineering and Research
Pune 412101, India
shivganga.gavhane@pccoer.in

Abstract

The detection of malware in any kind of file is very important in today's day to day life. New kind of malware which are highly powerful and efficient in exploiting the contents of the files or affecting the system with the help of residing in files and data. Malware is threat, highly lethal to the users if it goes undetected or unnoticed. These kinds of malware which are under development are different from the traditional one, and more dynamic in design and usually inherit the properties from two or more than two malware types, and they are known as polymorphic malware. By using various model, the system not only enhances performance and scalability but also provides comprehensive security coverage that adapts to emerging threats. Hybrid approach ultimately aims to fortify the security of data and system against increasingly sophisticated cyber threats.

Keywords—Malware detection, Machine learning, medium sized dataset, decision tree, random forest.

1.0 Introduction

One of the most promising approaches for file automatic classification to be either benign or malicious would be malware detection by machine learning. This is done by training the models on a large corpus of labeled files which include clean files and many other types of malware. Some of these include key elements such as meta-data from the file, system calls, entropy, byte sequences, and behaviors extracted from these files to train models. These models-think decision trees, Random Forest, Support Vector Machines, SVM, and deep learning algorithms such as neural networks-learn to recognize patterns and anomalies related to malicious files. Once trained, the model can classify new, unseen files in real-time, detecting previously unknown malware based on learned behaviors and features. Finally for increasing the accuracy of the model, some other techniques like feature selection, dimensionality reduction, and ensemble learning are used, which completely refine the prediction. Furthermore, in optimization methods, the database also arranges similar files so that storage capacity gets increased and response time of the model increases. This way, the system identifies malware faster and with higher accuracy since redundancy in the system is minimized and computing resources centered around the examination of new and possibly dangerous files. Thus, this machine learning-based algorithms' combination with feature extraction and system optimization results in a robust solution to secure systems from emerging malware threats.

2.0 Review of Literature

A. A survey of malware detection using deep learning: Ahmed Bensaoud, Jugal Kalita, Mahmoud Bensaoud [2] There is a comprehensive review of the latest developments in the application of deep learning approaches for malware detection on various operating systems including Windows, MacOS, Linux, Android, and iOS. It is talking about the classifying accuracy capability of the CNNs and GANs models over the malware samples from text as well as

image data. However, the authors further discuss the application of multi-task learning and transfer learning models for high precision in the detection of malware.

B. Improving the Machine Learning Models for Malware Detection Using the Embedded Feature Selection Method: Mohammed CHEMMAKHA, Omar

HABIBI, Mohamed LAZAAR[4] This paper discusses the issue of

improving machine learning models in malware detection using the embedded feature selection method, at a time when proper pre-processing in machine learning applied to malware detection is of crucial importance. The authors consider that

Iris Liveness Detection For Biometric Authentication Using Convolutional Neural Network: VGG16

Vaishali C. Kulloli¹, Aalisha Fakruddin Kureshi², Swaraj Rushikant Panjabi³, Sneha Vishwas Kamble⁴, Harsh Dipak Patil⁵, Maheshwari Biradar⁶

¹Pimpri Chinchwad College of Engineering and Research Pune, Maharashtra, India

⁶D Y Patil International University, Akurdi, Pune, Maharashtra, India

¹vaishali.kulloli@pccoer.in

⁶maheshwari.biradar@dypiu.ac.in

Abstract

This paper presents an in-depth review of iris liveness detection technologies currently used to enhance the security of biometric identification systems. Focusing on combating different fraud styles, this study examines different models, including convolutional neural networks (CNN), and investigates their effectiveness in checking iris spoofing images. Special attention is paid to the discovery of high quality synthetic iris images, which are increasingly used to bypass security measures. The analysis linked crucial limitations of being discovery tools, similar as the incapability to generalize numerous types of fraud and the incapability to descry subtle, complex phonies that would shirk discovery by conventional styles. In response to these challenges, this paper presents a dynamic discovery frame grounded on the VGG-16 network architecture, aiming to ameliorate the system's capability to distinguish between real and fake iris data. The findings punctuate the significance of using deep literacy models and large, different datasets to ameliorate the delicacy and robustness of iris liveness discovery systems. The paper also shows that the use of adaptive technology can further ameliorate biometric security and give important directions for unborn exploration in this area. These advances are necessary to ameliorate the trustability and performance of iris-grounded biometric identification.

Keywords: Iris liveness detection, biometric security, CNN, VGG-16 architecture, spoofing detection, Deep learning

1.0 Introduction

With the increasing prevalence of digital credentials, the security of biometric systems, particularly iris recognition, has become paramount. Iris-based authentication is well-regarded for its high accuracy and dependability, establishing it as a preferred security verification method in industries like finance, government, and consumer products. However, even with the inherent uniqueness of iris recognition technology, these systems remain susceptible to attacks employing artificially generated or counterfeit iris images to circumvent security protocols. Consequently, a robust detection method is essential to guarantee that only authentic, live irises are authenticated. Existing biometric security systems often utilize detection mechanisms that may not adequately identify fraudulent activities. This vulnerability creates an opportunity for the application of sophisticated deep learning models, particularly convolutional neural networks (CNNs), to enhance detection capabilities. Within this category, the VGG16 model is recognized as a potent instrument for detailed iris image analysis. By concentrating on characteristics like textural patterns, reflections, and pupil dynamics, VGG-16 possesses the capacity to differentiate between genuine and fabricated irises. This research employs the VGG-16 architecture within an iris liveness detection system to specifically address the growing challenge of spoofing attacks. While current systems offer a degree of protection, they frequently struggle to detect subtle spoofing attempts. This study undertakes a thorough evaluation of established iris liveness detection methods,

Securing Smart Irrigation Systems with Rust and Bytebeam



Avinash Golande, Vijay A. Kotkar, Ashwini Uadaysinh Bhosale,
Swanand Mulay, Swasti Rai, Laukik Gadam, and Nishant Patil

Abstract In the era where smart irrigation systems, traditional irrigation systems improved with the help of Internet of Things (IoT) are growing and getting mainstream, a major concern arises with respect to their security of the device or platform and privacy of users' data. This system aims to tackle these issues by prioritizing security with help of Rust, a memory safe programming language which offers similar, if not same, performance as C or C++. Bytebeam is an IoT backend platform which is used to visualize the data, control, and manage the devices. It also provides authentication and authorization, so the confidentiality of data and security of devices is held without compromising usability. This drastically improved security, and made it easy for new farmers to adapt and secure their smart irrigation systems.

Keywords IoT · Security · Rust · Smart irrigation · Data privacy embedded devices

1 Introduction

Effective utilization of water is one of the most crucial needs in this generation, as water is scarce and quite a valuable resource. Traditional irrigation methods are often wasteful and inefficient. The reason might be that there was an ample amount of water resources present at that time, but now the situation has changed and issue must be solved to survive. To tackle this issue, many researchers invested and explored the field of improving irrigation systems with help of Internet of Things (IoT), this, producing "smart irrigation systems". These smart irrigation systems are quite good

A. Golande · A. U. Bhosale · S. Mulay · S. Rai · L. Gadam (✉) · N. Patil
JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra 411033, India
e-mail: laukikgadam@icloud.com

A. U. Bhosale
e-mail: aubhosale_comp@jspmrscoe.edu.in

V. A. Kotkar
Pimpri Chinchwad College of Engineering and Research, Ravet, Pune, Maharashtra 412101, India

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Generative AI for Revolutionizing Personal Style

Ketaki Bhojar
School of Interdisciplinary & Research,
D Y Patil International University,
Pune, India
ketakib0890@gmail.com

Dr. Suvarna Patil
School of Interdisciplinary & Research,
D Y Patil International University,
Pune, India
suvarnadypiemr@gmail.com

Abstract— The fashion business is growing quickly and is one of the main forces behind the world's economies. The ever-expanding business is driving a significant rise in the application of computer science to address various issues inside it. It becomes difficult to discover a personalized wardrobe that reflects their preferences, taste and needs. Traditional Fashion Recommendation Systems (FRSs) limits their ability to scale and adapt the ever growing styles as they heavily rely on manual design. Fashion can also be so inclusive, expressive and sustainable. Appropriate recommendations given by FRS helps to enhance user satisfaction and makes it more enjoyable and accessible. Artificial Intelligence (AI) tools have revolutionized FRS enabling them to consume beyond conventional methods by taking in contextual data, user preferences and visual content for recommendations with a more individualized suggestion. Recently, Generative Adversarial Networks (GANs) have emerged as a potent technique to enhance these systems by generating diverse fashion designs with high fidelity. In this paper, a systematic review of parameters used to evaluate FRS using Generative Algorithms is discussed. Various parameters to evaluate system performance and the recommendation quality are analyzed. Detailed analysis of the input parameters, to be considered to design the efficient AI based FRS (AI-FRS) is also presented. Along with this, research gaps are explored by surveying numerous review papers. This review will help in deciding the evaluation parameters to develop and examine more efficient AI based FRS.

Keywords—System performance parameters, Generative Algorithms, Generative Adversarial Networks (GAN), Artificial Intelligence (AI), Performance metrics, Fashion Recommendation System (FRS)

I. INTRODUCTION

A. Related Work

Through the emergence of AI, fashion industry has transformed the way fashion companies interact with their customers. Recommendation engines play a huge role in shopping customized product by suggesting appropriate items to consumers. Originally introduced by Goodfellow et al. 2014: GANs performed best in developing advanced generative modelling methods, specifically demonstrated amazing results on producing realistic and diverse images that were best suited for the fashion industry. In this study, we present a detailed analysis of gaps in implementation of FRS using different deep learning methodologies and the advances achieved by GANs in intelligent fashion recommendation systems to underscore crucial state-of-the-art contributions and themed techniques along with potential for future research.

GANs are made up of a discriminator and a generator neural network. In order to fool the discriminator, and provide high-quality samples, the generator creates random noise

samples. It uses adversarial training to generate artificial data that closely mimics actual data. GANs have expanded into versatile instruments for text-to-image synthesis, style transfer, and picture synthesis. AI powered Recommendation systems leverage user data to create personalized content, increasing user engagement and providing better suggestions than conventional technology. It helps in examining user data to spot patterns, arrange intricate data visualizations, and offer insights. These systems use different deep learning methodologies for appropriate recommendations. Use of GANs in AI based FRS can enhance the quality of recommendations given to the user. It can also enhance the quality of dataset, which will lead to better suggestions as per the user satisfaction [2] [4].

B. Main contribution of the paper

Our analysis summarizes over forty current research accomplishments that integrates fashion and AI, with a focus on the use of GANs in fashion recommendation systems.

- The article provides a thorough overview, covering everything from conventional approaches to deep learning techniques based on GANs, demonstrating the variety and creativity of AI technologies in the fashion industry.
- It contains a variety of literature, such as preprints, conference papers, and journal articles. The literature that is studied covers the years 2017 through 2024 and highlights current developments in this field of study [2].
- The aim of this review is to perform parametrized analysis of AI based fashion recommendation techniques for investigating the system performance and research gaps.

C. Organization of the paper

This study provides a thorough overview of the literature on AI-based FRS. It combines the results of several studies to give a summary of the state of knowledge, point out gaps, contradictions, and trends, and make recommendations for future lines of inquiry. The introduction to AI-FRS, its importance, and the background of the field of study are briefly introduced in this article. The body is arranged thematically and synthesizes and evaluates data from various investigations. Performance evaluation parameter analysis is mentioned for analysing system performance metrics and recommendation quality metrics. Then, input parameter analysis is represented to finalize which inputs should be considered for further research. This paper also outlines the research gaps while briefing out all the relevant studies. Along with summarizing all the pertinent papers, this report also identifies the research gaps.

A Machine Learning Approach for Bug or Error Prediction using Cat-Boost Algorithm

Seema Darekar¹
Dept of AIML Engineering,
Nutan Maharashtra Institute of
Engineering & Technology
simu20591@gmail.com

Prachi Nilekar²
Dept. of Computer Engineering,
Pimpri Chinchwad College of Engineering
& Research,
Ravet, Pune, India
prachinilekar01@gmail.com

Shweta Lilhare³
Dept of AIML Engineering,
G.H.Raisoni College,
Pune, India
shweta1641991@gmail.com

Ashvini Chaudhari⁴
Information Security Awareness
Specialist,
The Lubrizol Corporation
ashvinirc@gmail.com

Riya Narayan⁵
Computer Engineering Pillai Hoc
college of Engineering and technology
(Mumbai University)
Rasayani, India
riyanarayan945@gmail.com

Vishal Borate⁶
Department of Computer Engineering
Dr. D. Y. Patil College of Engineering and
Innovation,
Varale, Talegaon, Pune, India
vkborate88@gmail.com

Abstract— Quality assurance is an inherent part of the software development life cycle, and bug prediction has a huge role in the reduction of costs and ensures reliable delivery. In this work, a high-performance, gradient-boosting algorithm, CatBoost, applied to software bug prediction. More specifically, the CatBoost model can efficiently deal with categorical features and provide robustness to overfitting using a dataset containing historical software metrics and defect data. It will thus be run against traditional machine learning algorithms and will spot probable bugs with a higher accuracy, precision, and recall. Hence, it is expected to indicate with a good level of accuracy the most important predictors of software defects and thus give insights that can help in integration into development practices geared at early bug detection. That is, CatBoost is one of the most powerful tools for predicting software bugs and thus provides ways toward more efficient and reliable software development processes.

Keywords— Software Bug Prediction, CatBoost, Quality Assurance, Software metrics, Classification, Reliability

I. INTRODUCTION

Software bug prediction is an area of software engineering concerned with identifying probable defects in software systems even before their exhibition in production. With systems becoming more and more complex, so does the possibility of defects that may further result in serious failures, security vulnerabilities, and dissatisfaction among the users. In its different phases of development, early detection of software bugs may significantly reduce the cost and effort involved in fixing such issues, improving the overall quality and reliability of the software.

A good number of machine learning models have been applied to software bug prediction, using historical data and a variety of software metrics. Two very famous models in use are Naive Bayes and Logistic Regression. Naive Bayes is a probabilistic classifier based on Bayes' Theorem, which makes the simplifying assumption that features are independent. While this can generally be a too strong assumption, Naive Bayes has been applied successfully to many domains, including bug prediction. This is so because of its simplicity, ease of implementation, and reasonably good performance, making it always a populist choice for any initial exploration related to software bug prediction.

Another very popular model is logistic regression, which assigns the probability of a binary outcome for example, whether, there is a bug or not based on one or more predictor variables. It forms a linear decision boundary between classes and hence is considered very interpretable. The coefficients from the model depict the relationship of magnitude and direction between the class attribute and each feature. This allows for understanding which factors are most influential in the occurrence of software bugs.

Even though Naive Bayes and logistic regression both offer very useful insights and turn out to be quite effective in many cases, they have some limitations while dealing with complex and high-dimensional data along with categorical features. In this respect, the paper proposes CatBoost—a novel gradient-boosting algorithm that natively and efficiently processes categorical data and allows for robust predictions by default with a minimum number of parameters to tune.

It holds categorical features itself. In other words, CatBoost does support the native processing of categorical features without creating a mess with structures and relationships inside data. That makes the pipeline for data preprocessing easier and increases predictive performance. The paper is aimed at showing the effectiveness of CatBoost in predicting software bugs by pitting it against traditional models like Naive Bayes and Logistic Regression. This paper exploits the strengths of [19] CatBoost in striving for better predictive accuracy and more reliable bug prediction results to improve the quality and reliability [20] of software..

II. LITERATURE SURVEY

In paper [1] authors present an overview of the in-depth review of the analysis of software bug reports with a number of machine learning techniques supporting the process of bug prediction. In this aspect, the authors introduce two methods of Random Forest and Support Vector Machines and their efficiency in the detection of fault-prone software components.

In paper [2] explains clearly how machine learning models really make software defect predictions. It provides consistency in attributions by feature in tree ensembles,

Image Captioning Using Deep Learning: Bridging the Gap between Vision and Natural Language Processing

Publisher: IEEE

[Cite This](#)Rachana Ravindra Mudholkar ; Kingshuk Srivastava ; Javeed Ahammed ; Niket Tajne ; Sharayu Anap ; R Kavitha [All Authors](#)46
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Abstract

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- III. METHODOLOGY
- IV. Results and Discussion
- V. Conclusion

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Abstract:

The process of writing educational captions for photos has evolved dramatically in recent years thanks to development in deep learning technologies. The issue of fully understanding image content and creating logical, contextually relevant captions remains a serious difficulty despite notable progress. Image captioning is a crucial task that can be applied to editing tools, virtual assistants, image indexing, and assistance for people with disabilities. AI and Natural Language Processing (NLP) meet up in picture or image subtitling/caption, which is the test of making clear normal language phrases for pictures. Since profound learning strategies, Using Regional Neural Networks (RNNs) and Convolutions Neural Networking (CNN) for image extraction, which are as often as possible upgraded by consideration instruments, have been taken on, this interdisciplinary test has seen critical progressions. Text summarization, template construction and information retrieval are the three main activities included in the suggested model. The both directions long short-term storage method is used to locate the written content utilizing every word in a phrase, extract the knowledge, and finally incorporate it within the semantically vector. This paper highlights the importance of deep learning as a whole while also examining the development of image inscribing, its important methodology, and state-of-the-art techniques. additionally discusses the hardships, uses, and expected ways in this field.

Image Captioning Using Convolution Neural Framework

Rutuja S.Magar¹

Assistant Professor
Pimpri Chinchwad College of Engineering and
Research, Ravet
Rutuja.magar@pccoer.in

Dhanashri R Patil

Assistant Professor
Dr.vishwanath Karad MIT World Peace University, Kothrud,
Pune
Dhanashri.patil@mitwpu.edu.in

Abstract—In recent years, many researches had done in machine learning, and computer vision. Current machine learning has a power to describe image in descriptive manner for the convolution neural system and long short-term memory. We present research for image captioning using a convolution neural framework. It gives a clear descriptive sentence for an image. This model uses a Convolution Neural Network (CNN) to focus extracted features from an image. Recent studies have used a combination of CNN and Long Short-Term Memory (LSTM) to achieve progress in vision to language problems. So, our final model delivers the best-reported results on both image captioning and obvious question answering on several benchmark datasets.

Keywords—Machine Learning, LSTM, CNN

I. INTRODUCTION

Computer vision and AI (artificial intelligence) are developing fastly, for normal people the idea is they can easily understand what they see, but for computer vision It is very hard to describe a image from user perspective. In coming years, this will be gainful for the person in each possible way. Then exchange business is going to check a piece of their primary concern with this technology. In our paper, we propose a technique dependent on the encoder-decoder system, named Long Short Term Memory (LSTM), the principle point is to create a clear sentence for the given picture by presenting reference data.

The primary challenges involve ensuring low latency aligned with human judgment, producing high-quality captions, and meeting the demands of various applications. Building on previous state-of-the-art frameworks, this deep vision model effectively detects a wide range of visual concepts. It incorporates an entity recognition model to identify objects within images and a confidence model to improve captioning accuracy. Our system demonstrates significant improvements over previous state-of-the-art system son both in-domain datasets, such as MSCOCO, and out-of-domain datasets. [18]- [19].

II. LITERATURE SURVEY

In the field of image captioning, numerous experiments have been conducted by researchers. Some notable previous works include the following

In [1], the authors introduced a neural network model that was tested on various datasets, achieving an accuracy of approximately 73.80% during decoding. The system described in [2] utilized a flexible dataset and word dictionary, with object recognition performed using a single decoder linked to English words. The study in [3] employed a CNN+RNN model, achieving a word accuracy of around 95%. In [4], the authors focused on attention mechanisms, highlighting their potential future applications and determining which parts of an image should be emphasized. The work in [5] presented a comprehensive survey of various research papers, models, and datasets to evaluate their results. In [6], the authors developed

an LSTM-based model for word dictionaries, achieving 85% word accuracy. The approach in [7] proposed a Consensus-based Image Description Evaluation method for image captioning, achieving 85% accuracy with 600 images. In [8], the authors categorized different classes of context in image captioning. The study in [9] used 113 English words from nine different datasets and achieved an accuracy of approximately 95.49%. In [10]; the author explored the importance of a Data Collection and Evaluation Server for word prediction. In [11], the authors introduced various Multimodal Deep Learning methods for Android Malware Detection using image features to aid in image classification. In [12], the focus was on attention mechanisms for image captioning. In [13], an Automatic Image Captioning model was implemented, achieving 92% accuracy. The authors in [14] discussed how advancements in object recognition and machine translation have significantly enhanced the performance of image captioning models, achieving a word accuracy of around 95%. In [15], an image captioning model for blind people using CNN was developed; achieving an accuracy of approximately 80.13%. The work in [16] presented an Empirical Study of Language CNN for Image Captioning with LSTM for word and image data. In [17], the author introduced the hash codes method for multimodal image captioning, utilizing deep orthogonal structures for encoding, achieving 78% accuracy. The study in [18] focused on Visual Question Answering based on attributes and external knowledge, which could be useful for blind people. In [19], the authors implemented an animal dataset for Rich Image Captioning in the Wild, achieving 92% accuracy. The research in [20] applied the word-to-index and index-to-word methods for generating long descriptions of images using LSTM. The author in [21] defined an Adaptive Attention mechanism via a Visual Sentinel for Image Captioning, providing visual attention to the model. In [22], the authors proposed an application model for accurately describing news images. In [23], an Attentive Linear Transformation method was introduced for image captioning using a mathematical model. The authors in [24] developed a feature extraction method for images, achieving 85% accuracy. Finally, in [25], the authors provided a detailed survey of 150 image captioning methods, categorized by technique, application, and parameters, addressing the limitations in the field. Previous approaches to image captioning have largely focused on isolated words and were often limited datasets.

PathLex AI: A Fairness-Driven Architecture for Intelligent Career Guidance

Rutuja Magar¹*, Harsh Palande², Akshay Nalkande³, Sachin Karhale⁴, Vedant Ghule⁵

¹Faculty, Computer Department, Pimpri Chinchwad College Of Engineering And Research, Pune 412101, India

Email: rutuja.magar@pccoer.in

^{2,3,4,5}Students, Computer Department, Pimpri Chinchwad College Of Engineering And Research, Pune 412101, India

Emails: {harshpalande25, nalkandeakshay66, sachinkarhale03, vdtghule11}@gmail.com

Abstract—AI-driven recruitment platforms often struggle with systemic bias, lack of transparency, and limited adaptability to dynamic labor markets. This paper presents PathLex AI, a modular framework centered on a fairness-aware hybrid recommendation engine that integrates content-based filtering, collaborative learning, and knowledge graph traversal. Unlike traditional systems, PathLex introduces in-processing adversarial debiasing and post-processing fairness-aware re-ranking to promote equitable exposure across demographic groups. The architecture is supported by auxiliary components for resume parsing and real-time labor market intelligence, ensuring accurate candidate representation and skill relevance. A multi-level explainability layer further enhances user trust by providing transparent rationale behind recommendations. PathLex demonstrates how integrated, ethically-aligned AI systems can advance

Index Terms—Fairness-Aware Recommendation; Hybrid Recommender Systems; Bias Mitigation; Explainable AI; Knowledge Graphs; Resume Parsing; Automated Recruitment; Job Matching.

I. INTRODUCTION

Artificial Intelligence (AI) is widely adopted in recruitment for candidate sourcing, resume parsing, and job matching. While over 70% of hiring teams now use AI to reduce time-to-hire [9], serious concerns have emerged around algorithmic bias, opacity, fragmented workflows, and outdated data models [2] [4] [3].

High-profile cases—such as Amazon’s AI recruiter penalizing resumes with the word “women’s”—highlight how systems trained on historical data can encode past inequities. Even when sensitive attributes are removed, proxy signals like name or institution may still yield biased outcomes [4]. These black-box systems typically offer minimal feedback, undermining both transparency and user trust.

Meanwhile, job seekers face fragmented platforms with inconsistent interfaces, which especially burdens those from underserved or nontraditional backgrounds. In addition, static role-taxonomies and outdated skills data [14] [18] [19] fail to match fast-changing labor demands—particularly in dynamic fields like software, data science, and cybersecurity.

These gaps call for AI-driven hiring systems that go beyond ranking and filtering. Instead, future systems must emphasize

fairness, transparency, adaptability, and long-term career guidance.

We propose **PathLex AI**, a unified recruitment platform integrating:

- Context-aware NLP for skill extraction,
- A fairness-aware hybrid recommender,
- Conversational guidance with reinforcement learning,
- Real-time labor intelligence pipelines, and
- Multi-level explainability.

PathLex AI reimagines recruitment as a transparent, personalized, and ethically aligned decision-support system.

A. Motivation and Problem Context

Our motivation stems from navigating the fragmented and opaque off-campus recruitment landscape as final-year students in India. As off-campus hiring grows—projected at 37% over the next three years—there is urgent need for accessible, bias-resistant platforms.

AI recruitment systems face four key challenges:

- **Bias:** Proxy signals (e.g., name, college) often perpetuate historical disparities [4] [6].
- **Opacity:** Users receive minimal feedback; decisions lack interpretability [2].
- **Fragmentation:** Candidates juggle multiple portals and interfaces [2].
- **Outdated Models:** Static datasets miss evolving job and skill trends [14] [18] [19].

PathLex addresses these through anonymized preprocessing, fairness-aware recommendations, real-time role updates, and integrated career guidance.

B. Contributions

PathLex AI introduces a modular, fairness-aware framework for AI-driven recruitment, with the following core contributions:

- **Resume Parsing with Contextual NLP:** A modular pipeline using domain-specific embeddings and a custom NER model to extract both technical and soft skills from unstructured resumes. It captures contextual relationships and role hierarchies for more accurate profile construction.

ASBO-MAT-BiLSTM: Social Media Network Anomaly Detection Using Optimized Multihead Attention Transformer based Model

Publisher: IEEE

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Sonali Lunawat ; Jyoti Rao ; Pramod Patil [All Authors](#)

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Abstract:

Currently, attacks in the networks are the most vital issue in modern society and the networks from minor to huge networks are susceptible to network threats. Various approaches exist with several advantages and limitations in detecting anomaly, such as computational complexity, overfitting, low level of accuracy in detection, and so on. To overcome these issues and detect network anomaly effectively Adaptive Secretary Bird Optimization algorithm (ASBO) is integrated with the RAnked Minority Oversampling in Boosting (RAMOB) model to resolve the issue of data imbalance through making the data in a balanced manner. The Multihead Attention Transformer (MAT) mechanism and ASBO algorithm enable the BiLSTM model to effectively detect anomaly by solving the issues of overfitting and complexities in terms of both time and computation. The experimental outcomes display that the ASBO-MAT-BiLSTM model reaches an accuracy of 97.116% using NSL-KDD Dataset and accuracy of 96.54%, using CIC-IDS2017 Dataset, which reveals that our model attains higher efficiency in detecting anomalies in the networks.

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Remote Sensing Image Watermarking using Archimedes Optimization Algorithm and Discrete Cosine Transform

Publisher: IEEE

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Minal Bodke ; Sangita Chaudhari **All Authors**

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II. METHODOLOGY

III. RESULTS AND DISCUSSIONS

IV. Conclusions and future scope

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Abstract:

The unprecedented growth in internet users and various social media platforms increases storage and transfer of digital data and hence leads towards security of this data. The data security ensures the ownership of the multimedia content. Watermarking, steganography, and encryption are the key technologies used to preserve multimedia content ownership. The multispectral images consist of many spectral bands of the images where watermarking is challenging to apply. This paper presents the multispectral image watermarking using the Archimedes Optimization algorithm (AoA) and Discrete Cosine Transform (DCT). The AoA algorithm selects the spectral band with the highest variability as a cover image for watermarking. The DCT is used to watermark the secret logo in the cover image. The performance of the suggested watermarking scheme is estimated based on peak signal-to-noise ratio (PSNR), mean square error (MSE), and structural similarity index (SSIM).

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RESEARCH ARTICLE | NOVEMBER 04 2024

A review paper on various image security techniques

[Minal Bodke](#); [Pranav Tiwari](#) ; [Sushant Gurav](#); [Soham Deshpande](#); [Rohit Bagal](#)

+ [Author & Article Information](#)

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<https://doi.org/10.1063/5.0239141>

In the contemporary era, ensuring security is imperative for safeguarding information and assets, preventing unauthorized access, data breaches, and maintaining the integrity and confidentiality of systems. This study delves into Image Security, employing encryption algorithms for image protection, comparing steganographic methods for dissemination security, and applying digital watermarking algorithms to protect image copyrights. Through a comprehensive analysis of existing literature, this survey paper explains the comparative strengths, weaknesses, and complexities of various approaches utilized in this fusion. Furthermore, it describes the challenges encountered, potential and outlines future research trajectories, aiming to acquire advancements in secure image transmission methodologies. The system addresses the need for robust security measures in handling image data. By using these techniques, it aims to enhance image security, detect unauthorized access or manipulation, and enable authenticated transmission across various platforms. This research contributes to the advancement of secure image transmission methodologies, addressing the increasing concerns regarding data privacy, integrity, and ownership in today's interconnected digital world.

Topics

[Analog transmission](#), [Cryptography](#), [Data management](#), [Review](#)

Iris Liveness detection using SIFT, SURF and SVM with Quality Metrics for Biometric Authentication

Vaishali C.Kulloli
SCSEA
DYPIU, Akurdi
PCET's PCCOER, Ravet
Pune, India
20241001002@dypiu.ac.in
vaishali.kulloli@pccoer.in

Maheshwari Biradar
SCSEA
DYPIU, Akurdi
Pune, India
maheshwari.biradar@dypiu.ac.in

Rahul Sharma
SCSEA
DYPIU, Akurdi
Pune, India
rahul.sharma@dypiu.ac.in

Bahubali Shiragapur
SCSEA
DYPIU, Akurdi
Pune, India
bahubali.shiragapur@dypiu.ac.in

Abstract - Iris recognition technology has become increasingly popular in applications involving biometric security because of its precision and uniqueness. These systems are vulnerable to fraudulent attacks, in which counterfeit iris samples are used to spoof the verification process. To address this issue, various methods for detecting iris authenticity have been developed to differentiate legitimate and counterfeit iris images. This paper presents a methodology for identifying iris liveness using a Scale-Invariant Feature Transform (SIFT), Speeded Up Robust Features (SURF), and Support Vector Machine (SVM) with quality Metrics. Our approach includes pre-processing iris images, extracting distinguishing characteristics using SIFT and SURF techniques, and SVM for classification. The results of experiments conducted on a standard Clarkson dataset 2017 and CASIA-Iris-Thousand, demonstrate the effectiveness of our approach, achieving remarkable precision in distinguishing between authentic and counterfeit iris images. This study contributes to the development of iris liveness detection technology and demonstrates the potential for enhancing the security of biometric verification systems.

Keywords: Iris Liveness, SURF, SIFT, SVM, Quality Metrics.

I. INTRODUCTION

In the past, strategies for personal identification were seriously constrained. However, within the current era marked by improvements in laptop imaginative and prescient biometrics, the need for external artifacts or tokens for recognition has been obviated. Instead, individuals can now be recognized based on their precise organic or behavioural characteristics through the utilization of biometric generation. Authentication serves as a crucial gateway for granting access to assets to authorized people. Traditional authentication mechanisms, such as PINs and passwords, fall quickly into distinguishing between proper users and imposters who have unauthorized access [1,2]. The propensity for forgetting passwords or PINs, in addition to the capability for robbery or misplacement of payment cards, necessitates more sturdy authentication answers.

Biometrics have emerged as a strategy to address these demanding situations, heralded for their automation, accessibility, and accuracy in assembling the evolving security needs of cutting-edge society. By examining human physiological and behavioural features, biometric structures facilitate unique identification, encompassing a spectrum of packages from detection to criminal identity and forensics [3].

Iris detection systems are susceptible to spoofing via various approaches, including the use of various types of touch lenses, together with transparent, coloured, and textured lenses. [9].

In this research, we propose a technique for iris liveness detection that integrates SIFT, SURF and a SVM with Quality Metrics. The SIFT and SURF algorithms are well known for their potential to extract different and invariant features from images, making them appropriate for iris characteristic illustration. SVM, an effective learning classifier, was used to discriminate between real and fake iris samples based on the extracted features. Additionally, we include quality metrics to strengthen the discriminative power of the detection system and improve its resilience to spoofing attacks.



Fig. 1. a) Sample from Clarkson dataset 2017[5] b) Sample from the CASIA-Iris-Thousand database [10].

II. RELATED WORK

In the initial phase of the study, the authors employed various feature extraction techniques rooted in their expertise within the field. Classification methods, notably support vector machines, have been utilized to discern between authentic and presentation attack images [4]. The BSIF feature extraction method is especially useful for iris identification systems in identifying textured contact lenses[8].Furthermore, the study demonstrated the viability of utilizing eye movement information to evaluate iris liveness, while acknowledging the potential of skilled imposters to mimic such movements [8]. In another study, color information from distinct channels replaced gray-textured images in presentation attack ocular image detection [6]. The authors then took a learning-based approach, using considerable training data to create a detection model that obscures the complexities of feature extraction and categorization. A spoofnet framework based on convolutional neural networks (CNN) was developed to detect textured cosmetic contact lenses [7]. The remarkable accuracy of object detection achieved by the CNN technique was validated by experiments conducted on the Notre Dame Contact Lens (NDCL-2013) dataset.

Onion Crop Cultivation & Prediction of Yields by Machine Learning

Dipti Chaudhari
Department of Computer Engineering
Pimpri Chinchwad College of
Engineering and Research, Pune, India
dipti.chaudhari@pccoer.in

Rakhi Dhaygude
Department of Computer Engineering
SVPM College of Engineering
Malegoan, Maharashtra, India
devkaterakhi@gmail.com

Umar Mulani
Department of Computer Engineering
K J College Of Engineering &
Management Research, Pune India
umar.mulani@gmail.com

Priyanka Rane
Vasantdada Patil Pratishthan's
College of Engineering & Visual Arts
Sion Mumbai, India
priyankarane@pvppcoe.ac.in

Yogesh Khalate
Department of Computer Engineering,
SVPMs College of Engineering
Malegaon Bk, Pune, India
yogeshkhalate1206@gmail.com

Vishal Borate
Department of Computer Engineering
Dr. D. Y. Patil College of Engineering
and Innovation, Talegaon, Pune, India
vkborate88@gmail.com

Abstract— The rising worldwide populace prompts the Indian government to upgrade food supply the executives for a long time to come. Reasonable farming practices are critical for guaranteeing steady food creation while protecting the climate against unsafe synthetics, accomplished through mechanical progressions in administration. This study presents a complex multi-phantom imaging framework customized for accuracy farming. Including a RGB camera and Pi NoIR camera worked by a Raspberry Pi installed a robot; this framework catches ethereal pictures for investigation. The pictures are communicated to a Java application for handling, including honing and resizing. Ongoing information is utilized to register the Standardized Contrast Vegetation Record (NDVI), working with crop wellbeing appraisal. Utilizing Profound Learning (DL) strategies, the framework successfully distinguishes onion crop development stages from the gained dataset. The detail the execution of a dynamic profound brain network model for this reason. The framework exhibits a great presentation precision of 97.63% for a cluster size of 24 and 98.45% for a bunch size of 56.

Keywords— Crop Monitoring; Remote Sensing; Onion Cultivation; Raspberry Pi

I. INTRODUCTION

In families around the world, onions are a staple topping utilized all year. Late examinations propose that integrating onions into diets might add to forestalling coronary illness and different infirmities. Around the world, onions are among the key harvests, with a creation outperforming 25 million tons yearly. In Ahmednagar Maharashtra, onion improvement has seen steady turn of events, with a business consequence of 1.8 million tons created across 131.4 thousand hectares [1]. The focal onion-conveying districts are arranged in Punjab and Maharashtra [2]. Accuracy agribusiness involves overseeing worldly and spatial changeability in fields through correspondence and data advances [3], aiming to enhance agro-environmental sustainability.

Extending the accessibility of innovative arrangements empowers remote collection and transmission of ecological boundaries [4, 5]. Automated Flying Vehicles (UAVs), generally known as robots, are airplane worked without human pilots ready. UAVs structure part of an automated airplane framework (UAS), involving the UAV, ground based regulators, and specialized strategies between them and its location from the different area from any other remote detecting altitude to social occasion data about an item utilizing sensors without direct actual contact [6]. Critical advancement in remote detecting for precision horticulture has been accomplished since the last part of the

1980s [7]. UAVs can work with fluctuating levels of independence, either constrained by people by means of controller or independently through locally available PCs known as autopilots [8]. Lately, a huge number of UAV models have been used in both military and regular citizen applications [9]. Strikingly, it's projected that around 75% of UAVs, for example, drones, somewhere in the range of 2016 and 2024 will be sent in accuracy agribusiness applications. UAVs give dependable and quick imaging of harvest fields, working with information catch. Figure 1 shows the robot used in this examination, outfitted with RGB and Raspberry Pi NoIR cameras, both coordinated with a Raspberry Pi 4.

At present, cultivating in India to a great extent depends on conventional strategies. Actually large numbers of ranchers need specialized mastery or monetary assets, bringing about a lack of precise data and temperamental practices. A lot of their cultivating choices depend on mystery, which frequently demonstrates inadequate. In this way, the propose the utilization of UAVs for crop observing. It accept that this approach will become norm in agribusiness because of its dependability and remote observing capacities. By digitizing rural exercises, ranchers can all the more likely grasp their yield's requirements and precisely evaluate its development. It is certain that drive will speed up their organizations higher than ever and increment productivity. The outcome of this execution relies on bringing issues to light among ranchers about its various advantages. All through ongoing years, there has been a striking extension in the use of UAVs in exactness cultivation applications. This example is credited to UAVs' ability to outfit farmers with basic information concerning trim prosperity, working with strong data the leaders [10].

VGG16, a variation of the Visual Figuring Gathering (VGG), shows 16 degrees of adaptability and stands apart for prescient designing. It is presently acquiring incredible significance as a favoured goal to separate thoughts from pictures [11]. VGGNet's weighting structure is broadly accessible and fills in as a standard power generator for applications with fluctuating levels of trouble. What separates VGG16 is areas of strength for the of 3x3 convolution layers with a pitch of 1 and the dependable utilization of 2x2 maxpool layers with a pitch of 2 and an imperceptible offset [12]. A miserable illustration of convolution layers in maxpool is the image of VGG16. At long last, it consolidates two completely coupled (FC) trailed by softmax for control [13].

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RESEARCH ARTICLE | NOVEMBER 04 2024

CNN for medicinal plant identification: A comprehensive review

Shrinika Inamdar, Apurva Talekar

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Ayurveda is oldest method to make essential medicines. The medicinal plants have been played a crucial role for curing the various diseases throughout the human history. Although the identification of medicinal plant is very complex task. The factors such as surrounding, growth phases, soil types and lighting difference are the causes for making the identification process more complex. The medicinal plants are classified according to their colour, shape, texture, etc. In this paper we explore various deep learning algorithms to classify the medicinal plants according to their morphological features. The Convolution Neural Network (CNN) based techniques are one of the efficient techniques for identification of medicinal plant using image dataset. The dataset is consist of large number of images of leaf of medicinal plants. Hence the leaves of the medicinal plant are classified based on their characteristics. Computer vision also plays an important role for identification of types of eaves as we as for collecting dataset. Thus, the deep learning technologies helps to provide an accurate and efficient result for the classifying the medicinal plants.

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FPGA Implementation for Speech Feature Extraction in Real Time

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Aditya Deshmukh ; Arman Khan ; Vedika Patil ; Kishor Bhargale [All Authors](#)

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- V. CONCLUSION & FUTURE SCOPE

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Abstract:

Speech recognition is vital for many human-computer interaction systems and Mel frequency cepstrum coefficients (MFCCs) plays vital role in feature extraction of the speech. This project aims to develop a Field Programmable Gate Array (FPGA) based application specific integrated circuit (ASIC) for extracting MFCCs from raw audio signals, and subsequently transmitting this feature data via USB to a laptop for further processing. MFCCs is widely used features in speech recognition, speaker identification, and other audio-based applications due to their ability to capture essential characteristics of the human voice. By extracting these features efficiently and transmitting them to a more powerful computing platform, this project seeks to provide a foundation for advanced speech processing tasks. The system will consist of an embedded platform (here, FPGA). It will be responsible for acquiring audio signals, performing pre-processing, extracting MFCC feature, and transmitting the feature data via USB to the laptop.

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Abstract:

Speech recognition is vital for many human-computer interaction systems and Mel frequency cepstral coefficients (MFCCs) plays vital role in feature extraction of the speech. This project aims to develop a Field Programmable Gate Array (FPGA) based application specific integrated circuit (ASIC) for extracting MFCCs from raw audio signals, and subsequently transmitting this feature data via USB to a laptop for further processing. MFCCs is widely used features in speech recognition, speaker identification, and other audio-based applications due to their ability to capture essential characteristics of the human voice. By extracting these features efficiently and transmitting them to a more powerful computing platform, this project seeks to provide a foundation for advanced speech processing tasks. The system will consist of an embedded platform (here, FPGA). It will be responsible for acquiring audio signals, performing preprocessing, extracting MFCC feature, and transmitting the feature data via USB to the laptop.

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6 Degree of Freedom Robotic-Arm Using Gesture Control

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Ajinkya Gaikwad ; Gouri Narawade ; Soham Sable ; Rahul Mapari ; Rupali Kawade ; Kishor Bhargale [All Authors](#)

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Abstract:

The modeling and analysis of robotic systems is critical for accurate control and automation in industrial applications. The kinematic model of a 6-DOF gesture- controlled robotic arm, intended for pick-and-place tasks and object classification according to size, shape, and color, is developed in this paper. The system recognizes gestures of a human hand movement simply by combining sensors such as flex sensors, accelerometer, and gyroscope. Data processing and control is performed by an ESP32 microcontroller. A depth-sensing camera integrated with ROS2 enables real-time object detection and classification, while NEMA stepper motors provide smooth and precise motion control. The Denavit-Hartenberg (DH) parameterization for forward kinematics is used to create the kinematic model, which allows for precise end effector location on the robotic arm. The inverse kinematics approach enables the arm to achieve any position and orientation in an unstructured environment. This model enhances precision, sorting efficiency, and gesture control accuracy because of its ability to reach the base position after completing each task thus making the system error free, according to experimental validation. This precision and error free behavior is achieved with help of limit switches and inductive sensors. The proposed approach is scalable and adaptable for industrial automation, laying a solid platform for future improvements in gesture-controlled robotic arms.

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Sortify- An Autonomous Voice Controlled 6 DOF Robotic Arm for Object Detection And Sorting

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Rupali Kawade ; Atharva Kale ; Suhani Chalmeti ; Rahul Mapari [All Authors](#)

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Abstract:

This paper examines the advancements in autonomous robotic systems, emphasizing their application in industrial automation. The paper discusses a wide range of technologies and their integration with Sortify - An autonomous voice controlled 6 degrees of freedom robotic arm for object detection and sorting, including computer vision, voice recognition, control algorithms, and hardware configurations. Key computer vision techniques such as Haar Cascade for object detection are explored. Voice recognition, enabled by Natural Language Processing (NLP) and the Google Speech-to-Text API, adds interactivity to the system by enabling voice-driven commands. Furthermore, it highlights the integration of Robot Operating System (ROS), along with stepper and servo motors for precise movement control. The use of embedded computing platforms such as Jetson Nano, Raspberry Pi, and Arduino Nano, is also discussed. The paper identifies the existing gaps in current research and suggests how those can be addressed in future developments. Future research opportunities in areas like machine learning, real-time processing, and energy-efficient designs are also proposed, with the aim of advancing industrial automation.

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Implementation of Central Gateway with SOME/IP

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Maithili Andhare ; Parth Ramesh Dhole ; Shraddha Anil Patil ; Ishwari Mahesh Naik ; Vaibhav Pathrikar **All Authors**

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- II. LITERATURE SURVEY
- III. METHODOLOGY
- IV. RESULT AND DISCUSSION
- V. CONCLUSION & FUTURE SCOPE

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Abstract:

The growing complexity of in-vehicle communication networks has made the use of service-oriented architectures such as SOME/IP in place of traditional CAN-based implementations necessary. The design and implementation of a central gateway to enable connectivity between legacy CAN/CAN-FD networks and Ethernet-based SOME/IP communication to enable seamless integration of mixed-protocol electronic control units (ECUs) in future vehicles are described in this paper. A microcontroller-based concept is realized based on an RTOS, where CAN messages are decoded, translated and passed on using the SOME/IP protocol stack. Performance analysis demonstrates the gateway's capability to offer low latency and high reliability and hence it can be a good solution for future automotive networks. Gateway architecture facilitates real-time communication using task priority and deterministic scheduling capabilities of the RTOS. Scalability is achieved by modular software components such that the inclusion of further protocols or ECUs can be done easily. Security features like authentication and encryption to suit automotive cybersecurity requirements could be potential enhancements.

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DOI: 10.1109/ICOCT64433.2025.11118488

Date Added to IEEE Xplore: 15 August 2025

Publisher: IEEE

► ISBN Information:

Conference Location: Bengaluru, India

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Sustainable Agriculture Using Machine Learning and IoT

Publisher: IEEE [Cite This](#) [PDF](#)

Vishakha Badgajar ; Aarya Panse ; Manali Mohite ; Siddhant Bedse ; Pranjal Lanjekar ; Vijayalaxmi Kumbhar [All Authors](#)

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Abstract:

This paper presents a novel approach to sustainable agriculture, integrating Machine Learning (ML), Deep Learning (DL), and the Internet of Things (IoT). It employs IoT devices with cameras for real-time monitoring of plant health, enabling early detection of diseases and pests. Through disease and pest detection machine learning models, the system provides farmers with timely alerts and tailored solutions via a user-friendly web application. Additionally, an IoT-based spraying mechanism delivers targeted treatments, reducing the overuse of pesticides and promoting sustainability. It provides precision agriculture, offering an efficient solution to enhance crop management and productivity while minimizing environmental impact.

Published in: 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)

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IOT Based Weather Monitoring & Analysis Using GUI

Adesh Dhage

Department of E&TC, Pimpri Chinchwad College of
Engineering and Research, Ravet,
Pune, India
adesh.dhage_entc21@pccoer.in

Yogesh Pawar

Department of E&TC, Pimpri Chinchwad College of
Engineering and Research, Ravet,
Pune, India
yogesh.pawar_etc2020@pccoer.in

Rohan Yadav

Department of E&TC, Pimpri Chinchwad College of
Engineering and Research, Ravet,
Pune, India
rohan.yadav_entc21@pccoer.in

Dipali Shende

Department of E&TC, Pimpri Chinchwad College of
Engineering and Research, Ravet,
Pune, India
dipali.shende@pccoer.in

Abstract - Weather forecasting is the application of science and technology to predict the state of the atmosphere at a particular location. The majority of early weather forecasting techniques were based on pattern identification, or the observation of recurring patterns in the events. For instance, one may notice that an especially crimson sunset typically heralded favorable weather the next day. Not all of these forecasts, though, turn out to be accurate. Here this system will predict weather based on parameters such as temperature, humidity, wind speed, rain gauge, wind direction, soil temperature, atmospheric pressure, soil moisture. We will collect the weather data with the help of some sensors and pass it to the system. System will take this parameter and will predict weather from previous data in database(dataset). The primary objective of our project is to develop a well-made and accurate weather forecasting model capable of predicting climate changes over extended periods and assessing their implications for future generations. The weather forecasting system forecasts weather based on historical records; thus, this prediction will prove to be trustworthy. It takes into account elements like temperature, humidity, wind speed, rain gauge, wind direction, soil temperature, atmospheric pressure, soil moisture. Air traffic, maritime, agriculture, forestry, military, navy, and other fields may all use this technology.

Keywords— BME280, Rain Gauge Sensor, Soil Moisture Sensor, Wind Direction Sensor, Wind Speed Sensor, ESP32 Controller, Linear Regression, AWS, Graphical User Interface.

I INTRODUCTION

According to The Indian economy's most significant sector is agriculture. Fifty percent of India's workforce is employed in the agriculture industry, which generates eighteen percent of the country's GDP. The world's top producer of wheat, rice, pulses, spices, and spice-related items is India. The weather is a vital natural element for life; depending on its severity, it may either provide or destroy opportunities for survival. To

put it simply, weather forecasting is the process of predicting the state of the atmosphere in a given location at a given time utilizing physics principles, technology, and a range of statistical and empirical methodologies. The weather prediction is incredibly helpful in protecting both people and property and to protect the crops and it will tell us what to expect in our atmospheric environment. Weather prediction data is essential for making quick modifications to daily agricultural activities, which reduces losses due to unfavorable weather conditions and raises the quantity and quality of agricultural output. aids in seasonal or long-term planning as well as crop selection according to ideal weather conditions. Seasonal forecasting contributes to the betterment of farmers lives in areas where there is significant fluctuation in yearly rainfall. Seasonal forecasts play an important role in deciding the economic policies of governments, during major drought was forecasted, monetary policy could be relaxed to maintain growth targets. The unique aspect of our approach is that ability to provide fast and reliable forecasts while operating on low-cost and resource-efficient computing systems. These forecasts have practical applications in our daily lives, enabling us to make informed decisions and adapt effectively to changing weather conditions. This paper presents the review on the various methods of Weather Forecasting. It focuses on the accurate weather prediction using advance IOT[1] and Machine Learning model[5][6] which predicts the Realtime weather conditions at max accuracy and this data is displayed on the dashboard.

II LITERATURE REVIEW

1. Gaurav Verma, Pranjul Mittal, Shaista Farheen (Department of Electronics Communication) Dayananda Sagar College of Engineering/ "Real Time Weather Prediction System Using IOT and Machine Learning"/ IEEE 2020 - Methodology Used 'Logistic Regression Model', Parameters 'Temp., Humidity, Light Intensity', Conclusion 'By using sensors machine Learning module

Commercial Automation Using RTOS-Based Architecture

Dr. Dipali Shende

Department of E & TC,
PCCOER,Ravet

Mrs. Vaishali Baste

Department of E & TC,SKNSCOE,
Vadgaon

Mrs. Shital More

Department of E & TC, SIT
Lonavala

Abstract - The primary objective of this research is to introduce an RTOS-based architecture for data transmission between the host region and the industry area. RTOS is a process that takes place between hardware and software. It proposes a model which is used to monitor (Host Area) the different physical values in industrial plants and its assembling environment (Industry Area) by adding the functionality of an RTOS. In an electronics manufacturing facility, temperature control, security, and other factors are crucial. If an accident occurs, productivity will suffer. With the aid of the Wireless Module, a system built with an ARM processor, and a port of a Real Time Operating System (RTOS) based on Linux, this project seeks to address this issue by remotely monitoring the temperature and other physical parameter levels of various plant areas. Here in addition to detection of any faults, the preventive action is also taken by using the control system mechanism. These things will make the industry to operate properly by preventing the accidents in real time and to increase the level of production.

KEYWORDS—ARM-Advanced RIS C Machines; RTOS - Real Time Operating System; RTLinux-Real Time Linux; VB-Visual Basic

I INTRODUCTION

The RTOS-implemented system has the capacity to multitask for task monitoring and task control. By modifying the kernel, the system can also add more apps. Therefore, system updates are also feasible as needed.[1][7] The most recent ARM Controller offers more advanced applications nowadays. The system can be connected through the wireless sensor network for monitoring remote area. Due to warmth and humidity, the electronics industry and others have recently experienced significant problems. These problems include increased board oxidation and bridging, faulty soldering joints, and solder component flaws. Through these parameters, the environment, in particular a few devices like desiccators and solder paste refrigerators for storing paste and bare PCBs, respectively, also has to be controlled. In order to increase a machine's efficiency, several factories try to keep the temperature under control. However, doing so can result in unanticipated accidents, poor product quality, and other problems. Microcontroller-based interfaces and the monitoring and control system they enable are more

expensive and less effective.[2][8] Also the response of the system is late which may sometimes lead to catastrophe. That means a real time response is missing part. Considering all these parameters the cost, efficiency, durability, reliability of such system will not be optimum. So, a change in the existing system is needed. Real Time Linux (RTLinux) can be ported to the ARM platform so that the system can be implemented. The RTOS-implemented system has the capacity to multitask for task monitoring and task control. By modifying the kernel, the system can also add more apps. Therefore, system updates are also feasible as needed. The most recent ARM Controller offers more advanced applications nowadays. For monitoring a remote location, the system can be connected via a wireless sensor network. For the ARM Controller, RTLinux is a pre-emptive, hard real-time deterministic multitasking kernel. RTLinux can run additional jobs by applying patches in accordance with our needs. RTLinux manages memory, time, and inter-process communication (using semaphores, message queues, and mailboxes). By gathering data from perceived values of the electronics manufacturing sectors under the direction of engineers, it helps to monitor and control the environment. The system's entire architecture is based on three categories: communication protocols, software details, and hardware specifics. The RTOS-implemented system has the capacity to multitask for task monitoring and task control. By modifying the kernel, the system can also add more apps.[3][9]

II CURRENT COMMERCIAL AUTOMATION SCENARIO

Globally, the new phrase The economy is quickly picking up speed. The industrial sector, which includes the automotive industry, has been altered and moulded by this new, disruptive technology, which has lately discovered its growth curve. Following Industry 4.0, this business era is seen as a collection of ICTs (information and communications technologies) and digitally enabled technologies. These include advancements in manufacturing machinery, intelligent goods, data tools, and analytics that make use of the Internet of Things (which can include, among other things, 3-D printing, prototypes, connected cars, product lifecycle management, and cyber physical production systems).[4][10]

Home > [Cognitive Computing and Cyber Physical Systems](#) > Conference paper

Use of Improved Generative Adversarial Network (GAN) Under Insufficient Data

| Conference paper | First Online: 05 January 2024

| pp 288–299 | [Cite this conference paper](#)



**Cognitive Computing and Cyber
Physical Systems**
(IC4S 2023)

Pallavi Adke, Ajay Kumar Kushwaha , Supriya M. Khatavkar & Dipali Shende

 Part of the book series: [Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering](#) ((LNICST, volume 536))

 Included in the following conference series:
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 336 Accesses  1 Citation

Abstract

The article covers enhancements to the generative adversarial network (GAN) model's architecture and training, enabling stable training in the absence of sufficient data. An improved generative adversarial network (GAN) architecture has been proposed. These improvements are then applied to the augmentation of a dataset on tyre joint defects, which is utilised for classification applications. The dataset used has a higher percentage of conformity images and is quite uneven. It is difficult to create precise defect classification models given this uneven and constrained dataset of defect identification. So, in the work that is being presented, research is done to expand the defect dataset and improve the balance between the various defect classifications. Indeed, the quality of generated images has considerably improved as a result of recent developments in generative adversarial networks (GANs). Deep learning models in the GAN class combine a generator network with a discriminator network. The current study reveals that the recommended augmented GAN model is useful in enhancing the performance classification model under a small dataset. The generated effects of progressed GAN are evaluated using the Fréchet Inception Distance (FID) score, which indicates extensive development over the styleGAN architecture. Additional dataset augmentation exams making use of generated photos monitor a 10% boom in category version precision in comparison to the preliminary dataset. To evaluate the effectiveness of GAN-generated picture augmentation, PCA plots can be used to visualize the distribution of real and augmented images in a lower-dimensional space.

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Machine Learning Based Heart Disease Prediction Using ECG Image

Publisher: IEEE [Cite This](#)  PDF

Kishor Bhargale ; Saurabh Kadam ; Sakshi Chame ; Hardik Saklikar [All Authors](#)

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- IV. Survey of Heart Disease Detection
- V. Generalized Methodology

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Abstract:

In a global health context outlined by the World Health Organization (WHO), the escalating prevalence of CVDs underscores a pressing need for advanced diagnostic methodologies. CVDs remain a leading cause of morbidity and mortality worldwide, necessitating innovative approaches for early detection. Traditional diagnostic methods face challenges in providing timely and accurate identification of heart conditions, often relying on subjective interpretation and lacking the sensitivity required for early intervention. Recognizing this critical gap, our engineering project focuses on the early detection of heart diseases using ML and DL techniques applied to ECG images. The integration of ML and DL offers a promising avenue to overcome the limitations of conventional diagnostic tools, leveraging intricate patterns within ECG data for more precise and timely detection. By addressing these challenges, our research aims to contribute to the advancement of cardiovascular health, providing a robust framework for early disease detection and improving overall patient outcomes.

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Publisher: IEEE

▶ ISBN Information:

Conference Location: Belgaum, India

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Neural Stress Mapping with Machine Learning from EEG Data

| Conference paper | First Online: 31 December 2024

| pp 56–71 | [Cite this conference paper](#)



**Intelligent Computing and Big
Data Analytics**
(ICICBDA 2024)

Meenakshi Raghupathy , Sakshi Salunkhe, Shweta Dhende, Kishor Bhangale & Dipali Dhake

 Part of the book series: [Communications in Computer and Information Science](#) ((CCIS, volume 2234))

 Included in the following conference series:
[International Conference on Intelligent Computing and Big Data Analytics](#)

 157 Accesses  1 Citation

Abstract

In our rapidly changing world, the influence of stress on our mental health has become a pressing concern, necessitating innovative approaches for timely detection and intervention. Stress can affect mental as well as physical states. There are many disorders and harmful effects of stress, so our work is helpful to detect stress using EEG (electroencephalography), which detects the electrical activities happening inside the brain. The primary goal is to assess stress levels by collecting data from EEG sensors. By analyzing EEG data, there is a possibility to detect stress using the activity of neurons. To study the variation in the EEG signal, we can use different stimuli like audio and videos which could help to study the modulation. Music and videos have an impact on external and internal factors that can be studied by using this technique. To achieve this, a machine learning model i.e. Random Forest can be used and hence a stress detection system in real time is developed with an accuracy of 77%. A summary report is generated where the statistical measures such as mean, median, skewness and kurtosis are calculated with respect to the EEG data. Using this real time stress detection system, we can analyze an individual's stress levels and provide assistance for their mental health which can help them be more productive and maintain a positive outlook on life.

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Smart IoT Based Real Time Crop Monitoring and Spectrum Management for Hydroponic System

Publisher: [IEEE](#) [Cite This](#) [PDF](#)

Sakshi Dharmadhikari ; Aastha Raina ; Sanika Chaskar ; Kishor Bhangale ; Apurva Mogal ; Pranav Awasarmol [All Authors](#)

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- V. CONCLUSION AND FUTURE SCOPE

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Abstract:

Numerous challenges arise in India, a developing nation heavily reliant on agriculture. These include issues such as small land plots, overuse of pesticides, and substitution of natural nutrients with harmful chemicals. Vertical farming (VF) effectively produces food sustainably while conserving space, natural resources, and labor. This system can be implemented year-round without being affected by seasonal changes, making it adaptable to any location and time. Soil erosion and infertility pose significant challenges in traditional farming. To combat this problem, soilless farming, also called hydroponics, is gaining popularity. Hydroponics is cultivating plants without soil, providing essential nutrients to the crops in a controlled environment. The utilization of research in the VF system for fresh, high-quality, locally-grown produce has risen in the past few years. This approach has been shown to significantly boost productivity and enhance production quality. Vertical farming with hydroponics addresses the issue of limited agricultural land by utilizing vertical space, while hydroponic techniques facilitate organic cultivation. The proposed vertical farming using hydroponics aims to utilize the Internet of Things (IoT) to sense and monitor vital factors like pH, TDS, temperature, and humidity to automate the system.

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Date Added to IEEE Xplore: 21 January 2025

Publisher: IEEE

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Human Activity Prediction Using Generative Adversarial Networks

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Amar Shete ; Aashita Gupta ; Ajay Waghumbare ; Upasna Singh ; Triveni Dhamale ; Kiran Napte [All Authors](#)

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Abstract

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- I. Material and Methodologies
- II. Experiments and Evaluation
- III. Conclusion

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Abstract:

This paper introduces an innovative approach to enhance human activity prediction by integrating Temporal Convolutional Networks (TCN) with an Encoder-Decoder model within the Generative Adversarial Network (GAN) framework. Our proposed model harnesses the power of spatio-temporal 3D convolutions to capture intricate patterns and temporal dependencies present in video data, thereby improving prediction precision and resilience. To showcase the effectiveness of our approach, we utilize the KTH dataset for action recognition tasks, demonstrating its utility in managing video data within deep learning pipelines. The KTH dataset serves as a valuable resource for simplifying data preprocessing and facilitating focused model development. At the core of our research lies the GAN-based model, which consists of a Generator and a Discriminator. The Generator is responsible for generating lifelike video frames from latent space representations, while the Discriminator guides adversarial training dynamics. By employing an encoder-decoder architecture augmented by TCN layers, our model adeptly captures both spatial and temporal information inherent in video sequences. Through extensive experiments conducted on benchmark datasets like KTH Action, we demonstrate the competitive performance of our model. Evaluation metrics including Mean Squared Error (MSE) and Structural Similarity Index (SSIM) highlight the superior accuracy of our approach compared to existing models such as FutureGAN, fRNN, and MCNet.

Published in: 2024 15th International Conference on Computing Communication and Networking Technologies (ICCCNT)

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Compact and Planar Sinuous Antenna operating in the Wide Band Frequency Range

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Prashantdeep Singh Sital ; Siddhesh Chavan ; Komal Borse ; Rajesh K. Singh ; Saurabh Shukla ; Triveni Dhamale [All Authors](#)

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<p>Abstract</p> <p>Document Sections</p> <ul style="list-style-type: none"> I. Introduction II. THEORETICAL BACKGROUND III. BASIC PRINCIPLES IV. ANTENNA DESIGN V. RADIATION CHARACTERISTICS <p>Show Full Outline ▾</p> <ul style="list-style-type: none"> Authors Figures References Keywords Metrics More Like This 	<p>Abstract:</p> <p>This paper investigates the enhancement of a two-arm sinuous antenna's operational bandwidth through structural modification. The conventional design was altered by introducing slots into the end arcs, to create resonances at the lower frequencies. Simulation results obtained using CST Microwave Studio are presented, with the S-parameter (S11) plots utilized as the primary metric for evaluating the antenna's performance. The modifications led to a new resonance at 2.4 GHz and 3.5 GHz, effectively extending the antenna's bandwidth into the lower frequency range. This paper elaborates on the simulation setup, modification process, and resultant changes in the antenna's performance, offering a wideband operation that could prove beneficial for various communication and radar applications.</p> <p>Published in: 2024 4th Asian Conference on Innovation in Technology (ASIANCON)</p> <p>Date of Conference: 23-25 August 2024 DOI: 10.1109/ASIANCON62057.2024.10838051</p> <p>Date Added to IEEE Xplore: 21 January 2025 Publisher: IEEE</p> <p>► ISBN Information: Conference Location: Pimari Chinchwad, India</p>
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Simulation and Analysis of Solar-Powered Electric Golf Cart

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Abhijeet Pagare ; Sarthak Shewalkar ; Supriya Yadav ; Dipali Dhake [All Authors](#)

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- III. COMPONENTS
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- V. DETERMINATION OF MOTOR POWER AND BATTERY PACK CAPACITY

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Abstract:
The research uses MATLAB Simulink to simulate and analyze solar-powered electric golf carts to evaluate their sustainability, efficiency, and performance. Using Simulink, a thorough simulation model includes all necessary elements and assesses performance in various operational and environmental scenarios. According to the study, solar-powered electric golf carts can lower carbon emissions, lessen reliance on fossil fuels, and provide environmentally beneficial transportation options. Additional optimization techniques to improve the efficiency and performance of carts are discussed, such as improvements in battery technology, vehicle design, operating protocols, and solar panel efficiency. The applicability for real-world scenario simulations is demonstrated in an in-depth study with MATLAB Simulink. With its conclusions, suggestions, and directions for further study and improvement, this research adds to the conversation on solar-powered electric cars and sustainable transportation by utilizing MATLAB Simulink's capabilities for simulation and analysis.

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Comprehensive Analysis of Solar-Powered Electric Carts

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Abstract

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- I. Introduction
- II. Literature Survey
- III. Findings From Literature Survey
- IV. Components of Golf Cart
- V. Methodology

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Abstract:

This study proposes an innovative way to reduce transportation's negative environmental effects by combining electric automobile technology with solar-powered electric golf carts. Our approach improves operating effectiveness and lowers greenhouse gas emissions by utilizing advances in lithium-ion batteries, solar panels, permanent magnet synchronous motors (PMSMs), battery management systems (BMS), and other related technologies. Methodologically, it highlights the function of the charger in power source transitions together with other important parts such as the motor controller, MPPT boost converters, and solar power circuit. The design features are validated by MATLAB Simulink simulations, which also demonstrate performance attributes including torque production, speed, and energy efficiency under different driving circumstances. Specifically, peak line voltage, torque, and velocity are seen during the acceleration stages of the FTP-75 driving cycle, and equivalent drops are observed during deceleration. This approach promotes effectiveness, viability, and ecological responsibility in the design and operation of electric golf carts by combining cutting-edge technologies, such as lithium-ion batteries, solar panels, and PMSMs. This presents a sustainable transportation option that has the potential to redefine the industry.

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MUSIC PLAYER SYSTEM USING REAL-TIME FACIAL EXPRESSION DETECTION

Swati Nikam
Department of Computer Engineering
Pimpri Chinchwad College of Engineering &
Research
Pune, India
swati.nikam@pccoer.in

Santosh Chobe
Department of Computer Engineering Pimpri
Chinchwad College of Engineering &
Research
Pune, India
santosh.chobe@pccoer.in

Simardeep Singh
Department of Computer Engineering Pimpri
Chinchwad College of Engineering &
Research
Pune, India
simardeep032002@gmail.com

Tejas Dixit
Department of Computer Engineering Pimpri
Chinchwad College of Engineering &
Research
Pune, India
tejas.dixit9119537275@gmail.com

Aditya Dhayagude
Department of Computer Engineering Pimpri
Chinchwad College of Engineering &
Research
Pune, India
adityadhayagude03@gmail.com

Himanshu Raheja
Department of Computer Engineering Pimpri
Chinchwad College of Engineering &
Research
Pune, India
himanshuraheja985@gmail.com

Abstract—In today's society, stress has become an escalating concern, aggravated by economic uncertainties and rising living costs. Listening to music is a widely recognized stress-relief strategy. The existing music player applications lack the sophistication to select songs tailored to the user's emotional state. This limitation restricts the therapeutic potential of music. Effective stress relief is closely tied to aligning the music with the user's current mood. To address this critical issue, we propose developing a groundbreaking Music Player System that leverages real-time facial expression detection to provide music recommendations. In this project, Python and Flask will be utilized to develop a user-friendly and responsive platform for the users. It uses the Convolutional Neural Network (CNN) algorithm to provide real-time analysis of the user's facial expressions captured via a camera. This unique approach is intended to transform the music experience of the user by providing a dynamic playlist that is generated by processing the facial expressions of the user. Moreover, the system is designed to provide a smooth and personalized music experience, ensuring each song matches the user's emotions. This way, the system aims to relieve the stress of the user by providing emotion-based music recommendations.

Keywords—*Innovative Music Player, Real-time Facial Expressions Analysis, User-friendly Platform, Dynamic Playlist, Personalized Music Experience.*

Dataset—*Images of facial expression*

I. INTRODUCTION

In today's world, stress levels are rising due to uncertain factors such as finances, high living costs, and various other personal reasons. There are multiple remedies to relieve stress, among which listening to music is a popular and effective method. However, the current music applications cannot select songs based on the user's current emotional state. This problem limits the potential of music to effectively relieve stress.

A. Current Scenario:

In the current scenario, individuals trying to use music for stress relief face a significant drawback. Regular music applications don't understand individual's feelings in real-time, so the playlists that are developing might not immediately suit the human mood. This makes the usage of music for releasing stress less efficacious. It is essential to develop new and creative solutions to enhance the music experience and create a stronger emotional connection.

B. User base in Similar Applications:

Examining similar applications that employ facial recognition to offer music suggestions to diverse user groups is crucial for understanding their user base and technological advancements. Analyzing the statistical data of these platforms provides valuable insights into the widespread adoption and impact of such technologies, aiding in comprehending their overall influence in the market.

	<p>Book Chapters Publications (A.Y. 2024-25)</p>	
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Chapter 6

Innovation Methodologies and Techniques Applied in Green Construction Through Sustainable Waste Materials

Sahil Sanjeev Salvi

 <https://orcid.org/0000-0002-0025-0750>

*Department of Civil Engineering, PCET's Pimpri Chinchwad College of
Engineering and Research, Pune, India*

M. Mathiyarasi

*Department of Aeronautical Engineering, Sathyabama Institute of Science and
Technology, Chennai, India*

Kottana Santhosi

Department of Chemistry, Government Degree College, Chintapalle, India

M. Ramarao

*Department of Mechanical Engineering, Bharath Institute of Higher Education
and Research, Chennai, India*

Arti Chouksey

*Department of Civil Engineering, DeenBandhu Chhotu Ram University of
Science and Technology, Murthal, India*

ABSTRACT

This chapter explored new ways to build green by using sustainable waste materi-

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The logo for RADemics features a vertical dark blue bar on the left. A horizontal blue arrow points to the right from the middle of this bar, containing the text 'RADemics' in white. Below the bar, there are several thin, curved lines in shades of blue and grey that resemble stylized grass or reeds.

RADemics

Agricultural Innovations Using 5G and IoT for Precision Farming Smart Irrigation and Sustainable Agriculture Practices

Mr.Chetan S, Dr. Rajeshwar Goud Jangampally
PCET'S PIMPRI CHINCHWAD COLLEGE OF ENGINEERING AND
RESEARCH, HYDERABAD INSTITUTE OF TECHNOLOGY AND
MANAGEMENT

CHAPTER 5

Social Media Analysis for Business Development using GenAI

*Sonali Lunawat**, *Aman Kocharekar***,
*Ishan Honmode****, *Ashwin Lavate***** and *Pushkar Sarda******

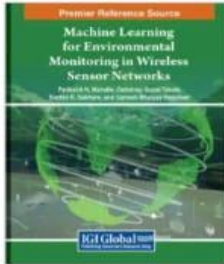
ABSTRACT

Within the highly competitive market environment, social media platforms play the role of dictating the public's perception of brands and products. Organizations frequently depend on consumer-generated content like reviews, comments, and tweets to evaluate the success of product launches and monitor constant customer feedback. Nonetheless, the manual examination of this massive volume of data is ineffective and may result in postponed understanding, thereby complicating the process. It is imperative for enterprises to react to public sentiment promptly. This project introduces a technique that is supposed to automate the process. Social media sentiment analysis for product performance assessment by enabling product owners to enter a brand designation, the tool retrieves recent entries or remarks from social media platforms and conducts a sentiment analysis to categorize them as positive or negative, or unbiased. Together with collecting sentiment results, the tool identifies crucial concepts linked to both affirmative and adverse provisions observations and generates a derived summary using a Large language model (LLM). The resulting information provides product owners with a comprehensive understanding of attitudes among consumers. This method will enable organizations to track the people's perception of their product launches, make data-driven decisions, and quickly resolve positive and negative feedback. It is intended to keep the business competitive with timely consumer content understanding, hence, improving the product and increasing customer involvement.

Keywords: Artificial Intelligence; Sentiment Analysis; Machine Learning; Natural Language Processing; Large Language Models (LLM).

1.0 Introduction

In today's digital landscape, social media serves as a crucial source for gathering customer feedback and understanding brand perception.



Edge Computing: A Guide to Achieving Sustainable Living

Manvi Vijay Gawande (/affiliate/manvi-vijay-gawande/483915/) (Pimpri Chinchwad College of Engineering and Research, India), Sanika Shrikant Hange (/affiliate/sanika-shrikant-hange/483916/) (Pimpri Chinchwad College of Engineering and Research, India), Mukesh Mukundraj Tandale (/affiliate/mukesh-mukundraj-tandale/483917/) (Pimpri Chinchwad College of Engineering and Research, India), and Archana Kollu (/affiliate/archana-kollu/483918/) (Pimpri Chinchwad College of Engineering and Research, India)

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Abstract

Data processing near the network edge solves decentralized cloud infrastructures. Without time-consuming transfers to centralized data centers, edge computing processes and analyzes data locally. Network processing at the edge minimizes latency when transferring or sharing data with remote servers. Reduced data center processing improves real-time application speed, latency, and energy savings. Edge computing makes AI and IoT devices work without cloud load. Energy is saved by offloading computation to edge devices. Edge computing selectively processes and consolidates data at the network edge and sends only relevant data to the cloud. Strategic data transmission conserves network capacity and benefits the environment. Edge data storage eliminates big data centers and reduces their environmental effect from construction, maintenance, and cooling. Automotive, healthcare, smart cities, and industrial automation benefit from edge computing architectures.

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Chapter 8

Blockchain-Based Secure Digital Twin Framework for Smart Healthy City

Sneha Kanawade, Suvarna Patil, Shivganga Gavhane, Nalini S. Jagtap, Amit Bhanushali

Book Editor(s): Amit Kumar Tyagi

First published: 10 September 2024

<https://doi.org/10.1002/9781394303564.ch8>

Summary

The fusion of health-focused technologies and smart city initiatives has opened up new avenues for creative approaches to building safe and secure urban environments. In order to fulfill the goal of creating a Smart Healthy City, this article investigates the creation of a secure digital twin framework based on blockchain technology. Urban areas, infrastructure, and health-related data can be dynamically represented with the help of digital twins, which are virtual copies of actual objects or systems. Together with blockchain technology, a decentralized, immutable ledger, this framework creates a safe environment for exchanging and managing private health data in the context of smart cities. Due to its decentralized structure, which lowers the possibility of unwanted access and improves privacy for health-related data, blockchain technology's built-in security features guarantee data integrity.

The innovative framework's numerous applications in enhancing health and well-being are emphasized in the article. The integration of blockchain and digital twins facilitates resilient and transparent health infrastructure within smart cities, enabling tasks like tracking spread of infectious diseases, securely managing electronic health records, and optimizing allocation of healthcare resources. The article further emphasizes how this secure digital twin framework can be used to improve citizen trust and engagement.

The framework gives citizens more power to actively participate in their own well-being within the larger framework of a smart city by giving them more control over their health data and guaranteeing transparent and traceable data transactions. A safer, more effective, and more resilient urban environment is fostered by the proposed blockchain-based secure digital twin framework, which emerges as a fundamental pillar for the development of Smart Healthy Cities as urbanization and health considerations become more intertwined.

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AI-Driven Approach for Optimal Soil-Based Crop Recommendations



Suvarna Patil, Deepali Hajare, Shivganga Gavhane, Nayan Panchal, Sahil Shelke, and Aditya Nikam

Abstract As agriculture remains a primary source of income in India, the rising instances of farmer distress, often associated with crop failure and low yields, emphasize the immediate need to promote agricultural sustainability. This challenge extends its implications to both the nation's economy and the global agricultural sector, becoming a significant concern for countries worldwide. The key issue revolves around the precise prediction of crop yields under diverse climatic conditions in India, considering various attributes. The overarching objective is to equip farmers with essential tools for informed decision-making, enabling them to choose the most suitable crops and optimize fertilizer usage. In the proposed system, Machine Learning (ML) model is used to address a variety of agricultural challenges, including soil classification and crop recommendation. Addressing these challenges, a proposed model aims to categorize and forecast suitable crops based on soil nutritional levels, employing diverse ML models termed as K-Nearest Neighbors (KNN), Logistic Regression (LR), Support Vector Machine (SVM), Stochastic Gradient Boosting (SG), and XG-Boost (XGB). The research dataset encompasses seven distinct soil parameters characterized by seven nutrient attributes. Training and testing of the models are conducted using 80 and 20% of the dataset, respectively. Notably, the outcomes reveal that XG-Boost surpasses other models, achieving an accuracy of 98.64%, precision of 98.49%, recall of 98.76%, and an F-score value of 98.59%.

Keywords Soil parameters · Crop recommendation · Soil classification · Agriculture · Sustainable agricultural practices · Machine learning

S. Patil (✉) · D. Hajare · S. Gavhane · N. Panchal · S. Shelke · A. Nikam
D Y Patil Institute of Engineering, Management and Research, Akurdi, Pune, India
e-mail: suvarna.patil@dypiemr.ac.in

D. Hajare
e-mail: deepali.hajare@dypiemr.ac.in

S. Gavhane
e-mail: shivganga.gavhane@dypiemr.ac.in

S. Patil · D. Hajare · S. Gavhane
D Y Patil International University, Akurdi, Pune, India

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Blockchain-Based Secure Digital Twin Framework for Smart Healthy City

Sneha Kanawade^{1*}, Suvarna Patil¹, Shivganga Gavhane¹, Nalini S. Jagtap¹ and Amit Bhanushali²

¹Dr. D.Y. Patil Institute of Engineering, Management and Research and D.Y. Patil International University, Pune, India

²West Virginia University, Morgantown, USA

Abstract

The fusion of health-focused technologies and smart city initiatives has opened up new avenues for creative approaches to building safe and secure urban environments. In order to fulfill the goal of creating a Smart Healthy City, this article investigates the creation of a secure digital twin framework based on blockchain technology. Urban areas, infrastructure, and health-related data can be dynamically represented with the help of digital twins, which are virtual copies of actual objects or systems. Together with blockchain technology, a decentralized, immutable ledger, this framework creates a safe environment for exchanging and managing private health data in the context of smart cities. Due to its decentralized structure, which lowers the possibility of unwanted access and improves privacy for health-related data, blockchain technology's built-in security features guarantee data integrity.

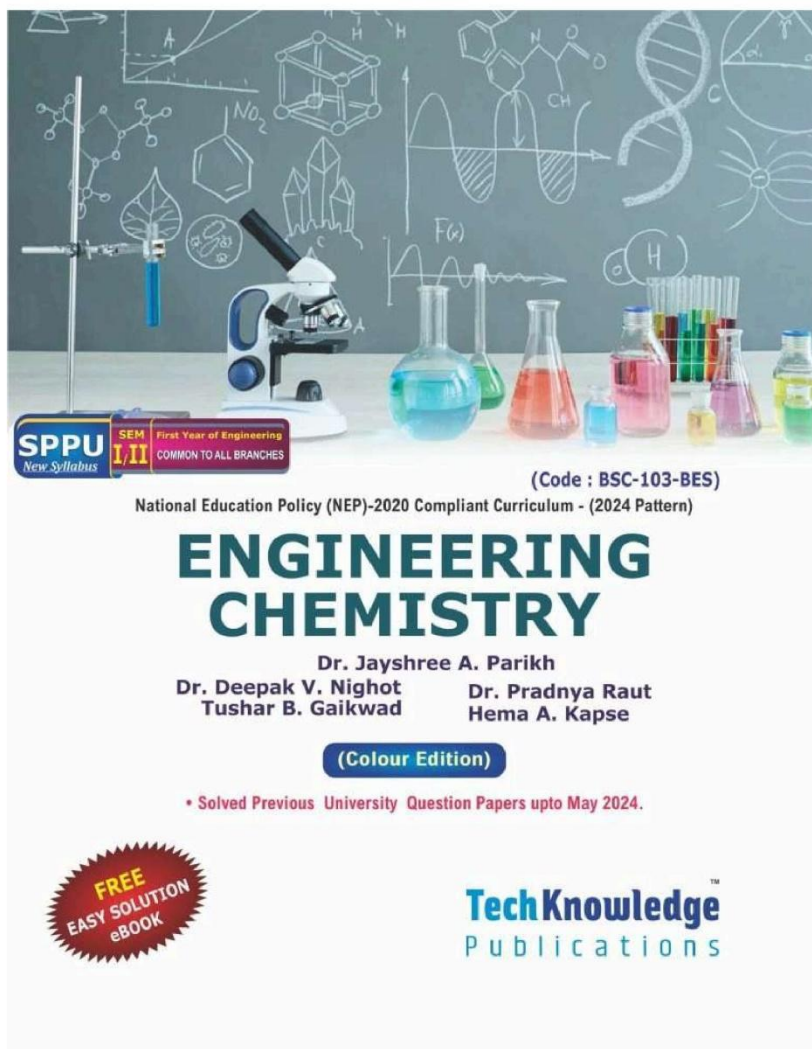
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Keywords: Blockchain technology, digital twins, smart healthy city, information security, data integrity

*Corresponding author: sneha.kanwade@dypiemr.ac.in

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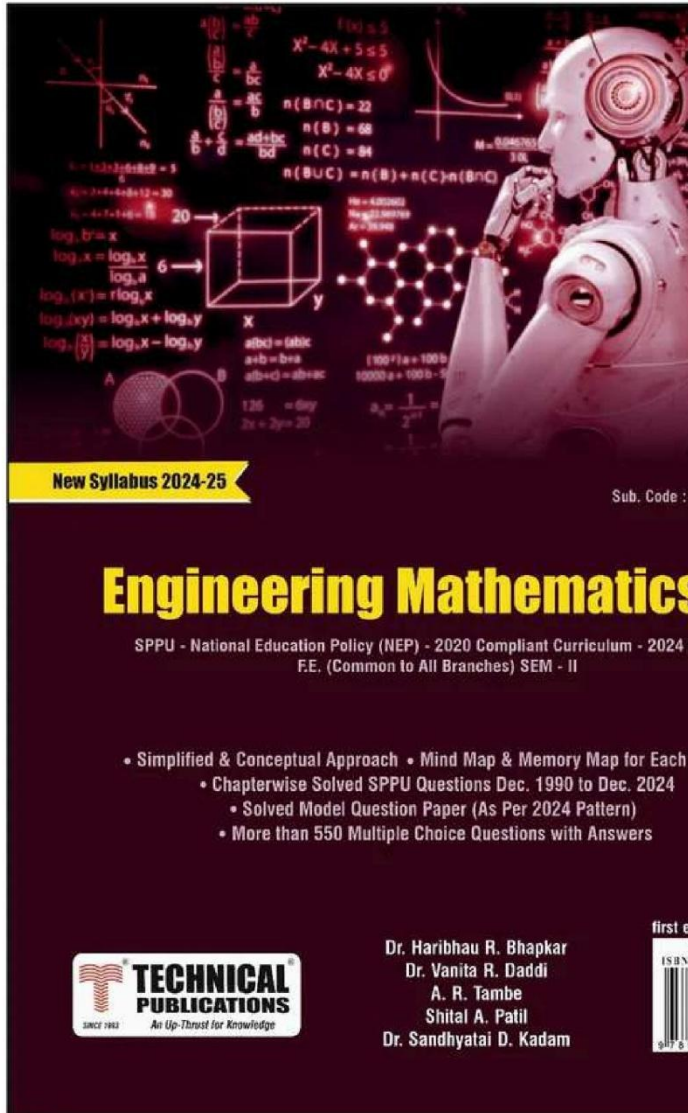
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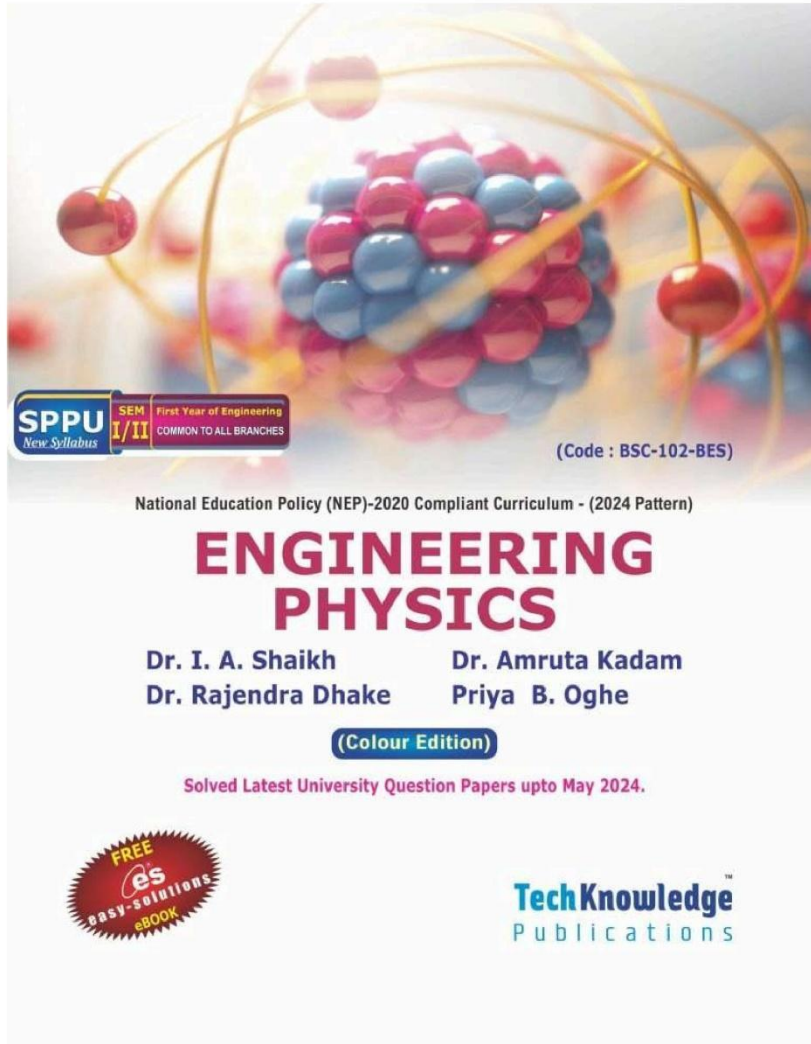
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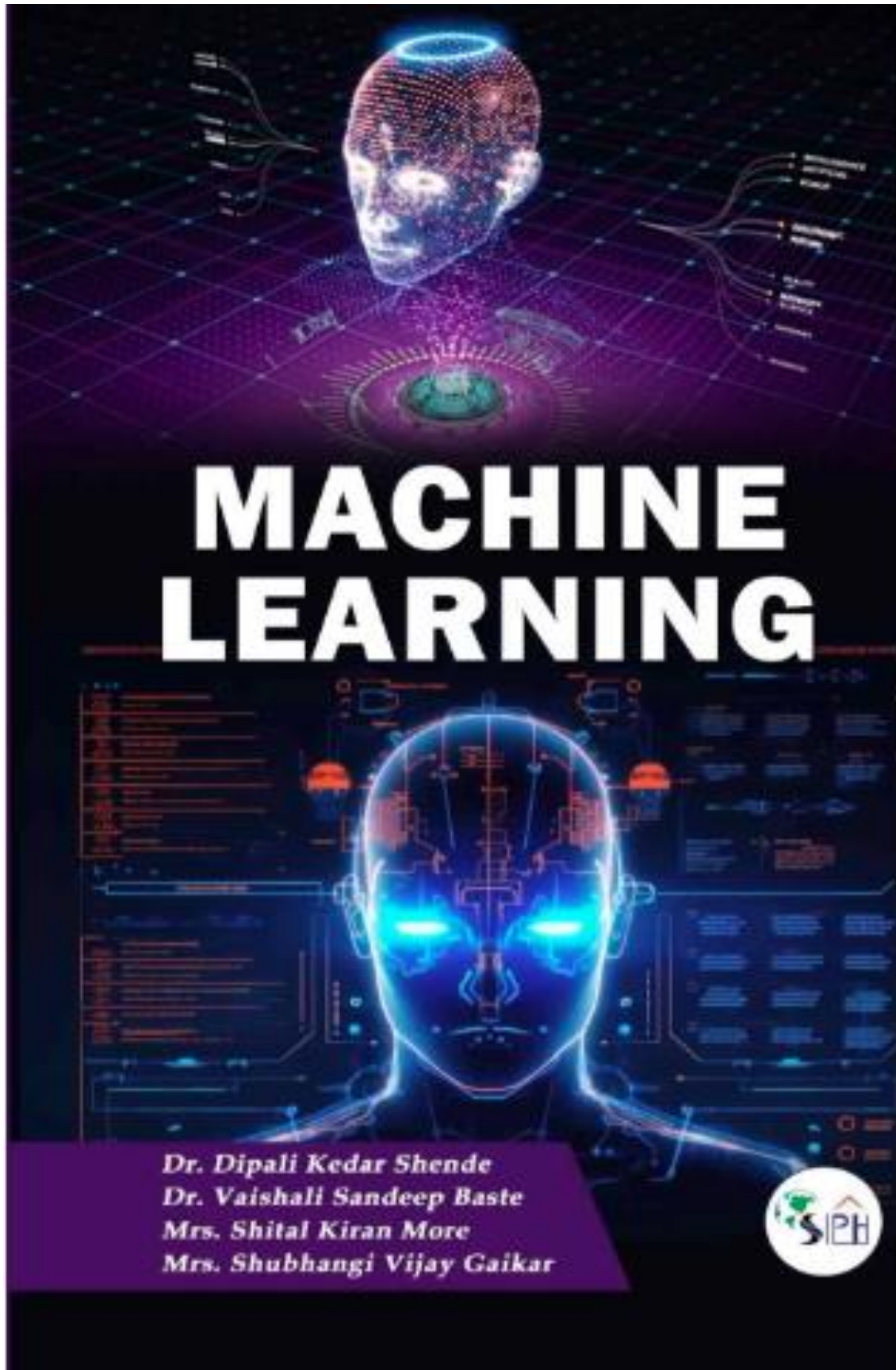
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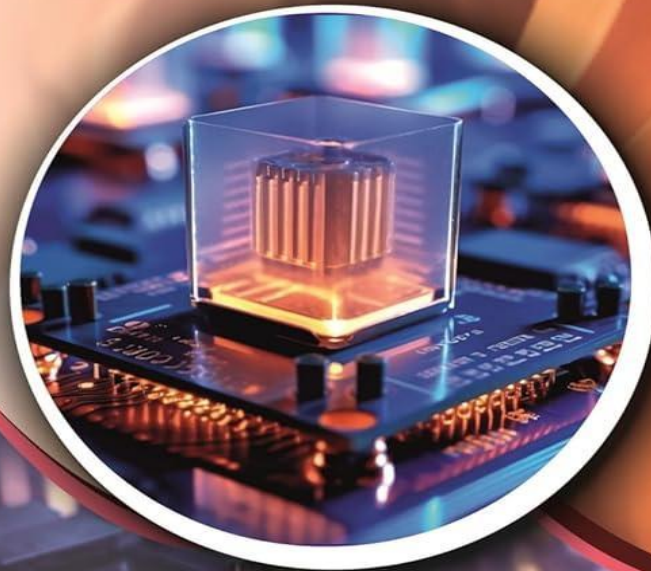
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