

INDIRA GANDHI DELHI TECHNICAL UNIVERSITY FOR WOMEN

(Established by Govt. of Delhi vide Act 9 of 2012)

ISO 9001:2015 Certified University

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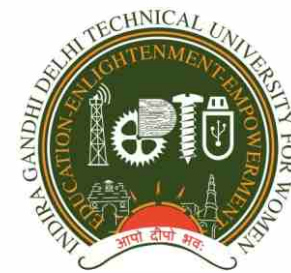
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2nd RESEARCH EXCELLENCE AWARDS

INDIRA GANDHI DELHI TECHNICAL UNIVERSITY
FOR WOMEN

2021-2022



A compendium of
Abstracts of
Published Papers

January 2021 - December 2022





2nd RESEARCH EXCELLENCE AWARDS



Year 2021-2022

This Compendium of Abstracts of published Papers for Research Awards is compiled and edited by Prof. Ranu Gadi, Dean (R&D), Dr. Bhavani Prasad and Dr. Shivani (Coordinators, R&D) on behalf of Indira Gandhi Delhi Technical University for Women, as per submissions made by the first/corresponding authors. This publication is meant for the internal circulation only and has no commercial purpose.

**“GIRLS’ EDUCATION IS THE SINGLE
BEST INVESTMENT THAT ANY SOCIETY
CAN MAKE.”**

-Carol Bellamy



From the desk of the VICE CHANCELLOR

The research is a scholarly and creative endeavour of students and faculty members leading to innovations and development in any University. The output of research and development (R&D) contributes towards academic excellence. Indira Gandhi Delhi Technical University for Women is inexorably committed towards expediting research of value, quality, and innovation, and keeps stimulating it by providing a suitable environment to the students and faculty maintaining sustainability and global standards.

The University is committed to develop sustainable systems and state-of-art infrastructure to enable Indian women to become future leaders in the field of Science, Engineering, Architecture & Planning, Technology, and Management. We have numerous National and International collaborations for working towards refining, building, and nurturing an upgraded system of education, innovation & design, and entrepreneurial activities. The University takes pride in revealing that it has signed MoUs with numerous International Universities, such as UniMAP-Perlis, JCU-Australia and NAIST-Japan to name a few.

The Research Excellence Awards with categorised rewards, recognizes the diligence of the faculty members and student researchers and serves to inspire emerging researchers, the most. IGDTUW witnessed a successful First Research Excellence Awards ceremony in 2021, with around forty recipients. Providing worthwhile recognition to the faculty members and student researchers has proved to be pivotal in maintaining the credibility of this Initiative. It gives me immense pleasure to realise that there is an escalating number of budding researchers. I, wholeheartedly, congratulate all our established and budding awardees, especially the female researchers, who are beginning to emerge in their full might at the University.

From the year 2022, the University incepted Patent awards and I feel elated that two patents under the commendable patent category have been selected for patent award.

The University with aim to improve overall research performance and promote research activities undertaken by Undergraduate and Postgraduate students introduced an Incentive Scheme for Journal Publications. The objective of this scheme is to encourage the students for publication of their research work in reputed journals. The research experience at the undergraduate and postgraduate level will not only allow the student to learn content, but they will also learn how knowledge is constructed in a particular discipline.

I am pleased to launch the second edition of the IGDTUW Research booklet; a compendium of abstracts of research papers selected for Research Awards and patents and invite the students and faculty members of IGDTUW to dedicate themselves in fostering research and innovation culture through their inclusive adherence and unconditional commitment to the research and innovation activities. Let us all abide by the path of research excellence and raise the bar for Education & Research at IGDTUW in the years to come.

**Dr. (Mrs.) Amita Dev
Vice Chancellor**

SECOND RESEARCH EXCELLENCE AWARDS 2021-2022

RESEARCH AT THE UNIVERSITY

“ We do not need magic to change the world; we carry all the power we need inside ourselves already: we have the power to imagine better. ”

The University is on a Mission to promote high quality Scientific Research with focus on Engineering, Technology, Science, Architecture, Management and Humanities. Research is of utmost importance for both the economic and social development of a Nation. Indira Gandhi Delhi Technical University for Women has evolved to become a National flagship, Research-Led University with a mission to foster an environment for academic excellence and research excellence in advanced & emerging areas of Technology to meet the contemporary needs of the Industry & Society at large.

The Major Thrust areas of Research at the University

• Artificial Intelligence	• Data Communication
• Big Data Analytics	• Cryptography
• Speech Translation Systems	• Cyber Security & Cyber Forensics
• Web Technologies	• Optical Communication
• Fuzzy Database Management	• Digital Signal & Image Processing
• Wireless Sensor Network	• VLSI Design
• Machine Learning	• Embedded System
• Internet of Things	• Medical Image Processing
• Algorithms Design	• Renewable Energy Resources
• Information Security	• Microelectronics
• Secure Wireless Networks	• Radio Frequency Circuits
• Clouding Computing	• Mathematical Programming
• Business Intelligence	• Allocation Problems
• Nanomaterial Fabrication & Engineering	• Data Aggregation in wireless sensor networks
• Thin Film Technologies	• Applied Optics
• Analog Integrated Circuits	• Thermal Science & Engineering
• Evolutionary Algorithms	• Green Manufacturing
• Biomedical Engineering	• Bio-Composite Material
• Power Electronics	• Polymers
• Machine Design Engineering	• Atmospheric Sciences
• Tribology	• Panoramic & 3-D Imaging
• Composite Material	• English Literature
• Robotics & Automation	• Communication Studies

In the recent past, IGDTUW has witnessed a greater focus on building research facilities & research temperament among students, scholars & faculty members. The University vows to devise sustainable systems and state-of-the-art infrastructure to enable Indian women to dawn the role of future leaders, managers, researchers, and productive team players in the fields of Engineering, Technology, Science, Architecture, and Management.

The Research and Development Cell (R&D) is a special Unit set up to act as an interface between funding agencies and the University to handle sponsored research projects and industrial activities. The R&D Cell of the University supports the research efforts of all students and Faculty Members, provides mentoring, facilitates and fosters industrial collaboration and identifies and disseminates research opportunities and collaborations. It also provides administrative and managerial support for the operation of sponsored research, industrial consultancy and other R&D related activities of the Institute. The Institute has expertise in various research areas to provide knowledge and intellectual inputs which are of interest to the industry. Many new laboratories have been added in various departments. Faculty members are working on various research projects funded by DST, MHRD, MCIT, Meity, etc., which have added value to their research, technology and innovation.

IGDTUW provides an excellent environment for Researchers and looks forward to contributions from Faculty members and students in extending this culture for research. It also support and facilitate partnerships, networking, and collaborations with other academic and research Institutions, industries and organizations.

The University aims to improve the overall research performance and promote research activities undertaken by the students of the University. The Research and Consultancy Wing of the University promotes research excellence to achieve 3Ps (Product, Patents, and Publications) and nurture a research environment for quality research and encourages innovation and new ideas to integrate research with evolving technologies for novel applications. It helps to disseminate research findings to the scientific and industrial communities.

To strengthen the research culture in the campus and encourage the students to pursue quality research work, various Incentive/ Schemes/ Financial Assistance Schemes have been launched by the University. To name a few:

- JRF/SRF Scheme for Ph.D. Scholars.
- Financial Assistance to Full-time Ph.D. Scholars of IGDTUW who are not in receipt of any kind of Financial Assistance from any other sources.
- Financial Assistance to non-GATE M.Tech. and M.Plan. students who are not in receipt of any other kind of Scholarship/Stipend etc. from any other sources.
- Research Awards/Incentive to UG/PG Students for Publication of Research Papers in SSCI/SCI/SCIE/Scopus/ESCI Indexed Journals.
- Financial support to the Faculty Members and Students for presenting Research Papers in National and International Conferences.

PREFACE

The faculty members and students of IGDTUW have a passionate commitment towards maintaining high standards of excellence in research and academics. The generous endeavour for the inception of the Research Excellence Awards in 2019, envisioned by our honorable Vice Chancellor, Dr. Amita Dev, was to acknowledge the irrevocable dedication in research & innovation. This is intended at building a foundation for fostering quality research and developing a robust research ecosystem in the University.

The University offers four categories of awards annually, namely, Outstanding Research Awards, Premier Research Awards, Commendable Research Awards and Motivational Research Awards. The primary goal of the Outstanding Research Awards is to recognize faculty who published papers in outstanding category with impact factor \geq five. The aim of the Premier Research Awards is to recognize the faculty who published papers in reputed journals in premier category with impact factor at least one. The goal of the Commendable Research Awards is to recognize the faculty who published papers in reputed journals in commendable research award category with impact factor less than one. All the above-mentioned awards would include the category of journals published in SCI/SCI expanded/SSCI publications. Finally, the aim of Motivational Research Awards is to recognize the faculty who published papers in the reputed Scopus indexed journals.

The first Research Excellence Awards ceremony was organized on Dec 24, 2021 where Research Awards were granted to all the Researchers who qualified the selection criteria in each category of the award for their papers published during August 2019 to December 2020. The Premier Research Awards were given to seventeen faculty members and nineteen students. Two faculty members and a student received the Commendable Research Award.

The categories of awards have been revised from the year 2022 by including patent awards in two categories, with an aim to achieve marked publications in highly reputed international journals along with the filing of patents. For Journal publications, the Outstanding Research Awards recognizes the publications in journals in the outstanding category. The Premier Research Awards aimed at recognizing the publication in reputed journals in premier research award category with impact factor of atleast one; whereas, the Commendable Research Awards recognizes the publication in journals with impact factor of atleast two. The Motivational Research Awards aimed at inducing impetus to the researchers to contribute to publications of significant advances in esteemed journals with impact factor \geq one. The UG/PG incentive scheme was introduced from year 2021-2022 to motivate the under-graduate & post-graduate students for promotion of research at the University. The incentive would include the category of journals published in SSCI/SCI/SCIE/SCOPUS/ESCI publications. We feel proud to announce that 12 UG/PG students are eligible for research incentive award under this scheme.

The University takes great pride in issuing the second edition of the compendium of research publications. It comprises a collection of works submitted by the faculty members and students along with the link to the details on the World Wide Web from January 2021- December 2022, considered for Research and Patent Awards. It shall be helpful in inspiring young researchers and students who pursue research at the University. All the publications eligible for Research Excellence Awards are the result of the author's original contribution published and indexed as per the notification issued by the University. In addition to the cash prize, a certificate of merit shall be provided to all the awardees. The compendium ought to be key in inspiring young women researchers and students, who have recently stepped into the University.

We on behalf of the Research and Development Cell of the University congratulate all the members of the academic fraternity on receiving the Research Excellence Awards.

Dr. Bhavani Prasad
Dr. Shivani
(Coordinators, R&D)

Prof. Ranu Gadi
(Dean, R&D)

SECOND RESEARCH EXCELLENCE AWARDS 2021-2022

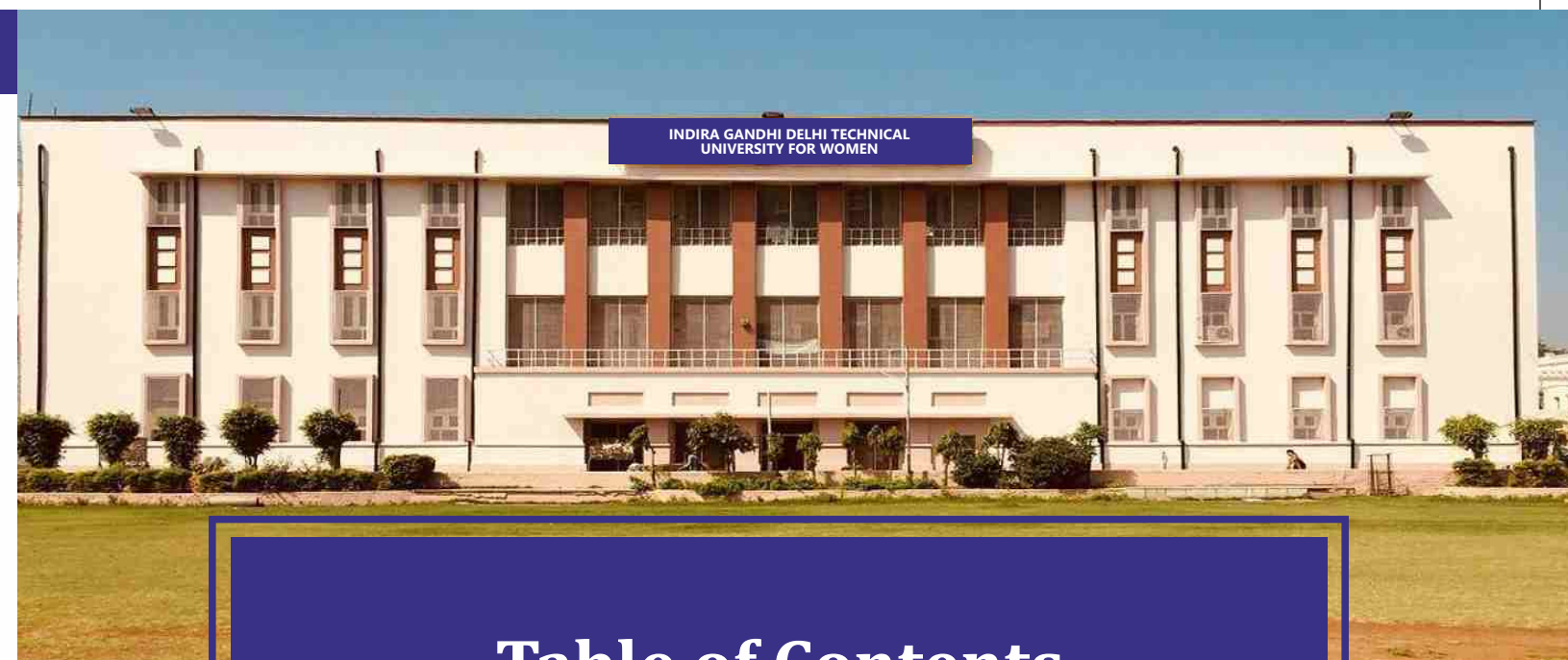


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BIOGRAPHIES OF AWARDEES



Dr. (Mrs.) Amita Dev
Vice Chancellor

Dr. (Mrs.) Amita Dev, Vice-Chancellor of Indira Gandhi Delhi Technical University for Women, Govt. of Delhi is a true leader, excellent administrator and passionate researcher. She is doing extensive research in the field of Deep Neural Networks, Speech Processing, Speech Modeling, Speech Recognition, Speech Synthesis etc. Having vast experience of more than three decades, she has unparalleled track record of Administration, quality Teaching, Innovation and Research. She has published more than 123 research papers in the Renowned International and National Journals and Conference Proceedings. She is an avid speaker and a great motivator and has been invited at various National and International forums.

In recognition to her valuable and worthy research contributions, she has been conferred with many awards viz.

- National Level AICTE Young Teacher Career Award with Research Grant for pursuing Advanced Research in the area of "Hindi Speech Recognition Using Connectionist Model".
- State Level Best Teacher Award awarded by Govt. of Delhi.
- National Level Best Engineering Teacher Award by ISTE for significant contribution in the field of Research and Technology.
- International ECONS Education Excellence Award for Academic Excellence.
- Vittiya Saksharta Abhiyan Award by the Hon'ble Minister for HRD, GoI for spreading Digital Literacy.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Dr. Ranu Gadi
Professor

Dr. Ranu Gadi is a Professor in Dept. of Applied Sciences and Humanities, Indira Gandhi Delhi Technical University for Women. She is presently holding the responsibility of Dean (Research & Development and Research & Consultancy) along with being the Director, IGDTUW Incubation Centre. She did her Masters and PhD in Chemistry from IIT Roorkee and pursued Post-Doctoral Fellowship at Environmental Sciences Division, Lancaster University, Lancaster, UK. Her research areas of interest include Atmospheric Chemistry and Climate Change; Characterization and Source Apportionment of Atmospheric Aerosols; Biomass burning emissions; Speciation and Bioremediation of trace metals in water/wastewater; Synthesis, Characterization and Application of Nano-materials; Green Corrosion Inhibitors. She has authored/co-authored more than hundred research papers in International refereed journals of repute and National/International conferences.



Dr. Chhaya Ravi Kant
Professor

Dr. Chhaya Ravi Kant is serving as Professor (Physics) at IGDTUW. She is presently holding the charge of the First Appellate Authority at IGDTUW. She has done Ph.D from Department of Physics and Astrophysics, University of Delhi and M.S. (Software Systems) from BITS, Pilani. She qualified the National Eligibility Test (JRF) in Dec 1992. She had joined IGDTUW in 2002 and is actively involved in research in the field of nanomaterials and nanocomposites with two Indian Patents and more than 45 publications in international, national journals and conferences. She has also set up the 'Nanomaterials and Thin Film Research Lab' at IGDTUW. She is an active researcher currently guiding Ph.D scholars and four students have been awarded Ph.D under her able guidance. She is a Life member of Electron Microscopy Society of India and Plasma society of India.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Dr. Shalini Arora
Professor

Dr. Shalini Arora is presently working as Professor in Mathematics and Head at Applied Sciences and Humanities Department, Indira Gandhi Delhi Technical University for Women (IGDTUW). She has more than 20 years of teaching experience. She did her Masters and Ph.D. in Mathematics from IIT Delhi. Prior to joining IGDTUW She worked as Assistant Professor at the Operations Management Group, IIM Calcutta and Department of Mathematics at Lady Shri Ram College. She is a recipient of the 'Young Scientist Award' by the SERC division of DST. Her areas of research interest include Mathematical Programming, Allocation Problems viz., Transportation and Assignment Problems, Combinatorial optimization etc. She has published more than 30 research papers in Journals of International and national repute.



Dr. Geeta Sachdev
Assistant Professor

Dr. Geeta Sachdev is an Assistant Professor (Mathematics) in the Applied Sciences and Humanities Department, IGDTUW, Delhi. She obtained her M.Sc. in Applied Mathematics and PhD in Mathematics from IIT Roorkee. She has published over seventeen research papers in the area of Mathematical Programming in various International Journals.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Dr. Bhavani Prasad
Assistant Professor

Dr. Bhavani Prasad is presently working as Assistant Professor at IGDTUW. Prior to this, he worked as post-doctoral research fellow at the Zhejiang University, China under the supervision of Prof. Hong Zhanglian. He received his PhD in 2013, from Indian Institute of Technology, Roorkee, under the guidance of Prof. Raj Kumar Dutta, where he carried out studies on antibacterial and photocatalytic applications of ZnO nanoparticles. Currently, his research areas includes- Applications of metal oxides/carbon nanomaterials/polymers nanocomposites in photocatalysis, controlled targeted drug delivery, antimicrobial activity studies, etc. He has published many research papers in SCI/Scopus-indexed international referred journals and more papers and posters presented in international conferences also.



Dr. Shivani
Assistant Professor

Dr. Shivani is an Assistant Professor in Department of Applied Sciences and Humanities. Prior to joining IGDTUW, she served as Assistant Professor (Ad hoc) at Department of Chemistry, Miranda House, University of Delhi. She has completed her Ph.D at Department of Applied Sciences and Humanities, IGDTUW. She has published 12 research papers in refereed international journals and received Premier research excellence award (2020). Her research work is focused on identification of major emission sources of ambient air pollution over National Capital Region. She has worked as JRF/SRF in DST funded research project and gained four years research experience. She has also worked as Visiting Research Student under India Institute Fellowship program at University of Birmingham, United Kingdom for three months.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Dr. Devendra K. Tayal
Professor

Dr. D.K. Tayal is working as Professor in Department of Computer Science & Engg. He has done M.Tech. (Computer Engg.), Ph.D. (Computer Engg.) from Jawaharlal Nehru University. He has a teaching experience of more than 13 years. He did his research in the field of Intelligent Systems and has published approximately 40 research papers in International Journals & Conferences. He has written numerous articles in newspapers and magazines as well. He is a member of International Advisory committee of International Journal of Computer Science, Hongkong and member of International Advisory Board of International Journal of Software Engg & Applications, Korea . Besides this he is referee on Editorial board of various International Journals including the famous IEEE Transactions on Fuzzy Systems having the SCI Impact Factor 4.26 . His area of research includes Intelligent Systems , Natural Language Processing, DBMS , and Fuzzy Logic . He keeps on regularly conducting Conferences & Workshops in his field of interest, in his department and outside also.



Dr. S.R.N. Reddy
Professor

Dr. SRN Reddy is a Professor in Computer Science and Engineering department, IGDTUW. He has more than 20 years' experience that includes research, industry and teaching. His research interest includes Engineering Education, Embedded Systems Design, Mobile Architecture and IoT. He has published more than 80 research papers in various international journals, conferences and couple of books. He is a PI in six externally funded projects by Microsoft, Intel and Nokia, and Co PI for two MHRD sponsored projects in collaboration with IIT Delhi and IIIT Delhi. He established the State of Art & Embedded Mobile Design, IoT Innovation lab in collaboration with Intel, Microsoft, Nokia, etc. He has received several equipment grants from Intel, Nokia, Microsoft and ARM. He has conducted more than 40 workshops and expert lectures. He received the fellowship and award from Intel to visit and present the work in USA and Taiwan.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Dr. Seeja K.R.
Professor

Dr. Seeja K.R. is Professor in the Department of Computer Science and Engineering, Indira Gandhi Delhi Technical University for Women (IGDTUW), Delhi. She has received her Ph.D. degree in Computer Science from Jamia Hamdard, New Delhi, India. Her research interest includes Data Mining, Intelligent Computing, Biometrics, Health Informatics and Algorithm Design. She has published many research papers in various international journals and conference proceedings.



Dr. Vivekanand Jha
Assistant Professor

Dr. Vivekanand Jha is working as Assistant Professor in the Department of Computer Science and Engineering at Indira Gandhi Delhi Technical University, Delhi. He received his Ph.D. degree in Computer Science and Engineering from Indira Gandhi Delhi Technical University, Delhi, M.Tech in Information Technology from Indian Institute of Information Technology, Gwalior, and B.Tech in CSIT from Rohilkhand University. He has teaching and research experience of more than 13 years. Before joining IGDTUW he worked with ITC Infotech India Limited, Bangalore as Associate IT Consultant and during that period won the Best Project Award for Campus Bath of 2006. He is trained over various SAP technologies both at ITC Infotech India Limited, Bangalore and SAP Labs, Bangalore. He has also received a certificate from IBM for training over Mainframe systems. He has also worked with The Institute of Chartered Accountants of India (ICAI), New Delhi in the capacity of Assistant Director (IT). He has published 10 research papers in reputed international journals and 19 research papers in international and national conferences. He is currently supervising B.Tech, M.Tech and Ph.D. students in the area of Wireless Sensor Networks, Internet of Things, Intelligent Networks, Software Defined Networks, Computer Networks and Algorithm Design.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Dr. Ravinder M.
Assistant Professor

Dr. Ravinder M. is working as Assistant Professor in the Department of Computer Science & Engineering, Indira Gandhi Delhi Technical University for Women, Delhi, since March-2018. He has more than Ten years of teaching experience. He has received his B.Tech. (Computer Science & Engineering) degree from B V Raju Institute of Technology (BVRIT), Jawaharlal Nehru Technological University Hyderabad, Telangana in 2003, M.Tech (Computer Science) degree from and School of Information Technology-Jawaharlal Nehru Technological University Hyderabad, Telangana in 2009, and Ph.D. (Computer Science & Engineering) degree from Jawaharlal Nehru Technological University Kakinada (JNTUK), Andhra Pradesh, India in 2017. His areas of research interest are Image Processing, Video Retrieval, Machine Learning, and Deep Learning.



Dr. Vijay K. Yadav
Assistant Professor

Dr. Vijay Kumar Yadav currently working as an Assistant Professor at Indira Gandhi Delhi Technical University For Women, Kashmere gate New Delhi. He has earned his M.Tech & Ph.D. from the Department of Cyber Law and Information security, at the Indian Institute of Information Technology, Allahabad. His thesis deals with the oblivious transfer for location-based services. He published his research work in various SCI/SCIE indexed journals and also presented his work at different National & International Conferences. He has 18 SCI/SCIE publications out of which 4 are published in IEEE Transactions and one in ACM survey computing which shows his research quest. He also served as a reviewer of several prestigious and peer-reviewed journals. His research area includes Cryptography, and Information Security, etc.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Dr. Arunima Jaiswal
Assistant Professor

Dr. Arunima Jaiswal is a Ph.D in Computer Science & Engineering from Delhi Technological University, Delhi, India. She has received her M.Tech (Master of Technology) degree from Delhi Technological University, Delhi, India and B.Tech (Bachelor of Technology) in Information Technology from University School of Information Technology, Guru Gobind Singh Indraprastha University, Delhi, India. Currently, she is working as a University Assistant Professor in Dept. of Computer Science & Engineering at the Indira Gandhi Delhi Technical University for Women, Delhi, India. She has many publications to her credit in various Journals with high impact factor and International Conferences. Her research interests are in the area of Sentiment Analysis, Social Media Analytics, Soft Computing, Machine Learning, Deep Learning, Social & Semantic Web.

DEPARTMENT OF ARTIFICIAL INTELLIGENCE & DATA SCIENCES



Dr. Ankush Jain
Assistant Professor

Dr. Ankush Jain worked as an Assistant Professor in the Department of CSE (AI & DS), Indira Gandhi Delhi Technical University for Women (IGDTUW), Delhi from Sept 2022 to Jan 2023. He completed his Ph.D. from ABV-Indian Institute of Information Technology and Management (ABV-IIITM), Gwalior, in 2022. He received his M. Tech. degree with a specialization in Advanced Networks from ABV-IIITM, Gwalior in 2017, and B. Tech. degree in Computer Science and Engineering from Rajasthan Technical University, Kota, in 2014. Earlier, he worked as an Assistant Professor at Bennett University (Times of India Group), Greater Noida. He has published several book chapters and SCI journal papers in his area of interest and proficiency in various peer-reviewed International journals of high repute. He serves as a reviewer in various international journals, e.g., IEEE Sensors Journal, ESWA, IJECE, Soft Computing, and Multimedia Tools and Applications. His research interests include Recommendation Systems, Evolutionary Computation, Face Hallucination, and Machine Learning.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Rakesh K. Singh
Professor

Dr. R.K. Singh is Professor in Department of IT and is also Registrar, IGDTUW. He obtained PhD(IT) from GGSIP University and Graduation and Post-Graduation Degrees from BITS, Pilani. He is pursuing his research work in the Information Security, Software Engineering, Software Testing, and Software Project Management etc. He has published more than 40 papers in International/National Journal/conferences of Repute. Presently 04 Research Scholars are pursuing PhD under his guidance in the area of Clone Detections, Software Change Management and Information Security Management. Two Research Scholars have been awarded Ph.D Degree. He is Fellow, IETE, India and life time member of ACM, USA and CSI, India.



Dr. Amar Kumar Mahapatra
Professor

Prof. A.K.Mohapatra (Member, IEEE), presently working as a Professor and HoD in the Department of Information & Technology, Indira Gandhi Delhi Technical University for Women, Delhi. He earned his PhD in IT from GGSIP University and M.Tech from IIT(ISM), Dhanbad. His areas of specialization are Cryptography and Cyber security. He has published more 67 research papers in referred journals and conferences. He also worked with Delhi Police as Chief Technical Advisor during 2018 to 2021. He has been awarded as the University Best Teacher (GGSIPU, Delhi) for the year 2006-2007 and as "Career Guru" in 2013. Prior to joining as Associate Professor at IGDTUW, he has worked as an Associate Professor at USICT, GGSIP University, Delhi. He was also appointed as the training and placement officer of USICT, GGSIP University and IGDTUW in past

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Arun Sharma
Professor

Dr. Arun Sharma completed his PhD Degree from Thapar University, Patiala India in 2009. Prior to this, he did M. Tech. (CSE) from Punjabi University, Patiala in 1997. Currently, he is working as Professor – IT and Dean (Examination Affairs) at Indira Gandhi Delhi Technical University for Women (IGDTUW), Delhi. He is also having the additional responsibilities as Director – NIRF, Accreditation and IQAC and Managing Director – IGDTUW Anveshan Foundation, an Incubation Centre at IGDTUW, where total 13 Start-up companies mainly led by young women are working. He has also been involved in establishing Centre of Excellence – Artificial Intelligence with a financial grant of approx. INR 80 million from DST, Govt. of India. He has been the Founder Head of the Department – AI and Data Sciences at IGDTUW.

His areas of interests include Machine Learning, Software Engineering, Soft Computing and Big Data. Under his guidance, 11 students have been awarded PhD degree. He has published more than 90 papers in SCOPUS/SCI/SCIE indexed international journals and conferences. He is also the author of two books. He is a Senior Member-IEEE and Life Member- CSI. Dr Arun Sharma is serving as Expert Chair/Co-chair/Member for various high-level Committee set up by NBA, DST, AICTE and others. He has been the Chairman of Computer Society of India - Ghaziabad Chapter and Member of IEEE Delhi Section Standing Committee on Technical & Professional Activities (Conferences). He has organized seven International Conferences as Conference Chair, Secretary or Convener and delivered Key Note Addresses in various Conferences and others in India and abroad including Singapore, Malaysia, Dubai and Thailand. He has been nominated for World's Who's Who by Marquis, USA in 2013. He has also been awarded by Computer Society of India in 2017 for his significant contribution for it.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Nonita Sharma
Associate Professor

Dr. Nonita Sharma is working as Associate Professor, Indira Gandhi Delhi Technical University for Women, New Delhi. She has more than 15 years of teaching experience. Her major area of interest includes data mining, bioinformatics, time series forecasting and wireless sensor networks. She has published several papers in the International/National Journals/Conferences and book chapters. She received several best paper awards for her research work in renowned international conferences. She has been awarded Best Teacher Award in view of recognition of contributions, achievements, and excellence in Computer Science & Engineering in NIT Jalandhar. She has been awarded Best Content Guru Award by Infosys twice. She has authored a book titled- "Analysis of Algorithms". She has been the editor of various books published by eminent publishers like WILEY, Taylor & Francis, CRC Press etc. She is member, IEEE and has been shortlisted in Top 5 for IEEE Women Achiever Award. She is the reviewer of many peer reviewed journals and contributed to academic research in terms of projects, papers, and patents.



Dr. Deepak K. Sharma
Associate Professor

Dr. Deepak Kumar Sharma is working as an Associate Professor in the Department of Information Technology, Indira Gandhi Delhi Technical University for Women (IGDTUW), Kashmere Gate, Delhi, India. He obtained his Ph.D in Computer Engineering from University of Delhi, India in 2016. His research interests include opportunistic networks, wireless ad hoc and sensor networks, Software Defined Networks and IoT Networks. He has over 17 years of experience in Academics. He has published various research papers in reputed international journals like ETT Wiley, IEEE Systems Journal, IEEE IoT Journal, Computer Communication Elsevier, IJCS Wiley etc. and conferences of repute like IEEE AINA, GLOBECOM etc. He has also authored various book chapters in edited books of IET, Wiley, Springer, Elsevier etc. He has served as session chair in many conferences and is also a reviewer of various reputed journals like ETT Wiley, AIHC Springer, IJCS Wiley etc.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Rishabh Kaushal
Assistant Professor

Dr Rishabh Kaushal works as Assistant Professor in the Department of Information Technology at Indira Gandhi Delhi Technical University for Women. He has a combined experience of 15 years in teaching, research, and industry. He earned his PhD from IIIT, Delhi in the area of social computing. He has done his MS by Research from IIIT, Hyderabad. He has written more than 30 research papers in reputed conferences. His areas of interest include social computing, security and privacy in social media, natural language processing, computer vision, machine learning, and deep learning.



Ms. Ankita Singh
Assistant Professor

Ms. Ankita Singh, is the author of paper "Gravitational Search Algorithm-driven Missing Links Prediction in Social Networks" published in the journal, Concurrency and Computation: Practice and Experience, SCIE indexed Journal. Ankita was born and raised in New Delhi, India. She has complete her graduation, B.Tech(IT) and post graduation, M.Tech(IT), from University School of Information, Communication and Technology, GGSIPU, Delhi. She is pursuing Ph.D from GGSIPU, computer science department. Right now, She is working as Assistant Professor, in IT Department, IGDTUW. She has joined the department in Jan, 2011. Her area of interest is problem solving using programming, Social network Analysis, Data analysis and Software Testing.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Bhawna Narwal
Assistant Professor

Dr. Bhawna Narwal has been an Assistant Professor at Department of IT, IGDTUW, since March, 2018. She successfully defended her Ph.D. in Information Technology at IGDTUW in 2021. She received her M.Tech. in Information Security Management (ISM) from IGDTUW in 2016 and was GATE Scholarship holder. She attained her B.Tech. with Honors in Computer Science and Engineering from GGSIPU. Her research interests include Cyber Security, Information Security, Security in Wireless Sensor Networks, Internet of Things (IoT) and Internet of Drones. She has published several research papers in various International Journals and Conference proceedings.



Dr. Sourabh Bharti
Assistant Professor

Dr. Sourabh Bharti received the Ph.D. degree in information technology from Indian Institute of Information Technology and Management, Gwalior, India. He served as an Assistant Professor at IGDTUW, Delhi from 2018 till 2022. His research interests are in the area of predictive maintenance, wireless networked systems and Internet of Things (IoT). He is also an associate investigator within the nationally funded CONNECT centre, Ireland.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Niyati Baliyan
Assistant Professor

Dr. Niyati Baliyan worked as an Assistant Professor at the Information Technology Department, Indira Gandhi Delhi Technical University for Women, Delhi, since 2018 till 2022. She received her Ph.D. from IIT Roorkee in 2016. She is the recipient of the Chancellor's Gold Medal during her MTech in ICT from Gautam Buddha University. She spent one semester during her Masters in the U.K. where she attained Post Graduate Certificate with Honors in Information Technology from Sheffield Hallam University. Her research interests are Knowledge Engineering and Applications of Machine Learning.



Dr. Mohona Ghosh
Assistant Professor

Dr. Mohona Ghosh is currently working as an Assistant Professor in Department of Information Technology at Indira Gandhi Delhi Technical University of Women, Delhi. Prior to that she worked as Assistant Professor in CSE department at IIITDM Jabalpur. Dr. Mohona has completed her masters and Ph.D. from IIIT Delhi in Information Security and B.Tech in Computer Science from GGSIPU. She did her Postdoctoral from Nanyang Technological University (NTU), Singapore. In past, she has been awarded the prestigious TCS Research Fellowship for 5 years while doing her PhD at IIIT-Delhi. Her research interests include Cryptography and Cyber Security.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Gaurav Indra
Assistant Professor

Dr. Gaurav Indra received his B.Tech (CSE) degree from Guru Gobind Singh Indraprastha University, Delhi, India, in 2009, the M.Tech (Software Engineering) degree from Delhi Technological University, Delhi, India, in 2011 and has earned his Ph.D. from University of Delhi, India in Feb-2022. Since 2018, he is working as an Assistant Professor in the Department of Information Technology at Indira Gandhi Delhi Technical University For Women, Kashmere Gate, Delhi, India. His specializations include Network Security, Post Quantum Cryptography, Mutual Authentication in Cognitive Radio based IoT, Secure Communication in Cognitive Radio Networks, and Stochastic Game Theory. He is a member of the IEEE, ACM, IACR, and AAAI.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Ashwini Kumar
Professor

Dr. Ashwini Kumar received his B.E, M.E and PhD degrees from Delhi College of Engineering, Delhi University. He is currently Pro Vice Chancellor, Dean (International Affairs) and Professor (Electronics & Communication Engineering) at Indira Gandhi Delhi Technical University, Govt. of NCT of Delhi, and New Delhi. He has an experience of more than 27 years. His research interests include Wireless Communication, Optical Communication & Digital Signal Processing.



Dr. Jasdeep Kaur Dhanoa
Professor

Dr. Jasdeep Kaur, B.E, MTech (DCE), Ph.D.-GGSIU (Low voltage analog design), took over as Dean Academic Affairs in 2021 and Training and Placement Officer in 2018 in Indira Gandhi Delhi Technical university for Women, Govt of NCT of Delhi. Prior to this she was the Head of the Department of Electronics & Communication Engineering, from May 2015 to 2018. With a keen interest in technology and hardworking in nature, she is a Senior Member of IEEE, and a Life member of IETE (AM-177702). She has publications in International and National Journals and Conferences. Her research areas of Interest are low voltage CMOS analog designs, mixed signal design, analog signal processing. In 2019, she was selected and participated in the International Visitor Leadership Program, sponsored by the USA State Federal Government on Advancing Women in STEM Fields. She is on a panel of Government/NGOs too.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Nidhi Goel
Professor

Dr. Nidhi Goel is working as Professor in the Department of Electronics and Communication Engineering Department at Indira Gandhi Delhi Technical University, New Delhi. She has been heading the ECE Department since May 2018. Prior to joining IGDTUW, she was associated with Delhi Technical University (Formerly, DCE). She has a teaching and research experience of approximately 20 years. After completing her undergraduate and postgraduate degrees, she pursued her research interest and completed her Ph.D. from Indian Institute of Technology Roorkee, India. Her area of interest includes Medical Image Processing, Deep Learning, Artificial Intelligence applications, Multimedia Security, Computer Vision, Soft Computing Techniques. She has published 4 book chapters, and over 80 research papers in reputed international journals and international conferences.



Dr. Vandana Niranjana
Professor

Dr. Vandana Niranjana is working as Professor in the Department of Electronics and Communication Engineering at Indira Gandhi Delhi Technical University Delhi, India. She graduated in the year 2000 and received her B.E. degree in Electronics and Communication Engineering from Government Engineering College (now University Institute of Technology of Rajiv Gandhi Proudhyogiki Vishwavidyalaya) Bhopal. In the year 2002, she received her M.Tech degree from the Department of Electronics and Communication Engineering at Indian Institute of Technology (I.I.T) Roorkee with VLSI Design as specialization. In the year 2015, she was awarded her Ph.D degree in the area of Low Voltage VLSI Design from University School of Engineering & Technology, GGSIP University Delhi. She has a teaching and research experience of approximately 20 years at Indira Gandhi Delhi Technical University Delhi. Her areas of interest includes MOSFET body bias techniques and Low-voltage Low-Power Analog CMOS circuit design. She has several publications to her credit in various international journals and conferences and Book chapters.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Shobha Sharma
Assistant Professor

Dr. Shobha Sharma is Assistant Professor in the department of Electronics and communication Engineering in IGDTUW. She did her PhD from Guru Gobind singh Inderprasth university. She had her M.E. from BITS Pilani. She had worked in world's top US/European MNCs in India and abroad as chip design engineer before joining IGDTUW. She had got offer of PhD with scholarship in University of west of England' with scholarship but refused before joining IGDTUW. Her area of specialization is Digital VLSI design. She is multitalented person with many awards in various field since childhood.



Dr. Pankaj Gupta
Assistant Professor

Dr. Pankaj Gupta received BE and ME degree in Electrical Engineering from BIT, Durg, India, and Delhi College of Engineering, Delhi University, India respectively. He received PhD degree in Electrical Engineering from NIT, Kurukshetra, India. He is conferred with prestigious POSOCO Power System Award-2017 for outstanding PhD research work entitled, "Protection issues of grid connected distributed generation" by the Power System Operation Corporation Limited, a subsidiary of Power Grid Corporation, India in partnership with Foundation for Innovation and Technology Transfer, IIT, Delhi. Currently, he is working with Indira Gandhi Delhi Technical University for Women, Delhi, India as Assistant Professor. His research interests include power system protection, microgrid control and protection, smart grid technologies, islanding detection.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Kanchan Sharma
Assistant Professor

Dr. Kanchan Sharma is Assistant Professor in the Department of Electronics & Communication Engineering, IGDTUW. He did Ph.D. in Electronics & Communication Engineering on "Performance evaluation and enhancement of free space optical communication system" in 2022 from DCRUST Murthal, Sonapat, Haryana, India. He did M.Tech. in 2002 and B.Tech. in 2000 from J. K Institute of applied physics and technology (Department of Electronics & Communication Engineering) Allahabad University. He had a teaching experience of more than 22 years in engineering colleges and university. His research interest includes Optical and Wireless communication, Digital Image Processing, Microwave and antenna design, Signal processing, Wireless sensor network, Information security, and IoT.



Dr. Richa Yadav
Assistant Professor

Dr. Richa Yadav received her Ph.D. degree from University of Delhi. She is currently working as Assistant Professor in the Department of Electronics and Communication Engineering in Indira Gandhi Delhi Technical University for Women (IGDTUW), New Delhi. Her research interests are Analog Circuit Design, Low Voltage Low Power Digital Circuit Design, Digital Signal Processing, Designing of Fractional Order Differentiators and Integrators, Optimization of Operators, Evolutionary Algorithms.

DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING



Dr. Nathi Ram Chauhan
Professor

Dr. Nathi Ram Chauhan is working as Professor and Training and Placement Officer (TPO) in Department of MAE in Indira Gandhi Delhi Technical University for Women, Delhi. He received his PhD in Mechanical Engineering from IIT, Roorkee, and M.Tech with specialization in Machine Design Engineering from IIT Roorkee. He did BTech. in Mechanical Engineering from BIET Jhansi (An Autonomous Institute Funded By the U.P. Government). He was head of the Department of Mechanical and Automation Engineering from 2014 to 2017. Currently he is head of Department of Mechanical and Automation Engineering since 2020. He is a Life Member of TSI (Tribology Society of India) and was a member of SAE, Society of Automotive Engineers, India. He is currently supervising PhD in the field of Tribology, Fluid Film Bearings, Alternate Fuels, Composite Materials, Manufacturing and Automation, Robotics and Automation. He has a teaching experience of more than 16 years. Under his supervision 5 PhD degrees have been awarded and 5 PhD students are working. He has published more than 140 papers in International/National Journals and Conferences.



Dr. Omendra Kumar Singh
Associate Professor

Dr. Omendra Kumar Singh received his Ph.D. degree from IIT, Delhi for his research on Thermal Power Plants. He did his M.Tech. in Mechanical Engineering with specialization in Thermal Sciences with First Class (Honours) from Aligarh Muslim University (awarded Gold Medal for securing First Position), Graduation Certificate in Marine Engineering with First Class with Distinction from Directorate of Marine Engineering Training (presently known as Marine Engineering & Research Institute), Bombay and B.Sc. Engineering (Mechanical) with First Class (Honours) from Regional Engineering College (presently known as National Institute of Technology), Calicut. He has been serving here since August, 2005 when the erstwhile IGIT was a part of GGSIP University. Earlier, he had served as Marine Engineer in Merchant Navy. He has contributed 14 research papers to the international journals of high repute. All his research papers are published in high impact factor journals mainly in the area of thermal power generation.

DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING



Dr. Vivek K. Chawla
Assistant Professor

Dr Vivek Kumar Chawla, PhD, presently works as a faculty member in the Mechanical and Automation Engineering Department at Indira Gandhi Delhi Technical University for Women, Kashmiri Gate, Delhi. He earned his BTech in Mechanical Engineering from AKGEC, Ghaziabad U.P, MTech in Production Engineering from Delhi Institute of Tool Engineering, Delhi, PGDBM in Operations Management from SCDL, Pune and PhD from the National Institute of Technology Kurukshetra, Haryana. He has more than 15 years of experience in teaching, industry activities, research, and academic administration. His research interests include production and industrial engineering. He is member of many professional bodies including the Institution of Engineers, SAE and ASME.



Mr. Urfi Khan
Assistant Professor

Mr. Urfi Khan has a teaching experience of more than ten years in the field of Mechanical Engineering. Currently, he is working as an Assistant Professor in the Department of Mechanical and Automation Engineering at Indira Gandhi Delhi Technical University for Women, Delhi, India. He is an M.Tech (Production & Industrial Engineering) and B. Tech (Mechanical Engineering) graduate from Jamia Millia Islamia, New Delhi, India. His proficiencies as a teacher as well as an engineering researcher are evident in numerous papers that he has published in reputed journals. His research interests lie in system modelling, analysis and optimization.

DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING



Dr. Deepti Chhabra
Assistant Professor

Dr. Deepti Chhabra, working as an Assistant Professor in the Department of Mechanical and Automation Engineering Department of Indira Gandhi Technical University for Women (Govt. of NCT of Delhi), Delhi, India. She is also In-charge, Public Relations at the University. She has over 15 years of expertise in technical teaching and research at the UG and PG levels in Government University in Delhi, India. She did Ph.D. in Green Logistics in the Indian Manufacturing Industry at Delhi Technological University, Delhi. Her major interest and research areas include Green Logistics, Industry 4.0, Circular Economy, Environment, Green Transportation, Renewable Energy Resources, Quality Control, Automation in Manufacturing, Computer Integrated Manufacturing, Artificial Intelligence, and Mechanical Engineering. She has over 18 (Eighteen) international research publications which include publications in reputed publishers like Elsevier, Inderscience, Emerald to her acclaim. She has been the recipient of various awards to her name. The prominent awards include WEAA Women Excellence Achievements Awards, 2020 for "Excellence in Education", "Teaching Excellence Award" by GTF World Summit 2019, "Best Outstanding Research Paper Award" First rank Holder by Novel Research Academy, 2019, and "Best Women Faculty Award" by Novel Research Academy, 2019 registered Enterprise under Govt. of India. She is an active reviewer of many international publishers like Elsevier, Inderscience and life member of various technical societies.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Ms. Sitakshi Gupta

Ms. Sitakshi Gupta is pursuing her Ph.D in Physics at the Department of Applied Sciences & Humanities, Indira Gandhi Delhi Technical University for Women, in collaboration with Department of Physics & Astrophysics, University of Delhi, India. She is currently serving as Assistant Professor at Department of Physics, Deshbandhu College, University of Delhi. She completed her Masters in Physics from Jamia Millia Islamia University, Delhi in 2015 and qualified the National Eligibility Test (Lectureship) in December 2016. She has done her B.Sc. (H) Physics from Hansraj College, University of Delhi (2013). Her research work primarily involves the synthesis and characterization of nanocomposites of reduced graphene oxide and metal oxides through chemical route for gas sensing applications. She also gained experience in the electrochemical synthesis of conducting polymers and their derivatives in the research lab. She has presented about nine papers at International and national conferences.



Ms. Ritu Goel

Ms. Ritu Goel is pursuing her Ph.D. in Physics under the supervision of Prof. Chhaya Ravikant, Department of Applied Sciences and Humanities, Indira Gandhi Technical University for Women (IGDTUW), New Delhi, and in collaboration with Prof. Ranjana Jha, Department of Applied Sciences and Humanities, Netaji Shubas University of Technology (NSUT), New Delhi. She has completed her masters in Electronics Science from University of Delhi in 2014 and qualified the UGC-NET exam (Lectureship) in December 2014. She has done her graduation Electronics Science from Hansraj College, University of Delhi in 2012. She has gain research experience and deep knowledge in optimizing the structural, optical and electrochemical properties of Nickel Oxide (NiO) to make a stable and efficient Photovoltaic device. She has published four papers in an international referred journal with an impact factor ranging from 2 to 4 and has presented four papers in international and national conferences. She works as an active researcher and has a quality of independent thinking.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Ms. Deeba R. Naqvi

Ms. Deeba Naqvi received her Bachelor's degree from Acharya Narendra Dev College, Delhi University in 2001 and a Master's degree from IIT-Delhi in 2003. She is currently working toward a Ph.D. degree in Mathematics (Department of Applied Sciences and Humanities), from Indira Gandhi Delhi Technical University for Women. Her research interests include decision analysis, optimization and computing with words. She has published her research work in peer-reviewed Journals like Granular Computing (ESCI), Soft Computing (SCIE), Journal of Intelligent and Fuzzy Systems (SCIE), etc. She has bagged 2nd rank in Delhi University-South Campus twice in the academic years 1999-2000 and 2000-2001. She is an Assistant Professor (Mathematics) in the Department of Applied Sciences at Maharaja Surajmal Institute of Technology, New Delhi.



Ms. Ritu Chaudhari

Ms. Ritu Chaudhari is pursuing her Ph.D. in Physics at the Department of Applied Sciences & Humanities, Indira Gandhi Delhi Technical University for Women. She completed her Masters in Physics from Banasthali University, Jaipur in 2016. Her research work primarily involves the synthesis, characterization and fabrication of BiI₃-polymer composites-based X-ray detector for detection and imaging applications. She has published research papers in refereed International journals and conference proceedings.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Ms. Shobhna Shankar

Ms. Shobhna Shankar is a PhD Scholar (SRF) in the Dept. of Applied Sciences and Humanities. She earned her B.Sc. (H.) Zoology from University of Delhi, and M.Sc. in Environmental Science from Central University of South Bihar. Her research interests include Environmental pollution surveillance (physical and chemical), Atmospheric Chemistry, RS-GIS and Cohort studies. She has also good experience in conducting biological experiments. She has published research papers in refereed International journals and conference proceedings.



Ms. Aakanksha Singh

Ms. Aakanksha Singh is pursuing her Ph.D. under the supervision of Prof. (Dr.) Shalini Arora, Department of Applied Science and Humanities. She is a hardworking, motivated researcher working on different types of transportation problems like quadratic, linear fractional and multi-objective transportation problem. She has published one research paper and a couple of conference papers. She is currently working as an Assistant Professor in the Mathematics, Department of Aryabhata College, University of Delhi with a teaching experience of more than 11 years.

DEPARTMENT OF APPLIED SCIENCES & HUMANITIES



Ms. Aishwarya Singh

Ms. Aishwarya Singh is a PhD Scholar in Dept. of Applied Sciences and Humanities, Indira Gandhi Delhi Technical University for Women, Delhi under the guidance of Dr. Bhavani Prasad. Her research interests include antibacterial and photo catalytic potential of Tellurite nanocomposites. She has published four quality research papers in peer reviewed journals. She has completed her Master's degree in Physical Chemistry specialization and Bachelor's degree in Biology from Meerut College, Meerut. She was also the University topper during her Bachelor's programme.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Dr. Sunita Kumari Chaurasia

Dr. Sunita Kumari Chaurasia has received her Bachelor in Engineering degree in Information Technology in 2003 from RGPV, Bhopal, India; completed her Masters in Technology in Information Technology from USIT, GGSIPU, India, in 2010. She has completed her Ph.D from Computer Science & Engineering Dept., IGDTUW, under Dr. SRN Reddy. Her area of research is context detection using machine learning and smartphone sensors. Currently, she is working as Assistant Professor - Computer Science Department at DSEU Rajokri Campus (formerly known as Rajokri Institute of Technology under Govt. of NCT of Delhi). She has around 15 years of teaching experience. She has published 3 papers in SCIE and Scopus indexed journals and 8 papers in different national and international conferences. Her areas of interests are databases, software engineering, programming, machine learning, etc.



Dr. Punam Kumari

Dr. Punam Kumari is currently working as Assistant Professor in the Computer and Communication Engineering department at Manipal University, Jaipur, Rajasthan, India. She has received her PhD degree from Indira Gandhi Delhi Technical University for Women Delhi. Her M.Tech. is from Banasthali Vidyapeeth, Rajasthan and B.Tech. is from JSS Academy of Technical Education Noida. Her research interests include Biometrics, Artificial Intelligence and Machine Learning.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Ms. Rajni Sharma

Ms. Rajni Sharma is a PhD Scholar in Department of Computer Science & Engineering, Indira Gandhi Technical University for Women, Delhi, under the guidance of Assistant Professor, Dr. Ravinder M. Her research interest include Image Processing, Soft Computing, and Machine Learning. She has completed her Master's degree from Deenbandhu Chhotu Ram University, Murthal, Sonipat.



Ms. Nidhi Agarwal

Ms. Nidhi Agarwal is a Computer Science and engineering educator, faculty with 18.5 years of experience, many papers in SCI/ SCI-E indexed journals, Scopus indexed journals and conferences, book chapters, patent holder, very good communication skills, strong subject knowledge, leadership qualities, NTA NET Qualified in Computer Science and Applications, strong bond with students and control on large student' gatherings. Punctual, diligent, and quickly responsive. National Merit Scholarship Holder for outstanding performance in mathematics in class 10. Pursuing Ph. D in Computer Science and Engineering from IGDTUW, Govt. of NCT of Delhi.

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



Ms. Rashika Sharma

Ms. Rashika Sharma received her undergraduate B.Tech. degree in Computer Science and Engineering from Indira Gandhi Delhi Technical University for Women, Delhi, India, in 2021. She currently works as a Technology Analyst in the Credit Risk Innovation team at the Deutsche Bank Technology Centre in Pune, India. Her research interests include Algorithms, Optimization Theory, Wireless Sensor Networks, and Optimization using Genetic Algorithms.



Ms. Pallavi Pandey

Ms. Pallavi Pandey is currently associated with School of Engineering & Technology, K. R. Mangalam University, Gurugram as assistant professor. She is pursuing Ph.D from Indira Gandhi Delhi Technical University for women, Kashmere Gate, New Delhi and did M.Tech. in Computer Science and Engineering, from Jamia Hamdard, Delhi in the year 2014. Ms. Pallavi Pandey possesses nearly 9 years of teaching experience. Her research interests include Data Mining, Biosignal Processing, Artificial Intelligence and Machine Learning.



Ms. Divya Arora

Ms. Divya Arora has been working under the esteemed guidance of Prof. D. K. Tayal as a PhD Scholar in the Computer Science Department. Her area of interest includes Natural Language Processing, Sentiment Analysis and Fuzzy Logic. Her PhD topic is "Solving uncertainty for Sentiment Analysis using Approximation theories".

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Ritu Rani

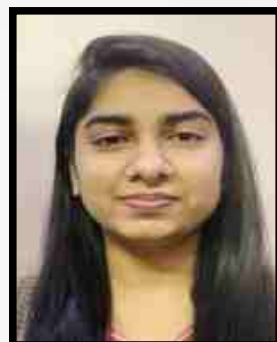
Dr. Ritu Rani is working as a Research Associate in Center of Excellence- Artificial Intelligence at Indira Gandhi Delhi Technical University for Women, Delhi under the Project "Centre of Excellence – Artificial Intelligence" funded by Department of Science and Technology (DST). She has more than 9 years of teaching experience at HMRITM, Delhi (Affiliated to Guru Gobind Singh Indraprastha University, Dwarka). She received her Undergraduate Degree (B.Tech in ECE) with distinction from University Institute of Engineering and Technology, Kurukshetra University in 2010, received her Post graduate degree (M.Tech in ECE) with distinction from Deenbandhu Chhotu Ram University of Science and Technology, Murthal in 2013 and Doctorate Degree (PhD, Electronics and Communication Engineering) in 2021 from Guru Gobind Singh Indraprastha University, Delhi. She is GATE and UGC-NET qualified. She has published more than 25 research papers in various renowned international conferences and SCI indexed journals/Scopus Indexed journal and UGC listed journals. Her research domain includes Image processing, Computer vision, Machine learning, Deep Learning, object detection.



Dr. Garima Jaiswal

Dr. Garima Jaiswal is currently working as an Assistant Professor in School of Computer Science Engineering & Technology at Bennett University. She has 13 years of teaching and research experience. Her interest areas include machine learning, deep learning, hyperspectral imaging, and document forgery. She has published more than twenty research papers in SCI/SCIE/SCOPUS and other journals and conferences.

DEPARTMENT OF INFORMATION TECHNOLOGY



Dr. Saumya Bansal

Dr. Saumya Bansal completed her PhD in the Department of IT from Indira Gandhi Delhi Technical University for Women, Delhi. She completed her M.Sc. Computer Science from University of Delhi and was a University rank holder during graduation at University of Delhi. She has published several papers in journals and conferences. Her research interests are Recommender Systems, Soft Computing, Deep Learning, and Machine Learning.



Dr. Shivi Garg

Dr. Shivi Garg received Doctor of Philosophy degree in December 2021 from Information Technology Department, Indira Gandhi Delhi Technical University for Women, Delhi, India. Her thesis title was: Design and Analysis of Mobile Application Vulnerabilities. She is also a post graduate in Information security from Delhi Technological University, Delhi, India. She has teaching and research experience since August 2016. Currently she is an Assistant Professor at J.C. Bose University of Science & Technology, YMCA, Faridabad. Her research interests include- Information Security, mobile security, cyber security, and Machine learning.

DEPARTMENT OF INFORMATION TECHNOLOGY



Ms. Garima

Ms Garima received her M. Tech. Degree from the Department of Computer Science and Engineering at Indira Gandhi Delhi Technical University for Women in 2015. She is working towards Ph.D. degree in the Department of Information Technology at Indira Gandhi Delhi Technical University for Women, Delhi, India. Her research interests include passive optical networks, wireless sensor networks, Machine Learning, and Deep Learning. She has published 05 research papers in total till date in SCIE indexed international journals and 05 papers in reputed international conferences. She has also received Best Paper Award in International Conference.



Ms. Dimple Sethi

Ms. Dimple Sethi is currently pursuing a Doctorate (Ph.D.) and working as a Senior Research fellow at Indira Gandhi Delhi Technical University for Women. She published papers in reputed journals and conferences. Her area of interest includes Artificial Intelligence, Gait Analysis, Medical Health care, and Machine learning.

DEPARTMENT OF INFORMATION TECHNOLOGY



Ms. Kritika Verma

Ms. Kritika Verma is working with Cisco as a Network Consulting Engineer, after having completed her M.Tech. in Information Security Management at Indira Gandhi Delhi Technical University for Women (IGDTUW), Delhi in 2021. She also completed her B.Tech. from IGDTUW in 2016 with a first class. Her key skills are security, Machine Learning and Programming.



Ms. Apoorva Dhawan

Ms. Apoorva Dhawan is currently working as a Data Engineer at Walmart. She has more than two years of experience in industry. She has completed her B.Tech from IGDTUW in Information Technology in 2020. Her areas of interest are e-commerce, data science and machine learning.

DEPARTMENT OF INFORMATION TECHNOLOGY



Ms. Malvika Bhalla

Ms. Malvika Bhalla is currently working as a Software Engineer 2 at Intuit. She is an avid learner who likes to explore new technologies and leverage them to solve real world customer problems. Her areas of interest lie in machine learning, natural language processing, cloud computing and building web applications. She has completed B.Tech in Information Technology from Indira Gandhi Delhi Technical University for Women in 2020.



Ms. Deeksha Arora

Ms. Deeksha Arora graduated in 2020 as a Bachelor of Technology in Information Technology from Indira Gandhi Delhi Technical University for Women, Delhi. She is currently working as a Software Engineer in the IT Industry with 2 years of work experience. Her areas of Interest include Machine learning, Deep learning, Artificial Intelligence and IOT.

DEPARTMENT OF INFORMATION TECHNOLOGY



Ms. Vidyotma Thakur

Ms. Vidyotma Thakur has completed her Masters in Information Security and Management from Indira Gandhi Delhi Technical University, New Delhi, India. Currently, she is pursuing her doctorate in Blockchain-based security for IoT from Thapar University, Patiala, India. Her specializations include Tactile Internet of Things Security in Industry 4.0, Post Quantum Cryptography, Mutual Authentication in Artificial Intelligence based IoT, Secure Communication in Cyber Physical Systems, and Distributed Ledger Technologies. She is a member of the IEEE, ACM, and Blockchain Consortium.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Monika Mathur

Dr. Monika Mathur received a B.E degree in Electronics and Communication Engineering from Maharishi Dayanand University in 2008 and an M.Tech degree in Signal Processing and Digital Designing from Delhi Technological University in 2013. She has completed her Ph.D. from Indira Gandhi Delhi Technical University in 2021 under the supervision of Prof. Nidhi Goel in the area of underwater imaging. Her primary research interests are image processing, machine learning, computer vision and signal processing.



Dr. Suman Yadav

Dr. Suman Yadav has been awarded Ph.D. degree from Indira Gandhi technological university for women in August 21, under the guidance of Prof. Ashwni Kumar and Dr. Richa Yadav from Electronics and Communication department. She is doing her research work in the field of digital filter design. After qualifying GATE 2010 (98 percentile), she has done her master of engineering from Delhi College of Engineering. She has published 4 research papers in international Journal (SCI indexed), 1 Book Chapter and 4 research papers in international conferences in the field of digital filter design. She has 12 years of teaching academic experience and presently working in Bharati Vidyapeeth College of Engineering, Paschim Vihar New Delhi.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Dr. Parnika Kansal

Dr. Parnika Kansal is a highly successful research professional having ethical and ground breaking research holding PhD from IGDTUW on the topic of Spectrum Sharing Techniques with Cognitive Radio for 5G systems using the latest Deep Learning and Machine Learning methodologies. She has published research papers in reputed international SCI journals and a book chapter in SPRINGER. Core competencies include Machine Learning, MATLAB, Python, highly focused & trainable. Parnika Kansal holds M.Tech. from HBTU Kanpur. She was awarded undergraduate degree by Institution of Engineering and Technology (IET). She has won Best Paper Awards in various International Conferences. She is a reviewer in IEEE, Taylor and Francis and Springer Journals. She was awarded for being a subject topper in CBSE Class XII boards. Parnika Kansal holds memberships of prominent professional bodies- IEEE, IEI, IETE, ISTE and IAENG. She holds certifications from premier institutes- Stanford University, CISCO, Vanderbilt University, John Hopkins University, University of California, Santa Cruz, IIT Madras, IIT Kanpur, HBTI Kanpur, DTU and NITTTR Chandigarh.



Dr. Megha Agarwal

Dr. Megha Agarwal did her Ph.D. under the supervision of Prof. Jasdeep Kaur Dhanoa, Department of Electronics and Communication Engineering, IGDTUW and Dr. Mukesh Kumar Khandelwal, School of Engineering, JNU. She has published three SCI indexed research papers in International referred journals and two papers in International IEEE indexed conferences in the research area of UWB-MIMO antennas. She is an active researcher and has gained more than 3 years of research experience. She received Premier Research Award for excellence in Research during 2019 and 2020 by IGDTUW, Delhi. Her research interest is in Microstrip Antennas, MM wave Antennas, UWB Antennas, MIMO and Band-notched Antennas for modern wireless applications. Currently, she is working as Assistant Professor in Bhagwan Parshuram Institute of Technology, GGSIPU, Delhi. She has a teaching experience of more than 14 years.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Ms. Reshma Sinha

Ms. Reshma Sinha received her B.E. degree in Electronics and Instrumentation from Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, India in 2009 and the MTech degree in VLSI Design from Indira Gandhi Delhi Technical University for Women (IGDTUW), Govt of NCT of Delhi, India, in 2015. She is currently working as an Assistant Professor in Instrumentation Department of Shaheed Rajguru College of Applied Sciences for Women, University of Delhi, India. She is pursuing her Ph.D. degree at the Department of Electronics and Communication Engineering, IGDTUW, New Delhi, India. She has publications in International and National Journals and Conferences. Her area of interest are VLSI design, spintronics, memory devices and modelling and simulation of low-dimensional 2D materials.



Ms. Neeraj

Ms. Neeraj is pursuing her Ph.D. in Electrical at the Department of Electronics and Communication Engineering, Indira Gandhi Delhi Technical University for Women. She completed her M.Tech. in power system from Rajasthan Technical University, Kota in 2014. She has done her B.Tech. in electrical and electronics engineering from Maharshi Dayanand University, Rohtak in 2011. She worked as an assistant professor in electrical department from 2013 to 2019. She has published about five papers at international conferences. She has published two book chapter at international journal also.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Ms. Pooja Pandey

Ms. Pooja Pandey is a research scholar at the Department of Electronics and Communication Engineering, Indira Gandhi Delhi Technical University for Women, Delhi. She is also currently serving as an Assistant Professor in the department of Electronics and Communication, JSS Academy of Technical Education, Noida. She has completed her Masters (M.Tech.) in Signal Processing from NSUT East Campus (Formerly AIACTR). Her research area includes image processing, computer vision, deep learning, and artificial intelligence applications.



Ms. Palak Handa

Ms. Palak Handa is pursuing her Ph.D. in medical image analysis of wireless capsule endoscopy data from the Department of Electronics and Communication Engineering, Delhi Technological University Delhi. She completed her M.Tech in Electronics and Communication Engineering (VLSI) from Indira Gandhi Delhi Technical University for Women in 2021. She is a member of IEEE, IUPRAI, IAENG, GHC, and Force Biomedical. Her research interests are medical computer vision, biomedical signal, and image processing techniques.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Ms. Manik Dangi

Ms. Manik Dangi is Research scholar at IGDW in the Department of Electronics and Communication Engineering at Indira Gandhi Delhi Technical University Delhi, India. She graduated in the year 2012 and received her B.Tech. degree in Electronics and Communication Engineering from Maharishi Dayanand University (MDU) Rohtak. In the year 2015, she received her M.Tech degree from the Department of Electronics and Communication Engineering at Banasthali Vidyapith, Rajasthan with VLSI Design as specialization.



Ms. Ruby Mann

Ms. Ruby Mann is a dynamic and hardworking go-getter with abilities to accept challenges and deliver results. She is presently working as an Assistant Professor at Raj Kumar Goel Institute of Technology (affiliated with AKTU) as a part of the Electronics and communication department. Pursuing PhD (VLSI Design), titled: "Modeling, Simulation and Characterization of High Electron Mobility Transistor"(Recently Published 2 International Journal) from Indira Gandhi Delhi Technical University for Women, New Delhi M.Tech (VLSI Design), from Indira Gandhi Delhi Technical University for Women, New Delhi B.Tech (Electronics & Communication), Bhagwan Parshuram Institute of Technology, Rohini (GGSIPU University, Delhi). Internship at Tata Power Delhi Distribution Limited (TPDDL) and Defence Research and Development Organization (DRDO) in Electronics Department at Centre for Fire, Explosive and Environment Safety lab.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Ms. Shilpa Garg

Ms. Shilpa Garg is pursuing her Ph.D. from Indira Gandhi Delhi Technical University for Women (IGDTUW), New Delhi. She is doing her research in the field of fractional order systems. She has done her M.Tech from Banasthali University, Jaipur. She has been working as Assistant Professor in JIMSEMTC, Greater Noida since 2014. She has more than 15 years of teaching experience.



Ms. Annu Dabas

Ms. Annu Dabas is working towards her Ph.D. degree in the Department of Electronics and Communication Engineering from Indira Gandhi Delhi Technical University for Women (IGDTUW), New Delhi. She is also working as Assistant Professor in Department of Electronics and Communication Engineering in Bharati Vidyapeeth's College of Engineering, New Delhi. Her research work is in the field of Analog Circuit Design.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



Ms. Annu Dagar

Ms. Annu Dagar is a research scholar in Department of Electronics and Communication Engineering, at Indira Gandhi Delhi Technical University for Women, Delhi. She is currently working as Assistant Professor in Electrical & Electronics Engineering Department, MSIT, Guru Gobind Singh Indraprastha University, Delhi. She received her B-Tech degree in Electrical & Electronics Engineering in 2008 from Guru Gobind Singh Indraprastha University, Delhi and M.Tech. degree in 2013 from Lingaya's University. She has a keen interest in teaching as well as research with a total experience of more than 12 years.



Ms. Bushra Abbas

Ms. Bushra Abbas is a VLSI Design Masters graduate from Indira Gandhi Delhi Technical University for Women (IGDTUW) in 2022. Her masters focuses on research in organic light emitting transistors (OLETs), which included its performance analysis in terms of different electrical parameters of OLETs. The career objective of the author is to be able to work in an organized environment and contribute her expertise and knowledge in applications of various electronics devices.

DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING



Ms. Ekta Yadav

Ms. Ekta Yadav has completed her B'Tech in Mechanical engineering from Vaish College of Engineering, MDU Rohtak, Haryana in 2011 and M.Tech in Manufacturing and Automation from UIET, MDU, Rohtak, Haryana in 2013. She is pursuing her PhD degree from Indira Gandhi Delhi Technical University for Women, Kashmiri gate, New Delhi. She has worked as an Assistant Professor for 8 years in engineering colleges. Her research interests include Fault Diagnosis in Mechanical equipment.



Dr. Neha Deepak Saxena

Dr. Neha Deepak Saxena has been awarded PhD from Department of Mechanical Engineering at Indira Gandhi Delhi Technical University for Women (IGDTUW) Delhi (India) under the guidance of Dr. N. R. Chauhan. The area of research is Lubricants and lubrication and its tribological analysis on Journal Bearing.

DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING



Dr. Aasiya Parveen

Dr. Aasiya Parveen has completed her Ph.D degree under the supervision of Dr. Nathi Ram Chauhan, Professor & Head-Dept. of Mechanical & Automation Engineering at Indira Gandhi Delhi Technical University For Women, Delhi and co-supervision of Dr. Mohd Suhaib, Professor, Department of Mechanical Engineering, Jamia Millia Islamia, New Delhi. Her title of research was "Characterization and Tribological-Mechanical Behaviour of Aluminium Hybrid Composites Fabricated by P/M Technique". During her research she has published five papers in SCI/ESCI journals and three papers in conferences.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Srishti Maheshwari

She is currently employed with IBM as Application Developer for the past 2 years. She has interest in web development, cloud application, and java full stack development. She completed her Masters in Computer Applications from Indira Gandhi Delhi Technical University for Women in 2020.



Ms. Shubhangi Aggarwal

She is currently working as Consulting Engineer at Cisco Systems. She is passionate to learn about new technologies and her areas of interest are Computer Networking, Internet of Things, and Machine Learning. She completed her Masters in Computer Applications from Indira Gandhi Delhi Technical University for Women in 2020.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Siddhi Mishra

She is currently working as a software engineer at Intuit. She is passionate about researching technology & exploring new ways to solve technical problems. Her areas of interest lie in machine learning, web applications, and cloud computing. She has completed B.Tech. in information technology from Indira Gandhi Delhi Technical University for Women.



Ms. Abhigya Verma

She is a final year B.Tech (Information Technology) student and an upcoming Associate Machine Learning Engineer at Servicenow. Last summer she interned at Microsoft and in the winter she did a 3 month long research internship at NAIST, Japan. She has got 4 published papers in Scopus indexed conferences and journals and another 4-5 papers have been sent for review to journals.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Kavita Meena

She is a final year student at Indira Gandhi Delhi Technical University for Women pursuing B.Tech in Computer Science & Engineering. She is an upcoming Associate Software Engineer at Lowe's; a passionate and self-motivated individual, eager to learn and explore. Her areas of interest lie in machine learning, natural language processing, operating systems, and contributing to open source.



Ms. Manmeet Kaur

She is a Software Engineer, who works at Microsoft and has a passion for innovation and problem-solving. With a degree in Information Technology from Indira Gandhi Delhi Technical University for Women, she has a strong foundation in the field. Her focus is on machine learning and web application development, and she enjoys discovering novel technologies to address customer issues. She is dedicated to staying up-to-date with emerging technologies and regularly participates in tech communities to share her insights and knowledge.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Priyanka Daryani

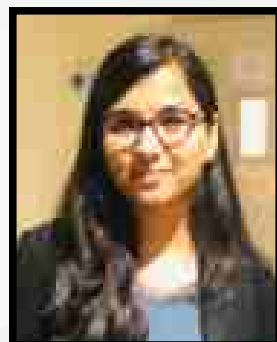
She is a Software Engineer at Microsoft working in Azure Backup Team. She is a 2021 graduate from Indira Gandhi Delhi Technological University for Women. Her areas of interest are cloud computing, machine learning and web dev, and she enjoys learning about cutting-edge technology to solve critical problems for other developers as well as customers. Apart from work, she's an avid reader and loves to travel.



Ms. Megha Varshney

She is a software engineer currently working at Walmart in the advertising domain who is passionate about technology and is always eager to learn about the latest trends and advancements in the field. She holds a bachelor's degree in Information Technology from Indira Gandhi Delhi Technical University for Women. She is fascinated by the way software can automate tasks, connect people across the globe, and create new opportunities for businesses and committed to using your skills to create software that is reliable, efficient, and user-friendly.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Naaima Suroor

She is currently working as an Applied Data Scientist at Dunnhumby. She completed her M.Tech. in Artificial Intelligence (CSE) from IGDTUW in 2022 and her B.Tech. in Computer Science Engineering from Jamia Hamdard University in 2020. She has a keen interest in research and has 3 publications thus far.



Ms. Aaishani De

She is a final year B.Tech. student at IGDTUW in the department of Electronics and Communication Engineering. During the course of graduation her research work primarily focuses on the topics of computer vision, natural language processing and deep learnings. In 2022 she worked as a software intern at JP Morgan Chase and will be joining there as a full time employee this year (2023). Her interests include web development, machine learning, data science and artificial intelligence.

BIOGRAPHIES OF INCENTIVE AWARDEES



Ms. Renu Singh

She is final year student at IGDTUW in the department of Electronics and Communication Engineering (B.Tech., ECE). She has worked on projects focussing on Machine learning, Serverless Computing and Spring boot technology. She has a keen interest at working in health sector.



Ms. Bandana Pal

Ms. Bandana Pal, working under the guidance of Prof. Nidhi Goel, is a driven post-graduate student in VLSI Design at Indira Gandhi Delhi Technical University for Women, New Delhi. On completing high school from CJM, Dehradun she received her B.Tech degree in Electronics and Communication Engg. from Jaypee University of Information Technology, H.P. with a CGPA of 9. Given her interest in Biomedical Image Processing and Computer Vision, she published three papers in international IEEE and Springer conferences, and got the opportunity to further enhance her knowledge in low-power VLSI circuits with AI during Masters. Currently, she is working as a technical intern at NXP Semiconductors, Noida and also is the PR head of her batch. After accomplishing her studies, she intends to continue contributing in high-quality research and make a significant impact in cutting-edge VLSI technologies.

Guidelines for Research Awards 2021

Research and development activities have a very high weightage for any accreditation like NBA or NAAC or the ranking purpose like NIRF, QS and others. In our University, research aspect needs further boosting. To promote good quality research papers for publication in reputed Journals, following is proposed. The cash award will be given to researchers (regular/contractual faculty members and students of IGDTUW) in the recognition of importance of the published research work and to motivate the individual excellence in research. The publications considered must be listed in Science Citation Index (SCI) or SCI expended or SCOPUS. The award will be granted to the journal papers published in each year (1 st January to 31 st December), published. Only the first author and/or the corresponding author shall be eligible to apply for the award. The publication made in the paid journals and open access journals shall not be considered for cash awards (irrespective of the listing in the publication societies/houses/presses specified in the following list).

First Author will be considered an individual who is a faculty member of IGDTUW and his/her name appears first in the list of authors on the title page of the paper. Corresponding author is a faculty member of IGDTUW and his/her name appears first in the list of corresponding authors on the submission page of the paper. As A proof of corresponding author, the researcher must provide the screen shot of the tool box of the paper submission system (say, Editorial Manager/Scholar One etc) where the name of the author appears on the login page and the title of the paper claimed is listed. If there are more than one corresponding authors then the author whose name appears first on the paper submission system, shall be treated as the corresponding author for the purpose of the award. Impact Factor must have been calculated by Thomson Reuters in case of SCI/SSCI or SCIE and Elsevier in case of SCOPUS.

Award Categories and Selection Criteria

OUTSTANDING RESEARCH AWARDS

A Cash Prize of Rs. 50,000/- (Rs. Fifty Thousand only) will be awarded along with certificate of merit. Selection Criteria: The Paper must be a Journal paper of impact factor at least 3.0, for IEEE Transaction and 1.0 for all other indexed Journals indexed in SCI/SSCI or SCI Expanded and published in the following:

1. Proceedings of Royal Society
2. American Mathematical Society
3. American Physical Society
4. American Society for Mechanical Engineers (ASME)
5. IEEE Transactions (IF>3.0)
6. ACM Transactions
7. Institute of Mechanical Engineering, London
8. American Society of Testing Materials (ASTM)
9. Nature Publishing Groups)

In addition to the above list, the journals with impact Factor ≥ 30 will also be considered for the award.

PREMIER RESEARCH AWARD

A cash prize of Rs.25,000/- (Rs. Twenty-Five Thousand Only) will be awarded along with certificate of merit. Selection Criteria: The Paper must be a journal paper of impact factor at least 1.0, indexed in SCI/SSCI/ or SCI Expanded and published in the following:

1. IEEE Transaction (TRIF<3)
2. IEEE Journals
3. Springer
4. Elsevier (Science Direct)
5. Oxford University Press
4. Elsevier (Science Direct)
5. Oxford University Press
6. Pergamon-Elsevier Science Ltd
7. Cambridge University Press
8. Wiley Blackwell
9. Blackwell Publishing
10. John Wiley & Sons
11. IET
12. Biomedical Central Ltd.
13. MIT Press
14. Indiana University Press
15. American Meteorological Society
16. American Physiological Society
17. American Society of Microbiology
18. American Chemical Society
19. American Institute of Physics
20. Institute of Physics (IOP) Publishing Ltd
21. International Organization for standardization (IOS) Press
22. Princeton University Press
23. Society if Industrial and Applied Mathematics
24. Proceedings of National; Academy of Sciences of USA

In addition to the above list, SCI and SCI Expanded indexed journal not included in the above list and having impact factor ≥ 5.0 shall also be considered for the award.

COMMENDABLE RESEARCH AWARD

A cash prize of Rs. 15,000/- (Rs. Fifteen Thousand only) will be awarded along with a certificate of merit. Selection Criteria: The paper must be a journal paper of impact factor less than 1.0 indexed in SCI/SSCI or SCI expanded and published in the above list (Premier Research Award category). In addition to the above list, SCI and SCI Expanded indexed journal not included in the above list and having impact factor ≥ 2 and ≤ 5.0 shall also be considered for the award.

MOTIVATIONAL RESEARCH AWARD

A Cash Prize of Rs. 10,000/- (Rs. Ten Thousand only) will be awarded along with a certificate of merit. Selection Criteria: The paper must be a journal paper not included in SCI/SSCI or SCI expanded but a SCOPUS indexed with impact factor ≥ 1.0 .

REGULATIONS FOR DIVISION DISTRIBUTION OF AWARD PRIZE

Case 1: If all the authors are amongst the university faculties, then first author will decide the individual author's contribution for the purpose of distribution of prize amount.

Case 2: If the authors are amongst the university faculties and the university students, then university faculty (whose name appears first in the paper) will decide the individual author's contribution for the purpose of distribution of prize amount.

Case 3: If one (or more) of the author/s is/are external to the university, then the prize amount will be divided by total number of authors and the equal part (one share) of the total prize amount will be disbursed to the university contributors. The prize amount of the external author will be subtracted from the total prize amount.

DETAILS OF PUBLISHED PAPERS FOR PREMIER RESEARCH AWARDS

1st January, 2021 to 31st December, 2021

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES			
1.	Shivani Ranu Gadi	Oxidative potential of ambient fine particulate matter for ranking of emission sources: an insight for emissions reductions	Air Quality, Atmosphere & Health, 14,1149–1153, 2021
2.	Ritu Chaudhari Chhaya R. Kant Alka Garg	Bismuth tri-iodide-polystyrene composite for X-rays switching applications at room temperature	Radiation Physics and Chemistry, 186, 109538, 2021
3.	Sitakshi Gupta Chhaya Ravi Kant	One-pot wet chemical synthesis of reduced graphene oxide-zinc oxide nanocomposites for fast and selective ammonia sensing at room temperature	Sensors and Actuators A: Physical, 331, 112965, 2021
4.	Aishwarya Singh Bhavani Prasad	Facile synthesis of Te-doped ZnO nanoparticles and their morphology-dependent antibacterial studies	Chemical Papers, 75, 4317–4326, 2021
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING			
5.	Sunita K. Chaurasia S.R.N. Reddy	State-of-the-art survey on activity recognition and classification using smartphones and wearable sensors	Multimedia Tools and Applications, 81,1077–1108, 2021
6.	Punam Kumari Seeja K.R.	A novel periocular biometrics solution for authentication during Covid- 19 pandemic situation	Journal of Ambient Intelligence and Humanized Computing, 12, 10321–10337, 2021
7.	Punam Kumari Seeja K.R.	An optimal feature enriched region of interest (ROI) extraction for periocular biometric system	Multimedia Tools and Applications 80, 33573–33591, 2021
8.	Rajni Sharma M. Ravinder Nitin Sharma Kanchan Sharma	An optimal remote sensing image enhancement with weak detail preservation in wavelet domain	Journal of Ambient Intelligence and Humanized Computing 13, 1941–1952, 2021

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF INFORMATION TECHNOLOGY			
9.	Garima Jaiswal Arun Sharma Sumit K. Yadav	Critical insights into modern hyperspectral image applications through deep learning	WIRES Data Mining and Knowledge Discovery, 11, 2021
10.	Bhawna Narwal Amar K. Mohapatra	A survey on security and authentication in wireless body area networks	Journal of System Architecture, 113, 101883, 2021
11.	Bhawna Narwal Amar K. Mohapatra	SAMAKA: secure and anonymous mutual authentication and key agreement scheme for wireless body area networks	Arabian Journal for Science and Engineering 46, 9197–9219, 2021
12.	Saumya Bansal Niyati Baliyan	Shill Detector: a binary grey wolf optimization technique for detection of shilling profiles	Journal of Ambient Intelligence and Humanized Computing, 2021
13.	Kritika Verma Niyati Baliyan	Grey wolf optimization with fuzzy logic for energy-efficient communication in wireless sensor network-based Internet of Things scenario	International Journal of Communication Systems, 34, 2021
14.	Shivi Garg Niyati Baliyan	Android security assessment: A review, taxonomy and research gap study	Computers & Security, 100, 102087, 2021
15.	Shivi Garg Niyati Baliyan	Comparative analysis of Android and iOS from security viewpoint	Computer Science Review 40, 100372, 2021
16.	Shivi Garg Niyati Baliyan	M2VMapper: Malware-to-Vulnerability mapping for Android using text processing	Expert Systems with Applications 191, 116360, 2021
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING			
17.	Parnika Kansal M. Gangadharappa Ashwni Kumar	An Efficient Composite Two-Tier Threshold Cooperative Spectrum Sensing Technique for 5G Systems	Arabian Journal for Science and Engineering, 47, 2865–2879, 2021
18.	Megha Agarwal Jasdeep K. Dhanoa	Two-port hexagon shaped MIMO microstrip antenna for UWB applications integrated with double stop bands for WiMax and WLAN	International Journal of Electronics and Communications-AEU, 138, 153885, 2021
19.	Pooja Pandey Rashmi Gupta Nidhi Goel	A fast and effective vision enhancement method for single foggy image	Engineering Science and Technology, an International Journal, 24, 1478-1489, 2021

S.No.	Author Name	Paper Title	Journal with Publication Details
20.	Annu Dagar Pankaj Gupta Vandana Niranjana	Microgrid protection: A comprehensive review	Renewable and Sustainable Energy Reviews, 149, 111401, 2021
21.	Kanchan Sharma	Optimization of throughput for free space optical communication system in presence of atmospheric turbulence and pointing error	Journal of Ambient Intelligence and Humanized Computing, 2021
22.	Kanchan Sharma	A new ABER approximation of FSO system using PPM-GMSK hybrid modulation scheme under weak turbulence	Optik, 248, 168129, 2021
23.	Suman Yadav Ashwini Kumar Richa Yadav Manjeet Kumar	A novel approach to design optimal 2-D digital differentiator using vortex search optimization algorithm	Multimedia Tools and Applications, 80, 5901-5916, 2021
24.	Pragya Srivastava Richa Yadav Richa Srivastava	Robust circuit implementation of 4-bit 4-tube CNFET based ALU at 16-nm technology node	Analog Integrated Circuits and Signal Processing, 109, 127-134, 2021
DEPARTMENT OF MECHANICAL AND AUTOMATION ENGINEERING			
25.	Aasiya Parveen Nathi R. Chauhan M. Suhaib	Influence of process parameters and reinforcements on aluminium hybrid composite developed by powder metallurgy process	Physics of Metals and Metallography, 122, 1007-1013, 2021
26.	O.K. Singh	Development of a solar cooking system suitable for indoor cooking and its Exergy and Enviroeconomic analysis	Solar Energy, 217, 223-234, 2021

DETAILS OF PUBLISHED PAPERS FOR COMMENDABLE RESEARCH AWARDS

1st January, 2021 to 31st December, 2021

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING			
27.	Parnika Kansal Ashwini Kumar M. Gangadharappa	Optimized Extreme Learning Machine for Intelligent Spectrum Sensing in 5G systems	Journal of the Communications Technology and Electronics, 66, 322-332, 2021

Abstracts with Publication Details 2021

Oxidative potential of ambient fine particulate matter for ranking of emission sources: an insight for emissions reductions

Shivani, Ranu Gadi

Abstract: In Delhi, the capital of India, fine particulate matter (PM_{2.5}) poses alarming challenges to human health and well-being. The majority of air pollution studies are focused on measurements of concentrations and composition of atmospheric particulate matter and gaseous species. However, a more useful insight is the actual impact on human health due to air pollution—and how this varies with pollutant abundance and pollutant source. Toxic potential measures the intrinsic/extrinsic toxicity of PM. Source apportionment studies are required to determine dominant sources contributing to PM toxic potential. Thus, health hazardous emission sources could be targeted first to reduce the air pollution levels in the region.

For Details refer DOI: <https://doi.org/10.1007/s11869-021-01005-x>

Bismuth tri-iodide-polystyrene composite for X-rays Switching applications at room temperature

Ritu Chaudhari, Chhaya Ravi Kant, Alka Garg

Abstract: Bismuth tri-iodide is potential low toxic material for fabrication of room-temperature X-rays detector due to its relatively high atomic number and density. However, on increasing the thickness of detector, higher leakage current at low bias voltage and low mechanical strength are major issues in utilizing its full potential in radiation detection and in other practical applications. BiI₃-polystyrene composite pellets was prepared to get unique defects tolerance nature of material that improves signal/noise ratio. BiI₃-polystyrene composite was prepared by low-cost dry-tumble mixing technique. XRD observations gives information of preferred orientated planes perpendicular to c-axis and morphology study by SEM also confirms the same orientation. X-rays switching response recorded at different voltages (13–100 V) for detector performance measurements. Resistivity of BiI₃ (107 ohm-cm) is less as compared to polystyrene (1015ohm-cm), it acts as conductive-tips in polystyrene-matrix and improves charge transfer to electrodes. These superior charge transfer properties lead to high photocurrent on-off ratio to 70 and suppress leakage current.

For Details refer DOI: <https://doi.org/10.1016/j.radphyschem.2021.109538>

One-pot wet chemical synthesis of reduced graphene oxide-zinc oxide nanocomposites for fast and selective ammonia sensing at room temperature

Sitakshi Gupta, Chhaya Ravikant

Abstract: The present study focuses upon the response of nanocomposites of reduced graphene oxide (rGO) and zinc oxide (ZnO) towards ammonia gas at room temperature. We have synthesized reduced graphene oxide-zinc oxide nanocomposites (rGO-ZnO) by wet chemical route via in situ one-pot method. The as-synthesized samples were characterized using FT-IR spectroscopy, Raman spectroscopy, X-ray Diffraction, Scanning Electron Microscopy (SEM) and high resolution Transmission Electron Microscopy (HR-TEM) techniques. The average crystallite size of the ZnO sample and rGO-ZnO sample, determined by Williamson-Hall analysis of the XRD results, were calculated to be 20.625 nm and 13.21 nm respectively. The TEM analysis suggests that these nanocomposites comprise of ZnO nanoparticles of average size about 10.8 nm, anchored on rGO sheets. At 300 K, the chemi-resistive gas sensing response of pure rGO and rGO-ZnO towards subsequently increasing concentrations (from 20 ppm to 200 ppm) of ammonia gas has been studied. rGO-ZnO samples were prepared by varying the concentration of precursor GO dispersion (0.5, 0.75, 1, 1.25, 1.5 mg/ml). The optimal nanocomposite material (1 mg/ml) is found to exhibit excellent selectivity towards ammonia with a response of 8.92% towards 20 ppm NH₃ and a response time of 8 s. The response is found to increase with increase in ppm level of gas. The selectivity of the synthesized nanocomposite towards ammonia has been confirmed by exposing it to 20 ppm of various other gases such as methanol, ethanol, acetone, propanol and chloroform. The response towards these gases was lower as compared to that towards NH₃. To assess the potential of the material in practical applications, the effect of ambient humidity on the sample's surface resistance was studied. The ammonia sensing response in the presence of humidity was found to vary only by

1.5% from 10% RH to 70% RH, beyond which it saturated. The rGO-ZnO nanocomposite sensing material also displayed good reversibility over subsequent exposure cycles and efficient stability of response with aging. The mechanism of NH₃ sensing is understood on the basis of heterojunction interactions between rGO and ZnO in the nanocomposites.

For Details refer DOI: <https://doi.org/10.1016/j.sna.2021.112965>

Facile synthesis of Te-doped ZnO nanoparticles and their morphology-dependent antibacterial studies

Aishwarya Singh, Bhavani Prasad Nenavathu

Abstract: The present study aims to carry out synthesis and characterization of Te-doped ZnO nanoparticles using an easy, low cost and solution-free thermo-mechanical method. The structural, morphological, optoelectronic characteristics of the as-prepared Te-doped ZnO NPs were analyzed by several techniques. From the FE-SEM studies, both pristine and Te-doped ZnO showed tube-shaped morphology when ground for 60 min. Remarkably, different grinding times caused the change in the shape of spherical ZnO NPs to tube-like ZnO. SEM images illustrate that spherical-like and hexagonal tube-like ZnO were prepared with grinding times 30 min and 60 min, respectively. XRD of Te-doped ZnO NPs (0.5wt%, 3wt%, 5wt%) revealed crystallite size of 10–20 nm. XPS results showed evidence for the binding energies of ZnO and Te. Disk diffusion assay showed that Te-doped ZnO NPs demonstrated good antibacterial activity against E. coli DH5 α cells compared with pristine ZnO NPs. The mechanism of antibacterial activity of ZnO NPs was due to the generation of reactive oxygen species (ROS), causing lipid peroxidation of the bacterial cell wall and resulting in the leakage of cellular contents and cell death. The photoexcited electrons were trapped by the oxygen vacancies and prevented the interaction between oxygen available on the exterior of the ZnO NPs and photoexcited electrons. This results in reducing the amount of ROS generation and subsequently lower antibacterial activity.

For details refer DOI: <https://doi.org/10.1007/s11696-021-01654-3>

State-of-the-art survey on activity recognition and classification using smartphones and wearable sensors

Sunita Kumari Chaurasia, S. R. N. Reddy

Abstract: Activity Recognition and Classification (ARC) have enabled growth of many automated applications like recommender services, old age assistance, health monitoring, security and surveillance, etc. This becomes possible due to advancement of technology in wear-able devices and smartphones. The small size, easy availability of various relevant sensors, ever decreasing cost, ability to monitor continuously and handy to use features have made them prominent devices to use in ARC. In this work, we provide a comprehensive survey on ARC using smartphones and wearable sensors. The work begins with the understanding of the ARC process followed by description of inertial sensors present in the smartphones and wearables. It covers the various feature extraction methods and the models used in traditional methods and the trending deep learning based methods. It is observed that, performance of any ARC method largely depends on number of sensors, classification technique, kind of device and placement and orientation of the device among many other parameters considered in the work. In our study, we present a detailed comparison of work done in this area considering ten such important parameters, which, to the best of our knowledge, is the first of its kind of surveys. Finally, we present ten challenges in this area and provide pro-spective dimensions that can be explored in future research.

For Details refer DOI: <https://doi.org/10.1007/s11042-021-11410-0>

An optimal feature enriched region of interest (ROI) extraction for periocular biometric system

Punam Kumari, Seeja K.R.

Abstract: With the onset of COVID-19 pandemic, wearing of face mask became essential and the face occlusion created by the masks deteriorated the performance of the face biometric systems. In this situation, the use of periocular region (region around the eye) as a biometric trait for authentication is gaining attention since it is the most visible region when masks are used. One important issue in periocular biometrics is the identification of an optimal size periocular ROI which contains enough features for authentication. The state of the art ROI

extraction algorithms use fixed size rectangular ROI calculated based on some reference points like center of the iris or centre of the eye without considering the shape of the periocular region of an individual. This paper proposes a novel approach to extract optimum size periocular ROIs of two different shapes (polygon and rectangular) by using five reference points (inner and outer canthus points, two end points and the midpoint of eyebrow) in order to accommodate the complete shape of the periocular region of an individual. The performance analysis on UBIPr database using CNN models validated the fact that both the proposed ROIs contain enough information to identify a person wearing face mask.

For Details refer DOI: <https://doi.org/10.1007/s11042-021-11402-0>

A novel periocular biometrics solution for authentication during Covid-19 pandemic situation

Punam Kumari, Seeja K.R.

Abstract: The outbreak of novel coronavirus in 2019 has shaken the whole world and it quickly evolved as a global pandemic, placing everyone in a panic situation. Considering its long-term effects on day to day lives, the necessity of wearing face mask and social distancing brings in picture the requirement of a contact less biometric system for all future authentication systems. One of the solutions is to use periocular biometric as it does not need physical contact like fingerprint biometric and is able to identify even people wearing face masks. Since, the periocular region is a small area as compared to face, extraction of required number of features from that small region is the major concern to make the system highly robust. This research proposes a feature fusion approach which combines the handcrafted features HOG, non-handcrafted features extracted using pretrained CNN models and gender related features extracted using a five layer CNN model. The proposed feature fusion approach is evaluated using multiclass SVM classifier with three different benchmark databases, UBIPr, Color FERET and Ethnic Ocular as well as for three non-ideal scenarios i.e. the effect of eyeglasses, effect of eye occlusion and pose variations. The proposed approach shows remarkable improvement in performance over pre-existing approaches.

For Details refer DOI: <https://doi.org/10.1007/s12652-020-02814-1>

An optimal remote sensing image enhancement with weak detail preservation in wavelet domain

Rajni Sharma, M. Ravinder & Kanchan Sharma

Abstract: This paper presents a novel and simple algorithm that uses adaptive intensity transformation function for color multispectral satellite images. This intensity transformation provides a solution to increase the quality of satellite images by using power law operator in natural R, G, and B color model. Firstly, the proposed technique uses Discrete Wavelet Transform (DWT) that decomposes the input satellite image in higher and lower four sub band. Thereafter, it computes the optimized value of the operator in lower sub band (LL) of DWT. The optimal value of operator is evaluated using nature inspired optimization algorithm (NIA) and applied correction factor using SVD. Finally, the corrected LL sub band takes IDWT with other unprocessed sub band. We measure its performance by using contrast assessment function (CAF) which is based on the luminance, entropy and contrast for different satellite images. The proposed method gives better metric values than other comparative state of art methods.

For Details refer DOI: <https://doi.org/10.1007/s12652-021-02957-9>

Critical insights into modern hyperspectral image applications through deep learning

Garima Jaiswal, Arun Sharma

Abstract: Hyperspectral imaging has shown tremendous growth over the past three decades. Hyperspectral imaging was evolved through remote sensing. Along, with the technological enhancements hyperspectral imaging has outgrown, conquering over other various application areas. In addition to it, data enriched data cubes with abundant spectral and spatial information works as perk for capturing, analyzing, reviewing, and interpreting results from data. This review concentrates on emerging application areas of hyperspectral imaging. Emerging application areas are selected in ways where there is a vast scope for future enhancements by exploiting cutting edge technology, that is, deep learning. Applications of hyperspectral imaging techniques in some selected areas (remote sensing, document forgery, history and archaeology conservation, surveillance and security, machine vision for fruit quality inspection, medical imaging) are focused. The review pivots around the publicly available datasets and features used domain wise. This review can act as a baseline for deep learning and machine vision experts, historical geographers, and scholars by providing them a view of how hyperspectral imaging is implemented in multiple domains along with future research prospects.

For Details refer DOI: <https://doi.org/10.1002/widm.1426>

A survey on security and authentication in wireless body area Networks

Bhawna Narwal, Amar Kumar Mohapatra

Abstract: Wireless Body Area Networks (WBAN) is often envisioned as a paradigm shift from the traditional healthcare system to the modern E-Healthcare system. The patient's vitals sensed by the sensors are highly sensitive, confidential, and susceptible to various attacks from adversaries. For the WBAN being a concrete application of the healthcare system, it is paramount to ensure that the data sensed by the WBAN sensors is safe and not exposed to unauthorised entities and security threats. In light of this, strong security solutions and authentication schemes are needed for the success and large scale adoption of the WBANs. To this end, a plethora of security solutions and authentication schemes have been suggested by the researchers over the last two decades. However, the absence of a clear and cohesive study in view of security and authentication does not serve the bigger goal of providing a bird-eye view of the domain. To fulfill the objectives mentioned above, we approach in the following manner. Firstly, an extensive review of the security essentials, security threats, attackers, and attack techniques, and current existing solutions are provided with a detailed classification of security mechanisms in the WBANs. Secondly, a detailed discussion on authentication, design, and development of the authentication scheme and its classification, adversary models and security protocol verifiers is provided. Furthermore, this work outlines the applications, open research issues, recommendations for future authentication schemes and future trends for the WBANs. All in all, this survey elaborates the functionality of WBAN, its technologies, building blocks, and a much wider view of WBAN in terms of security and authentication.

For Details refer DOI: <https://doi.org/10.1016/j.sysarc.2020.101883>

SAMAKA: Secure and Anonymous Mutual Authentication and Key Agreement Scheme for Wireless Body Area Networks

Bhawna Narwal, Amar Kumar Mohapatra

Abstract: The burgeoning advances in wireless communications, healthcare facilities, and sensor technologies bring a lot of transformation in businesses, the global economy, and convenience to people's life. To this, Wireless Body Area Networks (WBAN) has transpired as a low-cost, simple and effective solution for Smart E-Healthcare Systems. However, the mobility and open communication channel pose a significant risk of unapproved access, leakage of sensitive E-health data, and various attacks from the adversary, which remarkably impacts the large-scale adoption of the technology. To deal with such issues related to security and privacy in WBANs, many authentication schemes were suggested by the researchers in the past few years claiming to be secure, privacy-preserving, and efficient. Unfortunately, the existing schemes present security and privacy shortcomings which bring about the issues such as threats from adversaries and abuse of services.

In this paper, we have propounded a secure and anonymous mutual authentication scheme for WBANs (SAMAKA). In particular, SAMAKA preserves all the desired security features and guards from various security attacks from an adversary. Besides, the formal security proof for SAMAKA is given using BAN Logic and AVISPA. Moreover, SAMAKA is proved to be provably secure in the RoR Model. More importantly, a detailed informal security analysis demonstrates the robustness of SAMAKA against well-known security attacks. Finally, a comparative performance analysis reveals that SAMAKA achieves superior performance and shows promising results while providing more robust security and privacy.

For Details refer DOI: <https://doi.org/10.1007/s13369-021-05707-3>

Shill Detector: A Binary Grey Wolf Optimization Technique for Detection of Shilling Profiles

Saumya Bansal, Niyati Baliyan

Abstract: At Collaborative Filtering, though a successful recommendation technique is vulnerable to shilling attacks due to its open nature. These attacks alter recommendations being generated for the user by inserting fake user profiles in the database. To minimize the bias introduced in the recommendation process, many machine learning methods have been explored and shown excellent results. However, supervised machine learning detection techniques are restricted to hand-designed features while unsupervised detection techniques require prior knowledge about fake profiles. In this paper, we propose a novel approach namely, ShillDetector for the detection of shilling attacks based on the recently proposed swarm intelligence technique, grey wolf optimization. The proposed approach works as a dimensionality reduction technique taking advantage of high correlation among shillers and removing correlated features that are redundant. Further, it works directly on the rating matrix, does not require hand-designed features, prior knowledge of attack profiles, or any training time. The performance of ShillDetector has been evaluated on the MovieLens dataset consisting of 100 K ratings. Experimental results depict that ShillDetector outperformed two state-of-the-art approaches, namely, SVM-TIA and PCA-VarSelect approaches with an average precision of 0.99 in case of average attack taken over different attack sizes, viz, 1%, 2%, 5%, and 10%.

For Details refer DOI: <https://doi.org/10.1007/s12652-021-03320-8>

Grey wolf optimization with fuzzy logic for energy-efficient communication in wireless sensor network-based Internet of Things scenario

Kritika Verma, Niyati Baliyan

Abstract: Wireless sensor network is an essential building block for Internet of Things (IoT) due to its usage for collecting and sensing data by the sensor nodes in a nearby environment. Energy efficiency is an important requirement for these networks as the sensors used are short on power and memory. In this paper, an enhanced energy-efficient clustering protocol is proposed that works on three major phases under network setup: grid formation and grid head selection, clustering, and cluster head (CH) selection. Clustering is achieved using nature-inspired grey wolf optimization (GWO) algorithm, and CH selection is accomplished using fuzzy inference-based system. Simulation is performed in MATLAB software, and the protocol is evaluated in terms of network lifetime, the first node dead (FND), half node dead (HND), and last node dead (LND). Additionally, a prototype modeling of IoT using the Things peak IoT Platform provided by Math works is also integrated with the proposed protocol to demonstrate its usage in IoT applications. The simulation results indicated that the proposed scheme attained better performance in preserving energy and extending network lifetime.

For Details refer DOI: <https://doi.org/10.1002/dac.4981>

Android Security Assessment: A Review, Taxonomy and Research Gap Study

Shivi Garg, Niyati Baliyan

Abstract: Security threats are escalating exponentially posing a serious challenge to mobile platforms, specifically Android. In recent years the number of attacks has not only increased but each attack has become more damaging to the platform. Therefore, it is important to develop more stringent counter-measures to defend the mobile systems. Although in the last few years, significant research progress is seen in the field of the detection and mitigation of Android security, yet numerous challenges and gaps still exist. This paper presents a comprehensive and sound taxonomy to review the state-of-the-art approaches used in Android security. We have highlighted the trends and patterns of different analysis approaches, identified the key aspects in terms of objectives, analysis techniques, code representations, tools and frameworks used, etc. and enumerated the research areas for future work. To carry out this study, the proper systematic literature review process is followed and the results of nearly 200 research publications have been comprehended based on different security aspects.

For Details refer DOI: <https://doi.org/10.1016/j.cose.2020.102087>

Comparative Analysis of Android and iOS from Security Viewpoint

Shivi Garg, Niyati Baliyan

Abstract: Smartphone usage has increased exponentially in the recent years. Android and iOS are the most popular smartphone platforms, while the ease of use along with the computational power to handle a wide array of applications attracts millions of users worldwide, also raises the security concerns on these platforms. This paper presents a comparative analysis between Android and iOS on a wide range of security aspects. It analyzes data for the period 2015-2019 and gives a detailed snapshot of not only the quantum of vulnerabilities, but also their impact. In addition, the paper leverages the well-established security triad i.e. CIA (Confidentiality, Integrity, Availability) to compare both the operating systems. The comprehensive and pragmatic approach taken in the paper makes it easier to infer that Android is more susceptible to security breaches and malware attacks as compared to iOS. Hence, researchers should divert their efforts and focus on finding solutions to problems pertaining to Android. The paper concludes by laying down future research directions and scope of work, which can be leveraged not only by application developers, but also by researchers. This will help make Android safer for users and will further increase its demand as a mobile operating system.

For Details refer DOI: <https://doi.org/10.1016/j.cosrev.2021.100372>

M2VMapper: Malware-to-Vulnerability Mapping for Android using Text Processing

Shivi Garg, Niyati Baliyan

Abstract: Over 90% of the mobile malware target Android mobile platform. Many Machine Learning (ML) and Deep Learning (DL) techniques have been used to detect and analyze Android malware, however, there is a many-to-many mapping between malware and vulnerability. This means a single malware can exploit multiple security vulnerabilities (known or unknown) and a single vulnerability can be exploited by multiple malware. Therefore, it is important to analyze the behaviour of malware to identify and reduce the vulnerabilities. Till date, no ML/DL or other technique has been deployed to analyze the malware behaviour to identify and reduce the vulnerabilities. The paper proposes a DL framework 'M2VMapper' that combines transfer learning and pretrained language models, which aims to map malware and potential vulnerabilities using a 2D matrix. The many-to-many mapping matrix is obtained by using transformer models such as BERT and XLNET; in addition to DL models such as Multi-layer Perceptron (MLP), Recurrent Neural Network (RNN) and Textual Convolutional Neural Network (Text CNN). This malware-to-vulnerability mapping can be leveraged to measure the severity of unknown vulnerabilities and malware during the initial phase of application development. The study is a first of its kind and considers 150 malware families from different datasets, such as AMD, CICInvesAndMal2019, and Androzoo with a total of 48 907 malware samples and 9 vulnerability types affecting Android. M2VMapper has delivered highly promising results with an accuracy of 99.81%, when XLNET is used with TextCNN, and precision and F1-scores above 95% using DL models.

For Details refer DOI: <https://doi.org/10.1016/j.eswa.2021.116360>

Optimized Extreme Learning Machine for Intelligent Spectrum Sensing in 5G systems

Parnika Kansal, Ashwni Kumar, M. Gangadharapa

Abstract: A two-level learned distributed networking (LDN) structure that uses existing machine learning (ML) algorithms and the novel Optimized Extreme Learning Machine (OELM) algorithm to perform intelligent spectrum sensing for 5G systems has been proposed and implemented. This novel technique uses input vectors like received signal strength indicator, the distance between Cognitive Radio users and gateways, and energy vectors to train the model. Extreme Learning Machine optimized by BAT algorithm outperforms the existing Machine Learning techniques in terms of detection accuracy, false alarm, detection probability and cross validation curves at different SNR scenarios.

For Details refer DOI: <https://doi.org/10.1134/S1064226921040045>

An Efficient Composite Two-Tier Threshold Cooperative Spectrum Sensing Technique for 5G Systems

Parnika Kansal, Ashwini Kumar

Abstract: There are fixed thresholds in the conventional double threshold sensing techniques. There is no sensing or confusion region when the test statistic lies between high and low thresholds leading to meager detection probability and lengthier sensing time for the upcoming fifth-generation networks. Hence, there occur problems of low SNR and threshold discrepancies in conventional detectors. So, a novel composite two-tier threshold (CTTT) cooperative spectrum sensing algorithm has been proposed that utilizes the confusion region, and the energy vectors, RSSI vectors, and distance vectors are exploited by the secondary users in a two-tier process to sense the spectrum. Relay Centers (RCs) are introduced that can combine the decisions of the secondary users according to different decision strategies and decide about final spectrum availability. The proposed model operates at 2.4 GHz in the sub-6 GHz band of fifth-generation communication. The proposed scheme's performance is assessed on false alarm rate, detection probability, miss detection rate, sensing time, and bit error rate vs. SNR graphs with the conventional methods. The simulated results depict that the proposed scheme outperforms the existing techniques with sensing time as low as 1.09 s, a very low miss detection probability of 0.0002100, and a significantly less BER of 0.0001, giving robust spectrum predictions for the 5G environments.

For Details refer DOI: <https://doi.org/10.1007/s13369-021-05938-4>

Two-Port Hexagon Shaped MIMO Microstrip Antenna for UWB Applications Integrated with Double Stop Bands for WiMax and WLAN

Megha Agarwal, Jasdeep Kaur Dhanoa

Abstract: A tapered fed hexagon-shaped patch microstrip antenna is analyzed with double-port MIMO technology. The presented antenna is designed for UWB applications integrated with two stopbands. The antenna is compact and has dimensions of $35 \times 46 \times 1.5748$ mm. This antenna is operatable from 2.1 GHz to 11.4 GHz with maximum coupling power of -24.5 dB within almost full band except -15 dB from 3.8 GHz to 4.8 GHz. Evolution and achievement of final results, including the mutual coupling suppression method, are explained step by step. Two stopbands are achieved at 3.5 GHz and 5.5 GHz to suppress the interference with WiMax and WLAN applications, respectively. The radiation characteristics, diversity parameters are also observed and found satisfactory. Experimental results are measured to validate the simulations.

For Details refer DOI: <https://doi.org/10.1016/j.aeue.2021.153885>

A Fast and Effective Vision Enhancement Method for Single Foggy Image

Pooja Pandey, Rashmi Gupta, Nidhi Goel

Abstract: Images captured in foggy weather conditions suffers from inevitable problems such as low contrast, blurriness and less visibility. In many computer and vision applications like surveillance, object detection, object tracking and navigation, these low-quality images cannot be used and it requires improvement in the image quality. Different algorithms have been proposed in this direction and to upgrade the quality of a foggy image. Most of the existing methods gives good quality image but with high time complexity. In this paper, a novel and effective method is proposed to remove fog from a single image. The proposed method is based on principal component analysis and modified dark channel prior. In proposed algorithm, foggy image is pre-processed using principal component analysis. This pre-processed image is further enhanced using fast global smoothing filter. Time complexity of the proposed method is much less as compared to the various existing methods and at the same time, quality is also maintained. Also, proposed algorithm does not require a large data set and specific hardware. To see the effectiveness of the proposed technique, both qualitative and quantitative analysis has been done on synthetic data set as well as on natural dataset. The running methodology a case is presented using hypothetical data from the literature.

For Details refer DOI: <https://doi.org/10.1016/j.jestch.2021.03.014>

Microgrid Protection: A Comprehensive Review

Annu Dagar, Pankaj Gupta, Vandana Niranjana

Abstract: Amalgamation of distributed energy resources (DER) with power system is developing as an emerging power framework. It is ecumenically based on the paramount issues such as extensive use of technologies based on distributed energy resources, shortage of fossil fuel in future, liberalism of electrical service industries and custom vigilance on environmental impact of the conventional method of generating electrical power. These issues are transmuting the concept of conventional power generation globally and introduce incipient challenges in the generation and distribution system. The interconnection of distributed generators has initiated the concept of microgrid which is the assemblage of interconnected distributed generators, intermediate storage units and loads. The pragmatic application of microgrid faces numerous technical challenges. Scheming with a congruous protection scheme is one of the solemn challenges in a microgrid framework. The level of fault current in both the modes of operation, active distributed generation, two-way flow of power, increased value of impedance and quality of communication network are the profuse challenges in scheming an efficacious protection technique. The protection scheme must be reliable, selective, fast and susceptible in both the working modes. This paper presents the meticulous study of the architecture of AC microgrid, DC microgrid and hybrid microgrid along with the associated protection issues and solutions. It also provides the censorious assessment of available challenges in the protection of microgrid in both grid-tied & islanded mode and available protection strategies for both AC microgrid and DC microgrid. An all-inclusive review has been done in each section considering the latest developments along with the future progression in the field of microgrid protection.

For Details refer DOI: <https://doi.org/10.1016/j.rser.2021.111401>

Optimization of throughput for free space optical communication system in presence of atmospheric turbulence and pointing error

Kanchan Sharma

Abstract: This paper presents a fuzzy logic controlled based scheme that optimizes the throughput efficiency of the free space optical (FSO) communication system. The appropriate packet length required is computed using the particle swarm optimization method. The proposed scheme appropriately acquired the transmitted packet length and modulation order as per feedback of computed Channel State Information (CSI) at the receiver. The numerical results show a 0.4–1.8 dB gain improvement in throughput in comparison to the FSO communication system using fixed packet length.

For Details refer DOI: <https://doi.org/10.1007/s12652-021-03478-1>

A new ABER approximation of FSO system using PPM–GMSK hybrid modulation scheme under weak turbulence

Kanchan Sharma

Abstract: In this paper, free space optical communication system (FSO) employing a hybrid modulation technique called pulse position modulation–Gaussian minimum shift keying (PPM–GMSK) technique, is investigated by considering log–normal as the channel fading statistics under weak turbulence. The analytical average bit error rate (ABER) and closed form expression of the proposed hybrid modulation scheme are derived. Simulation results depict the excellent agreement of the derived closed form expression with those obtained using Gauss–Hermite approximation and with the Monte Carlo simulations.

For Details refer DOI: <https://doi.org/10.1016/j.ijleo.2021.168129>

A novel approach to design optimal 2-D digital differentiator using vortex search optimization algorithm

Suman Yadav, Ashwni Kumar, Richa Yadav, Manjeet Kumar

Abstract: The designing of 2-D digital differentiator is multimodal and high dimensional problem which requires large number of differentiator coefficients to be optimized, hence conventional design techniques will not lead to optimal 2-D differentiator design. Metaheuristic approaches is a good approach to handle multimodal and high dimensional problem under consideration. In this paper, a novel method for the design of FIR two-dimensional (2-D) digital differentiator with quadrantly odd symmetric properties is proposed. The coefficients of 2-D digital differentiator are computed and optimized using vortex search optimization (VSO) algorithm with the support of L1 error objective function. The unique combination of VSO and L1 error fitness function aids in achieving flatter magnitude response in designing of 2-D differentiator. Further, some comparative analysis with the well-known established techniques like cuckoo search algorithm (CSA), particle swarm optimization (PSO) and real coded genetic algorithm (RCGA) methodology is reported over full frequency bands, in order to demonstrate the advantage of the proposed novel 2-D digital differentiator design approach. To measure the performance of proposed system, some parameters are selected for illustration such as absolute magnitude error, mean absolute error, standard deviation and execution time. The excellence of the proposed approach is observed in approximating the ideal response of 2-D differentiator in contrast to other algorithms and to provide global optimal solution.

For Details refer DOI: [10.1007/s11042-020-10012-6](https://doi.org/10.1007/s11042-020-10012-6)

Robust circuit implementation of 4-bit 4-tube CNFET based ALU at 16-nm technology node

Pragya Srivastava, Richa Yadav

Abstract: Tremendous and inescapable application of full adder adds impetus to its optimization till high-end performance. Use of full adder propels the design engineer to unearth various digital circuits, whose implementation otherwise would not be a cakewalk. This paper exhumes finest 3-bit parity checker in terms of power dissipation (PWR) and energy-delay product (EDP) variability. MCML (MOS Current Mode Logic) based implementation is practiced to improvise the circuit. Further, in this treatise, above mentioned 'CNFET-based 3-bit MCML parity checker' (used as full adder) and Transmission Gate based multiplexer is used to implement a novel design of '4-Bit 4-Tube CNFET based ALU' at 16-nm Technology Node. This CNFET-based ALU thus implemented is further compared with its CMOS counterpart. Simulation results establish the superior performance of proposed '4-Bit 4-Tube CNFET-based ALU' in terms of propagation delay (tp) (9.049), PWR (1.689), PDP (15.099) and EDP (136.429). The exposition establishes that the idea of using a 'CNFET-based 3-bit MCML parity checker' to design a new ALU circuit, i.e., '4-Bit 4-Tube CNFET-based ALU' would provide a gigantic horizon for a design engineer.

For Details refer DOI: <https://doi.org/10.1007/s10470-021-01825-y>

Influence of Process Parameters and Reinforcements on Aluminium Hybrid Composites Developed by Powder Metallurgy Process

Aasiya Parveen, N. R. Chauhan, M. Suhaib

Abstract: In this study, aluminium hybrid composites were developed by the powder metallurgy in which Si_3N_4 and ZrO_2 were used as reinforcements. The synthesized composite powder as per weight percentage of the reinforcements was milled in a centrifugal ball mill at 600 rpm for 0.5 and 2.5 hours and then compacted at 420 MPa. The compacted composites were kept in a tube furnace for sintering at 550°C under controlled environment for 30 minutes. The influence of milling time and wt% of the reinforcements was investigated on the microstructure, density and hardness of the composites. The SEM images indicated that the $\text{Si}_3\text{N}_4/\text{ZrO}_2$ particles were homogeneously mixed with the matrix and reduction of clusters also observed with the milling time. It was also observed that high milling time and wt% of high-density reinforcements increase the density of the composites but porosity decreases. Finally, it was found that the micro-hardness also improved with fine homogeneous and high-strength ceramic reinforcement embedded within the matrix.

For Details refer DOI: <https://doi.org/10.1134/S0031918X21100094>

Development of a solar cooking system suitable for indoor cooking and its exergy and enviroeconomic analyses

O.K. Singh

Abstract: In the present work, a solar cooking system that makes the controlled cooking possible inside the kitchen has been developed. This cook-friendly device introduces a new solar heat transfer concept for indoor cooking by providing a heater plate installed inside the kitchen to which solar heat is transferred from a parabolic collector by means of a heat transfer fluid. An LDR-based electronic solar tracker is integrated with the parabolic collector to automatically adjust its position so that it always remains directed towards the sun to collect maximum solar radiations. A solar P-V panel continuously charges a 12 V battery through charge controller. The battery supplies electricity to the solar tracker and to a DC motor-pump set which circulates heat transfer fluid through the heating coil of the heater plate. The pump is thermostatically operated to maintain correct temperature of the heater plate for effective cooking and for maintaining the nutritional value of food. The system is equipped with an electronic circuit, a digital thermometer, a pressure gauge and a relief by-pass valve in the heat transfer fluid line to ensure its safe and smooth operation. Exergy and enviro-economic analyses of this device are also carried out to evaluate its efficiency and CO_2 mitigation potential.

For Details refer DOI: <https://doi.org/10.1016/j.solener.2021.02.007>

Guidelines for Research Awards 2022

1. The cash award will be given to Researchers (regular/contractual faculty members and students of IGDTUW) in the recognition of importance of the published research work and to motivate the individual excellence in research.
2. The award will be granted to the journal papers published in each year (1st January to 31st December), published along with Digital Object Identifier (DOI), vol., issue, no. pagination and month/year of publication.
3. Only Publications listed in SCI/SCIE/SSCI Journals are considered for the awards. The latest list of SCI/SCIE/SSCI indexing and impact factor by Clarivate are applied for deciding the indexing and impact factor of the journals.
4. Only papers having the author's affiliation as Indira Gandhi Delhi Technical University for Women are considered for Research and Patent Awards.
5. Journal papers with complete information (DOI, vol., issue, no. pagination and month/year of publication) are only considered for award. The date when the final version of the paper appears/published online with complete citation information as mentioned is considered as the date of publication of the paper.
6. The awards comprise of cash prize along with certificates. Certificates bearing complete citation information of the publications are presented to all awardees.
7. The publications made in the journals, which seek publication fee in any form except overlength charges are not considered for cash awards (irrespective of the listing in the publication agencies specified in the following lists)
8. If at a later date the publication is withdrawn or retracted due to some reason the authors return the award (money as well as certificate).
9. The distribution of prize money shall be on equal contribution basis and therefore the authors will get equal share. Only the authors from IGDTUW are eligible for the awards and the prize money corresponding to outside IGDTUW authors, if any, is deducted.
10. The applications of awards for patents are also to be treated similarly. However, the impact factor and indexing are not applicable for patents. Only Patents having the applicants name as Indira Gandhi Delhi Technical University for Women will be considered for awards.
11. An application form in the format (provided by IRD Cell) is to be filled by Faculty Member/student for applying for the award. The Application form shall be duly verified by HOD and submitted to the IRD Cell along with all the requisite documents by 31st January of the succeeding year.
12. A University level Screening Committee comprising of Dean (IRD), Dean (R&C), Dean (Academics)/Dean (Examinations) and three HODs shall be nominated by Hon'ble Vice Chancellor to review the applications. The Committee shall declare the list of faculty members and students eligible for Research awards with approval of the Vice Chancellor.

The expenditure on "Award for Researchers (Faculty/ Students) of the University" will be met under the Head "GIA (General)"

Award Categories & Selection Criteria :

Following are the categories for the research and patent awards.

1st. Awards for Research Papers: Following are the four categories for the research awards:

1. Nature (British Multidisciplinary Scientific Journal)
2. Science (Academic Journal of the American Association)
3. Harvard Business Review (Management magazine published by Harvard Business Publishing, a wholly owned subsidiary of Harvard University)

B. Premier Research Awards: A cash prize of Rs. 1,00,000/- (Rupees One Lakhs only) is awarded along with certificate of merit.

Selection Criteria: The paper must be a journal paper of impact factor at least one (1.0) and indexed as SCI/SCIE/SSCI and published in the following:

1. American Mathematical Society
2. American Physical Society
3. American Society for Civil Engineers (ASCE)
4. American Society for Mechanical Engineers (ASME)
5. American Society of Testing Materials (ASTM)
6. Association for Computing Machinery (ACM) transactions
7. IEEE Transactions/Journals/Letters/Reviews
8. IET Transactions/Journals/Letters/Reviews
9. Institute of Civil Engineering publishing, London
10. Institute of Mechanical Engineering, London
11. Proceeding of Royal Society

In addition to the above list, the SCI/SCIE/SSCI journals with impact factor equal to or more than seven (7.0) are also considered for this award.

C. Commendable Research Awards: A cash prize of Rs. 50,000/- (Rupees Fifty Thousand only) is awarded along with certificate of merit.

Selection Criteria: The paper must be a journal publication (other than listed in category A and B above) of impact factor at least two (2.0) and indexed as SCI/SCIE/SSCI.

D. Motivational Research Award: A cash prize of Rs. 20,000/- (Rs. Twenty Thousand only) will be awarded along with a certificate of merit.

Selection Criteria: The paper must be a journal publication (other than listed in category A and B above) of impact factor \geq one (1.0) and less than two (2.0) and indexed as SCI/SCIE/SSCI.

II. Awards for Patents: Following are the two categories for the awards on patents.

- a) Premier Patent Awards: A cash prize of Rs. 5,00,000/- (Rupees Five Lakhs only) is awarded along with a certificate of merit for grant of US/UK patent.
- b) Commendable Patent Awards: A cash prize of Rs. 2,00,000/- (Rupees Two Lakhs only) is awarded along with a certificate of merit for grant of Indian patent.

In case of any dispute the decision of the Competent Authority, IGDTUW is final and binding to all the authors.

Prof. Ranu Gadi
Dean (R&D)

DETAILS OF PATENTS GRANTED

1st January, 2022 to 31st December, 2022

S.No.	Inventor's Name	Title of Invention
1.	Ritu Rani, Rashmi Gandhi, Amita Dev, Arun Sharma	Tomcrop: A Deep Learning Architecture for Tomato Leaf Disease Detection
2.	Pooja Pandey, Nidhi Goel, Monika Mathur, Inderdeep Kaur, Rashmi Gupta, Amita Dev	Single Foggy Image Restoration Method and System Based on Principal Component Analysis

Patents Granted 2022

Tomcrop: A Deep Learning Architecture For Tomato Leaf Disease Detection






Ritu Rani, Rashmi Gandhi, Amita Dev, Arun Sharma


Abstract: Tomatoes are an important crop in mineral salt and vitamin C-rich agricultural areas. Plant health is important for crop output growth in terms of quantity and quality. However, in order to meet these goals, crops must be disease-free or adapted to detect infections early. In this study, extensive experimentation was carried out for the detection of Tomato leaf disease using pre-trained models. There are two major steps involved in this process: feature extraction and classification. In this paper, two different models are proposed using the pre-trained models for the detection of tomato leaf disease detection. In the first model, the pre-trained models (Inception3, MobileNet, Resnet50, Xception, Densenet121, VGG16 and EfficientNetB0) are used as the convolutional base for feature extraction and then a stack of fully-connected layers followed by a softmax layer as classifiers that are fed by the features extracted from the pre-trained models. Through empirical analysis it is observed that the MobileNet model perform better than the remaining models, thus the hyperparameter tuning of the proposed model with MobileNet as feature extractor is also done for various optimizers Adam, SGD, Adagrad, Adadelta and RMSprop and the results have been analysed. Also, the experimentation of the Mobile Net model has been for the various batch sizes 32, 64 and 128 has also been done. In the second model, TomCrop: A deep learning architecture has been proposed which involves fine-tuning of the pre-trained model Mobile Net by unfreezing some of the layers of the convolutional base and retraining the network with a lower learning rate and Adam optimizer. The results obtained from the proposed deep learning architectures are then compared in terms of precision, recall, F1 score. The experimental results and comparative analyses testify the efficacy of the proposed system over existing systems for tomato leaf disease detection.

Single Foggy Image Restoration Method And System Based On Principal Component Analysis


Pooja Pandey, Nidhi Goel, Monika Mathur, Inderdeep Kaur, Rashmi Gupta, Amita Dev

Abstract: The present invention relates to an effective method and system to remove fog from a single image. The proposed method is based on principal component analysis and modified dark channel prior. In the proposed invention, the foggy image is pre-processed using principal component analysis. This pre-processed image is further enhanced using the fast global smoothing filter. Time complexity of the proposed method is much less as compared to the various existing methods and at the same time, quality is also maintained. Also, proposed method does not require a large data set and specific hardware. To see the effectiveness of the proposed technique, both qualitative and quantitative analysis has been done on synthetic data set as well as on natural dataset.

 INTELLECTUAL PROPERTY INDIA PATENTS DESIGNS TRADE MARKS GEOGRAPHICAL INDICATIONS	 सत्यमेव जयते भारत सरकार GOVERNMENT OF INDIA पेटेंट कार्यालय THE PATENT OFFICE पेटेंट प्रमाणपत्र PATENT CERTIFICATE (Rule 74 of The Patents Rules)	क्रमांक : 011153711 SL No : 
पेटेंट सं. / Patent No.	:	414312
आवेदन सं. / Application No.	:	202211025536
फाइल करने की तारीख / Date of Filing	:	02/05/2022
पेटेंटी / Patentee	:	Indira Gandhi Delhi Technical University for Women (IGDTUW)
<p>प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित TOMCROP: A DEEP LEARNING ARCHITECTURE FOR TOMATO LEAF DISEASE DETECTION नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख मई 2022 के दूसरे दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।</p> <p>It is hereby certified that a patent has been granted to the patentee for an invention entitled TOMCROP: A DEEP LEARNING ARCHITECTURE FOR TOMATO LEAF DISEASE DETECTION as disclosed in the above mentioned application for the term of 20 years from the 2nd day of May 2022 in accordance with the provisions of the Patents Act, 1970.</p>		
 अनुदान की तारीख : 13/12/2022 Date of Grant :  पेटेंट नियंत्रक Controller of Patent		
<p>टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, मई 2024 के दूसरे दिन को और उसके पश्चात प्रत्येक वर्ष में उसी दिन देय होगी। Note. - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 2nd day of May 2024 and on the same day in every year thereafter.</p>		




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भारत सरकार
GOVERNMENT OF INDIA
पेटेंट कार्यालय
THE PATENT OFFICE
पेटेंट प्रमाणपत्र
PATENT CERTIFICATE
(Rule 74 of The Patents Rules)


क्रमांक : 011154249
SL No :



पेटेंट सं. / Patent No.	: 415627
आवेदन सं. / Application No.	: 202211027659
फाइल करने की तारीख / Date of Filing	: 13/05/2022
पेटेंटी / Patentee	: Indira Gandhi Delhi Technical University for Women (IGDTUW)

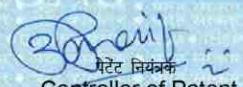
प्रमाणित किया जाता है कि पेटेंटी को, उपरोक्त आवेदन में यथाप्रकटित SINGLE FOGGY IMAGE RESTORATION METHOD AND SYSTEM BASED ON PRINCIPAL COMPONENT ANALYSIS नामक आविष्कार के लिए, पेटेंट अधिनियम, 1970 के उपबंधों के अनुसार आज तारीख मई 2022 के तेरहवें दिन से बीस वर्ष की अवधि के लिए पेटेंट अनुदत्त किया गया है।

It is hereby certified that a patent has been granted to the patentee for an invention entitled SINGLE FOGGY IMAGE RESTORATION METHOD AND SYSTEM BASED ON PRINCIPAL COMPONENT ANALYSIS as disclosed in the above mentioned application for the term of 20 years from the 13th day of May 2022 in accordance with the provisions of the Patents Act, 1970.



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GEOGRAPHICAL INDICATIONS

अनुदान की तारीख : 27/12/2022
Date of Grant :



पेटेंट नियंत्रक
Controller of Patent

टिप्पणी - इस पेटेंट के नवीकरण के लिए फीस, यदि इसे बनाए रखा जाना है, मई 2024 के तेरहवें दिन को और उसके पश्चात प्रत्येक वर्ष से उसी दिन देय होगी।
Note. - The fees for renewal of this patent, if it is to be maintained will fall / has fallen due on 13th day of May 2024 and on the same day in every year thereafter.

Details of Research Awards 2022

DETAILS OF PUBLISHED PAPERS FOR PREMIER RESEARCH AWARDS

1st January, 2022 to 31st December, 2022

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING			
1.	Punam Kumari, Seeja K. R.	Periocular biometrics: A survey	Journal of King Saud University -Computer and Information Sciences 34, 1086-1097, 2022
2.	Pallavi Pandey, Seeja K.R.	Subject independent emotion recognition from EEG using VMD and deep learning	Journal of King Saud University-Computer and Information Sciences 34, 1730-1738, 2022
DEPARTMENT OF INFORMATION TECHNOLOGY			
3.	Dimple Sethi, Sourabh Bharti, Chandra Prakash	A comprehensive survey on gait analysis: History, parameters, approaches, pose estimation, and future work	Artificial Intelligence in Medicine 129, 102314, 2022
DEPARTMENT OF MECHANICAL & AUTOMATION ENGINEERING			
4.	Md. Zakir Hussain, Sabah Khan, Urfi Khan	Optimization of MWCNTs/Al nano composite fabrication process parameters for mass density and hardness	Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science 236, 2022

DETAILS OF PUBLISHED PAPERS FOR COMMENDABLE RESEARCH AWARDS

1st January, 2022 to 31st December, 2022

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES			
1.	Ritu Jangirh., Shivani., Ranu Gadi, et al.	Gridded distribution of total suspended particulate matter (TSP) and their chemical characterization over Delhi during winter	Environmental Science and Pollution Research volume 29, 17892-17918 (2022)
2.	Ritu Goel, Ranjana Jha, Chhaya Ravikant	Synergistic effect of Urea and Potassium Sulphate during hydrothermal synthesis of NiO nanospheres with reduced crystallite size and enhanced electrical conductivity	Inorganic Chemistry Communications 141, 109563, 2022

3.	Ritu Goel, Ranjana Jha & Chhaya Ravikant	Solution-processed spin coated multilayer structured nickel oxide thin films for anodic electrochromism	Journal of Applied Electrochemistry 2022
4.	Ritu Chaudhari, Chhaya Ravikant & Alka Garg	Polymer-BiI3 composites for high-performance, room-temperature, direct X-ray detectors	MRS Communications 12, 358-364, 2022
5.	Ritu Chaudhari, Chhaya Ravikant	A review on BiI3 perovskites and composites for direct X-ray detection	Sensors and Actuators A: Physical 346, 113863, 2022
6.	Aakanksha Singh, Ritu Arora, Shalini Arora	Bilevel transportation problem in neutrosophic environment	Computational and Applied Mathematics 41, 1-25, 22
7.	Deeba R. Naqvi, Rajkumar Verma, Abha Aggarwal, Geeta Sachdev	Solutions of matrix games involving linguistic interval-valued intuitionistic fuzzy sets	Soft Computing 27, 783-808, 2022
8.	Aishwarya Singh, Bhavani Prasad Nenavathu, Khushboo Dasauni, Tapan Kumar Nailwal	C-ROS-Mediated Aquaculture Waste water Remediation Using TeO2-Deposited ZnO Nanotubes	Water Air Soil Pollution 233, 1-12, 2022
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING			
9.	Vivekanand Jha, Rashika Sharma	An energy efficient weighted clustering algorithm in heterogeneous wireless sensor networks	The Journal of Supercomputing 78, 14266-14293, 2022
10.	Vijay Kumar Yadav, Nitish Andola, Shekhar Verma & S. Venkatesan	PSCLS: provably secure certificateless signature scheme for IoT device on cloud	The Journal of Supercomputing 2022.
11.	Nidhi Agarwal, Devendra K. Tayal	FFT based ensembled model to predict ranks of higher educational institutions	Multimedia Tools and Applications 81, 34129-34162, 2022
12.	Nidhi Agarwal, Devendra K. Tayal	A new model based on the extended COPRAS method for improving performance during the accreditation process of Indian Higher Educational Institutions	Computer Applications in Engineering Education 2022
13.	Devendra Kumar Tayal, Sumit Kumar Yadav, Divya Arora	Personalized ranking of products using aspect-based sentiment analysis and Plithogenic sets	Multimedia Tools and Applications 82, 1261-1287, 2022

DEPARTMENT OF INFORMATION TECHNOLOGY			
14.	Karan Gupta, Deepak Kumar Sharma, Koyel Datta Gupta, Anil Kumar	A Tree Classifier based Network Intrusion Detection Model for Internet of Medical Things	Computers and Electrical Engineering 102, 108158, 2022
15.	Deepak Kumar Sharma, Utsha Sinha, Aditi Gupta & Manju Khari	Modified minimum spanning tree based vertical fragmentation, allocation and replication approach in distributed multimedia databases	Multimedia Tools and Applications 81, 37101–37118, 2022
16.	Deepak Kumar Sharma, Jahanavi Mishra, Aeshit Singh, Raghav Govil, Gautam Srivastava, Jerry Chun-Wei Lin	Explainable Artificial Intelligence for Cybersecurity	Computers and Electrical Engineering 103, 108356, 2022
17.	Nonita Sharma, K. P. Sharma, Monika Mangla and Rajneesh Rani	Breast cancer classification using snap shot ensemble deep learning model and t-distributed stochastic neighbour embedding	Multimedia Tools and Applications 82, 4011–4029, 2022
18.	Apoorva Dhawan, Malvika Bhalla , Deeksha Arora, Rishabh Kaushal, Ponnurangam Kumaraguru	FakeNewsIndia: A benchmark dataset of fake news incidents in India, collection methodology and impact assessment in social media	Computer Communications 185, 2022
19.	Garima Jaiswal, Arun Sharma, Sumit Kumar Yadav	DFD-SS: Document Forgery Detection using Spectral – Spatial Features for Hyperspectral Images	Journal of Visual Communication and Image Representation 89, 103690, 2022
20.	Garima Jaiswal, Arun Sharma, Sumit Kumar Yadav	Deep feature extraction for document forgery detection with convolutional autoencoders	Computers and Electrical Engineering 99, 107770, 2022
21.	Saumya Bansal, Niyati Baliyan	Remembering past and predicting future: a hybrid recurrent neural network based recommender system	Journal of Ambient Intelligence and Humanized Computing, 1-12, 2022
22.	Gaurav Indra, Vidyotma Thakur	Cryptographically secure privacy-preserving authenticated key agreement protocol for an IoT network: A step towards critical infrastructure protection	Peer-to-Peer Networking and Applications volume 15, 206–220 (2022)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING			
23.	Reshma Sinha, Jasdeep Kaur Dhanoa	Analyzing the Impact of Different Composite Dielectrics on Performance Parameters of a Magnetic Tunnel Junction Memory Device	Journal of Electronic Materials 51, 5686–5703, 2022

24.	Megha Agarwal, Jasdeep Kaur Dhanoa, Mukesh Kumar Khandelwal	Construction of compact two-port throne-shaped antenna with dual stopbands and high isolation for Ultrawideband Multiple-Input Multiple-Output wireless communication systems	International Journal of Communication Systems 35, 1-19, 2022
25.	Manik Dangi, Raghvendra Sahai Saxena, Vandana Niranjana	An improved source follower per detector ROIC for HgCdTe infrared photodiodes	Microsystem 28, 2755-2764, 2022
26.	Ruby Mann, Sonam Rewari, Praveen Pal, Shobha Sharma R.S. Gupta	Radiation-sensitive AlGaIn/GaN MOS-HEMT-Based dosimeter	Journal of Electronic Materials 51, 5609–5616, 2022
27.	Shilpa Garg, Richa Yadav, Manjeet Kumar	Discrete cosine transform interpolation based design of two-dimensional FIR fractional order digital differentiator	Multidimensional Systems and Signal Process 33, 1-20, 2022
28.	Nidhi Goel, Samarjeet Kaur, Deepak Gunjan and S.J.Mahapatra	Investigating the Significance of Color Space for Abnormality Detection in Wireless Capsule Endoscopy Images	Biomedical Signal Processing and Control 75, 103624, 2022
29.	Nidhi Goel, Samarjeet Kaur, Deepak Gunjan and S.J.Mahapatra	Dilated CNN for Abnormality Detection in Wireless Capsule Endoscopy Images	Soft Computing 26, 1231-1247, 2022
30.	Palak Handa, Nidhi Goel,	Peri-ictal and non-seizure EEG event detection using generated metadata	Expert System, 39, 2022
31.	Parnika Kansal, M Gangadharappa, Ashwni Kumar	Long Boosted Memory Algorithm for Intelligent Spectrum Sensing in 5G and Beyond Systems	Journal of Network and Systems Management 30, 41, 2022
DEPARTMENT OF MECHANICAL AND AUTOMATION ENGINEERING			
32.	Ekta Yadav & V. K. Chawla	Fault detection in rotating elements by using fuzzy integrated improved local binary pattern method	Journal of the Brazilian Society of Mechanical Sciences and Engineering 44, 1-18, 2022
33.	Krishnakant Sahu, S.C. Sharma, N.R. Chauhan	Misalignment and Surface Irregularities Effect in MR Fluid Journal Bearing	International Journal of Mechanical Sciences 221, 107196, 2022
34.	Mohd. Azmal Hussain, Asiya Parveen, Nathi Ram Chauhan, Mohd. Suhaib, Mohammad Waseem	Statistical analysis and ANN modelling of tribological performance of aluminium hybrid composites fabricated by PM method	Surface Topography: Metrology and Properties 3, 2022

S.No.	Author Name	Paper Title	Journal with Publication Details
35.	Deepti Chhabra, Rajesh Kr. Singh	Analyzing barriers to green logistics in context of Circular Economy and Industry 4.0 in the context of Indian manufacturing industry.	International Journal of Logistics Research and Applications, 2022
DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND DATA SCIENCES			
36.	Ankush Jain, Surendra Nagar, Pramod K. Singh, Joydip Dhar	A hybrid learning-based genetic and grey-wolf optimizer for global optimization	Soft Computing 2022

DETAILS OF PUBLISHED PAPERS FOR MOTIVATIONAL RESEARCH AWARDS

1st January, 2022 to 31st December, 2022

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF APPLIED SCIENCES AND HUMANITIES			
1.	Shobhna Shankar, Ranu Gadi, S. K. Sharma & T. K. Mandal	Identification of Carbonaceous Species and FTIR Profiling of PM2.5 Aerosols for Source Estimation in Old Delhi Region of India	MAPAN 37, 529-544, 2022
2.	Deeba R. Naqvi, Geeta Sachdev, and Izhar Ahmad	Matrix Games Involving Interval-valued Hesitant Fuzzy Linguistic Sets and Its Application to Electric Vehicles	Journal of Intelligent & Fuzzy Systems, IOS 1-22 (Pre-press) 2022
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING			
3.	Garima, Vivekanand Jha, Rakesh Kumar Singh	A novel dynamic bandwidth allocation scheme for XGPON based mobile fronthaul for small cell CRAN	Optical Switching and Networking 45, 100674, 2022
DEPARTMENT OF INFORMATION TECHNOLOGY			
4.	Garima, V N Jha, R K Singh	Comprehensive performance analysis of dynamic bandwidth allocation schemes for XG-PON system	Optical Switching and Networking, 47, 2022
5.	Garima, V N Jha, R K Singh	A novel dynamic bandwidth allocation scheme towards improving the performance of XG-PON system	Optical Switching and Networking, 47, 2022

6.	Ankita Singh, Nanhay Singh	Gravitational search algorithm-driven missing links prediction in social networks	Concurrency and Computation: Practice and Experience 2022
7.	Monika Singh, Anviksha Khunteta, Mohona Ghosh, Donghoon Chang, Somitra Kumar Sanadhya	FbHash-E: A time and memory efficient version of FbHash similarity hashing algorithm	Forensic Science International: Digital Investigation 41, 301375, 2022

S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING			
8.	Neeraj, Anubha Goel, Shobha Sharma, Sonam Rewari, Radhey Shyam Gupta	SiC-based analytical model for gate-stack dual metal nanowire FET with enhanced analog performances	International Journal of Numerical Modelling 35, 1-15, 2022
9.	Neeraj, Shobha Sharma, Anubha Goel, Sonam Rewari, Radhey Shyam Gupta	Temperature sensitive analytical analysis of gate-stack dual metal nanowire field-effect transistor (4H-SiC)	International Journal of Numerical Modelling 35, 1-15, 2022
10.	Annu Dabas, Richa Yadav, Maneesha Gupta	Improved performance recycling folded cascode OTA using multipath positive feedback and pseudo differential pair for biasing	Sadhana 47, 2022
11.	Bushra Abbas, Kanchan Sharma	Organic light emitting transistors: performance analysis and high performance device	Analog Integrated Circuits and Signal Processing 113, 383-391, 2022
DEPARTMENT OF MECHANICAL AND AUTOMATION ENGINEERING			
12.	V.K. Chawla, A.K. Chanda, S. Angra & A. Bonyadi	Coexistent scheduling in the tandem flow path configuration of a flexible manufacturing system by using an advanced grey wolf optimizer	Scientia Iranica, Sharif University 29, 3404-3417, 2022
13.	Neha Deepak Saxena, Nathi Ram Chauhan	Modelling and Analyzing the Performance of Journal Bearing with TiO2 and CuO Nanoparticle as Lubricant Additives	Petroleum Chemistry, Pleiadas publishing 2022

Abstracts with Publication Details 2022

Gridded distribution of total suspended particulate matter (TSP) and their chemical characterization over Delhi during winter

Ritu Jangirh, Sakshi Ahlawat, Rahul Arya, Arnab Mondal, Lokesh Yadav, Garima Kotnala, Pooja Yadav, Nikki Choudhary, Martina Rani, Rubiya Banoo, Akansha Rai, Ummed Singh Saharan, Neeraj Rastogi, Anil Patel, Shivani, Ranu Gadi, Priyanka Saxena, Narayanasamy Vijayan, Chhemendra Sharma, Sudhir Kumar Sharma & Tuhin Kumar Mandal

Abstract: In the present study, total suspended particulate matter (TSP) samples were collected at 47 different sites (47 grids of 5×5 km² area) of Delhi during winter (January–February 2019) in campaign mode. To understand the spatial variation of sources, TSP samples were analyzed for chemical compositions including carbonaceous species [organic carbon (OC), elemental carbon (EC), and water-soluble organic carbon (WSOC)], water-soluble total nitrogen (WSTN), water-soluble inorganic nitrogen (WSIN), polycyclic aromatic hydrocarbons (16 PAHs), water-soluble inorganic species (WSIS) (F^- , Cl^- , SO_4^{2-} , NO_2^- , NO_3^- , PO_4^{3-} , NH_4^+ , Ca^{2+} , Mg^{2+} , Na^+ , and K^+), and major and minor trace elements (B, Na, Mg, Al, P, S, Cl, K, Ca, Ti, Fe, Zn, Cr, Mn, Cu, As, Pd, F, and Ag). During the campaign, the maximum concentration of several components of TSP (996 $\mu g/m^3$) was recorded at the Rana Pratap Bagh area, representing a pollution hotspot of Delhi. The maximum concentrations of PAHs were recorded at Udhog Nagar, a region close to heavily loaded diesel vehicles, small rubber factories, and waste burning areas. Higher content of Cl^- and Cl^-/Na^+ ratio (>1.7) suggests the presence of nonmarine anthropogenic sources of Cl^- over Delhi. Minimum concentrations of OC, EC, WSOC, PAHs, and WSIS in TSP were observed at Kalkaji, representing the least polluted area in Delhi. Enrichment factor <5.0 at several locations and a significant correlation of Al with Mg, Fe, Ti, and Ca and C/N ratio indicated the abundance of mineral/crustal dust in TSP over Delhi. Principal component analysis (PCA) was also performed for the source apportionment of TSP, and extracted soil dust was found to be the major contributor to TSP, followed by biomass burning, open waste burning, secondary aerosol, and vehicular emissions.

For details refer to <https://doi.org/10.1007/s11356-021-16572-w>

Identification of Carbonaceous Species and FTIR Profiling of PM_{2.5} Aerosols for Source Estimation in Old Delhi Region of India

Shobhna Shankar, Ranu Gadi, S. K. Sharma & T. K. Mandal

Abstract: In this study, PM_{2.5} samples from a traffic-influenced site in old Delhi were collected from January 2021 to June 2021 (January–March, 2021: months with regular activities; April–June, 2021: partially restricted months due to second wave of pandemic) and analysed to assess noteworthy effect on their infrared (IR) spectral features and carbonaceous content viz., organic carbon (OC) and elemental carbon (EC) and their sub-fractions with their link to major sources in the vicinity of the sampling site of Delhi. Absorbance peaks for the structural and functional groups for previously identified compounds associated with vehicular/combustion/biogenic emissions at the site were notable. Intensive peaks for C=C, C–H, O–H and NH_4NO_3 were observed on certain days pointing towards enhanced emission of the related compounds. Lower spectral peaks were observed for March and first half of April probably due to transitioning meteorological variables and imposed restrictions. Monthly variation in ratios, such as OC/EC, EC/TC and OM/OC, revealed about the probable emission sources. Comparatively higher peaks/values were observed during January, February and June. The overall results followed a general pattern of variation for regular days.

For Details refer DOI: <https://doi.org/10.1007/s12647-022-00575-0>

Solution-processed spin coated multilayer structured nickel oxide thin films for anodic electrochromism

Ritu Goel, Ranjana Jha & Chhaya Ravikant

Abstract: Solution-processed, NiO thin films have been synthesized via spin coating technique. Nickel nitrate hexahydrate and 2-Aminoethanol have been used as nickel precursor and oxidizing agent, respectively for depositing layers of NiO solution on the FTO substrate. Investigating the effect of NiO layers on morphological, structural, electrochromic properties has been observed. An X-Ray diffraction study has confirmed the deposition of cubic phase nanostructured NiO with an observed average crystallite size varying from 15 to 25 nm. FESEM images of NiO thin films show the formation of nanorods and nano pebbles structures. Synthesized NiO thin films exhibit anodic electrochromism in 1 M KOH electrolyte solution, i.e., transition from bleached to coloration state due to intercalation of OH⁻ ions and electrons with a switching time of around 1.2 s. Transportation of OH⁻ ions and electrons at the interface of NiO thin film has been well explained using cyclic voltammetry, electrochemical impedance spectroscopy in potential window of -1.0 V to + 1.0 V. 20 layers of NiO thin film shows better electrochromic reversibility and stability. Also, it gives a Power conversion efficiency of 0.41% when used as hole transporting layer (HTL) in Dye sensitized solar cell (DSSC) application with maximum value of J_{sc} as 5.81 mA/cm². Thus, synthesized NiO thin film has been a potential candidate for DSSC and electrochromic based applications.

For Details refer DOI: <https://doi.org/10.1007/s10800-022-01807-6>

Synergistic effect of Urea and Potassium Sulphate during hydrothermal synthesis of NiO nanospheres with reduced crystallite size and enhanced electrical conductivity

Ritu Goel, Ranjana Jha & Chhaya Ravikant

Abstract: Nickel oxide (NiO) nanoparticles (NPs) have been synthesized using a high-yield, efficient hydrothermal technique. Investigations have been done to study the effect of the alkaline environment provided by Urea and Potassium Sulphate on the structural, optical and electrochromic properties of NiO nanoparticles. Hydrolysis of Urea provides an alkaline environment that controls the formation of NiO precipitate. SO₄²⁻ ions in Potassium Sulphate create active sites on the surface of Ni(OH)₂ leading to better absorption of Ni²⁺ and OH⁻ ions. Present study shows that Urea and Potassium Sulphate act synergistically as structure directing/ complexing agents in the formation of NiO nanoparticles. FESEM studies of the NiO particles depict a spherical morphology with an average crystallite size of 7 to 11 nm as calculated using XRD. The process of charge transfer in electrodes, diffusion of molecules and ions within the electrolyte and adsorption of ions on an electrode surface has been explored using Cyclic Voltammetry and Electrochemical Impedance Spectroscopy. The carrier lifetime has been observed as 5–7 μs, upon fitting the exponential decay curve of TRPL. So, lower charge transfer resistance, higher carrier lifetime and uniformly distributed nanoparticles are indicative of the material to offer better electrical conductivity for enhanced performance in solar cells and electrochromic applications.

For Details refer DOI: <https://doi.org/10.1016/j.inoche.2022.109563>

A review on BiI₃ perovskites and composites for direct X-ray detection

Ritu Chaudhari & Chhaya Ravikant

Abstract: Bismuth-triiodide has received remarkable attention because of its properties like low toxicity, wide band gap, high density, high attenuation coefficient, and defect tolerance for direct X-ray detection applications. The material has demonstrated promising X-ray detection results in polycrystalline films and single-crystal detectors. However, the inherent defects and voids in the structure of BiI₃ create recombination centers and decrease the charge collection in the detector. Over the last few years, BiI₃-polymer composites and BiI₃-based perovskites have been investigated for the defect tolerance to deliver high sensitivity, high SNR, and low detection limit. These composites and perovskites tailor the trap density in the BiI₃ and increase the density of shallow defects, which helps to improve the charge collection. In this review, we summarize the properties and limitations of BiI₃ and the role of deep and shallow defects in charge carriers' transportation. The highlights of the recent developments in BiI₃-based composites and perovskites to address these challenges to yield high material performance for direct X-ray detection applications.

For Details refer DOI: <https://doi.org/10.1016/j.sna.2022.113863>

Polymer-BiI₃ composites for high-performance, room-temperature, direct X-ray detectors

Ritu Chaudhari, Chhaya Ravikant & Alka Garg

Abstract: Low-energy X-rays have a predominant role in medical diagnostic applications, grown tremendously during recent Covid-19 pandemic times. Synthesis of stable, PMMA/polystyrene-BiI₃ composites has been done through a facile, low-cost, dry-tumble mixing technique for direct X-ray detector applications. Comparative analysis of structural, optical, and photocurrent responses upon irradiation with low-energy X-rays (30 and 60 kV) ensue that PS-BiI₃ demonstrates high SNR 3300, sensitivity 189 μC Gy⁻¹ cm⁻³ and fast response time 30 ms, at dose rate 1.68 mGy s⁻¹, affirming the composite to be prospective candidate for low-energy, room-temperature, direct X-ray detectors under low bias conditions.

For Details refer DOI: [10.1557/s43579-022-00185-6](https://doi.org/10.1557/s43579-022-00185-6)

Bilevel transportation problem in neutrosophic environment

Aakanksha Singh, Ritu Arora & Shalini Arora

Abstract: In the current times of the predominance of COVID-19, almost all the countries are conducting inoculation drives. Given the market's inability to compute how much to manufacture, how to transport and the frequently changing demand, the cost of safely and timely transporting the vaccines from factory to syringe is currently indeterminate. In this paper, we formulate this situation using a bilevel transportation problem with neutrosophic numbers (BLTP-NN). The problem comes from a vaccine manufacturing company where the vaccine is produced and then transported to different distribution centres from where it is further transported to various health centres for the conduction of their vaccination drive. The authors have tried to perceive this situation from two perspectives by formulating two different problems. The first problem is a bilevel linear fractional transportation problem which aims at minimizing the transportation cost in proportion to per unit maximization of quantity transported. The second problem is a bilevel indefinite quadratic transportation problem which aims at minimizing the transportation cost and depreciation cost. In both problems, cost coefficients are neutrosophic numbers along with availabilities and demands in the constraint set. These formulated bilevel transportation problems in neutrosophic environment are solved using goal programming strategy to arrive at a satisfactory solution. The relevance of this work is to help the decision makers in budgeting their finances related to the transportation by strategic disbursement leading to a smooth administration of vaccination program.

For details refer DOI: <https://doi.org/10.1007/s40314-021-01711-3>

Solutions of matrix games involving linguistic interval-valued intuitionistic fuzzy sets

Deeba R. Naqvi, Rajkumar Verma, Abha Aggarwal & Geeta Sachdev

Abstract: Game theory has found significant applications in a wide range of fields to deal with competitive environments between individuals or organizations. The researchers investigated several augmentations of ordinary game theory to deal with uncertainty and ambiguity in payoffs and goals. However, the quantifiable parts of the problems have been studied in matrix games with payoffs expressed by interval numbers, fuzzy numbers, and intuitionistic fuzzy numbers. In several situations, qualitative information is critical in describing the payoffs of a game problem. Experts frequently prefer expressing their perspective in natural linguistic terms rather than numerical values in real-life decision-making challenges. This linguistic representation has been utilized to resolve plenty of decision-making problems. This paper explores the theory of matrix games under a qualitative information environment. We use linguistic interval-valued intuitionistic fuzzy numbers (LIVIFNs) to describe the payoff values as suggested by experts. The LIVIFNs are more efficient tools that provide experts with a flexible information modeling capability to describe their ambiguous and uncertain perceptions in the form of linguistic terms. The solution of this class of matrix games is attained by resolving a duo of linear or nonlinear programming problems originating through nonlinear bi-objective programming problems. Finally, a numerical example is presented to demonstrate the applicability of the suggested approach.

For details refer DOI: <https://doi.org/10.1007/s00500-022-07609-4>

Matrix games involving interval-valued hesitant fuzzy linguistic sets and its application to electric vehicles

Deeba R. Naqvi, Geeta Sachdev & Izhar Ahmad

Abstract: Game theory has been successfully applied in a variety of domains to deal with competitive environments between individuals or groups. The matrix games involving fuzzy, interval fuzzy, and intuitionistic fuzzy numbers exclusively examine the numeric components of an issue. However, several researchers have also examined various extensions of conventional game theory, considering the ambiguous situations for payoffs and goals. In many real-life scenarios, qualitative information is often critical in expressing the payoffs of a matrix game. Thus, the present work contributes to the field of matrix games where the payoffs have been quantified via qualitative variables, termed interval-valued hesitant fuzzy linguistic sets. The mathematical formulation and solution concept for matrix games involving interval-valued hesitant fuzzy linguistic numbers is designed by utilizing an aggregation operator supported by linguistic scale function and solving them by employing score function. Finally, the proposed approach is validated by applying it to electric vehicle sales.

For details refer DOI: 10.3233/JIFS-222466

ROS-Mediated Aquaculture Wastewater Remediation Using TeO₂-Deposited ZnO Nanotubes

Aishwarya Singh, Bhavani Prasad Nenavathu, Khushboo Dasauni & Tapan Kumar Nailwal

Abstract: The current study focuses on utilizing TeO₂-deposited ZnO nanotubes fabricated via a solution-free thermo-mechanical method for aquaculture wastewater remediation. The phase, crystallite size, and morphological studies of the fabricated TeO₂-deposited ZnO nanotubes were characterized by powder X-ray diffraction (XRD) and scanning electron microscopy (SEM). XRD of TeO₂-deposited ZnO nanotubes (0.5 wt%, 3 wt%, 5 wt%) exhibited crystallite size of 10–20 nm. FE-SEM shows that TeO₂ nanoparticles are uniformly deposited on the surface of ZnO. The photocatalytic studies confirm the higher photocatalytic activity of 3 wt% and 5 wt% TeO₂-deposited ZnO (about 90% and 94.5%) and 80% for pristine ZnO towards the photodegradation of 2,4-dichlorophenol in aqueous medium under both UV and sunlight. The antibacterial activity of synthesized samples was investigated against Gram-positive (*Bacillus subtilis* MTCC 441 strain) and an aquatic fish pathogenic Gram-negative (*Aeromonas salmonicida* strain MTCC 1522) bacteria applying the disc diffusion method. This assay showed that 5 wt% TeO₂-deposited ZnO exhibited excellent antibacterial activity compared to pristine ZnO NPs. Reactive oxygen species (ROS) determination assay confirmed that the 2,4-dichlorophenol degradation by TeO₂-deposited ZnO was due to the generation of superoxide radicals. The mechanism of both pollutant degradation and antimicrobial activity is studied in terms of scavenging of produced ROS in the aqueous medium by a scavenger test using histidine and ascorbic acid. The reusability of the TeO₂-deposited ZnO nanotubes was also studied, and it showed stability up to three cycles with a negligible loss of efficiency. The synthesized materials could also be applicable for preparation of electrochemical devices to track bacteria.

For details refer DOI: <https://doi.org/10.1007/s11270-022-05668-9>

An energy efficient weighted clustering algorithm in heterogeneous wireless sensor networks

Vivekanand Jha & Rashika Sharma

Abstract: Wireless sensor networks are most used to monitor remote environments. Multitudinous sensor nodes gather data in a self-governing manner, operating on an exhaustive source of energy or battery. Clustering process structures the network into a hierarchy wherein sensor nodes gather data passed to selected cluster head nodes which perform data processing, aggregation, and transfer it to a base station. Prolonging network lifetime and enhancing total data transmission to base station are major challenges in wireless sensor network and same is addressed in this work. A distributed energy-based epoch is used in this paper to determine node eligibility to become cluster head and a multi-parameter-weighted scalarization function is proposed to determine best cluster head candidates in order to manage dynamic and multi-characteristic node heterogeneity. The parameters used are distance to base station, expected cluster head lifetime, average cluster member node lifetime and maximum power consumed by a cluster member node. A novel weight computation strategy using analytical hierarchy process is introduced in this paper which enhances the optimality of scalarization function value. The proposed algorithm is distributed over two phases

as network setup phase and clustering phase. The network setup phase computes the energy model and optimal number of cluster heads. The second phase proposes the cluster head selection process using weight-based scalarization and introduces the novel weight selection method. Finally, network operation enters the data transmission phase. The results show an enhancement in throughput at base station, with an increase of close to 30% along with an increase in the network lifetime of up to 20% as measured by last node death. The simulation results are produced in comparison with the considered base protocol of DEEC as well as other protocols using similar concepts for implementation. However, utilization of a two-step cluster heads selection process including unique node epochs for shortlisting and scalarization function-based node fitness, along with optimal weight selection procedure, has led the proposed model to give better results on simulation and analyzation than preexisting algorithms.

For details refer DOI: <https://doi.org/10.1007/s11227-022-04429-z>

A Novel Dynamic Bandwidth Allocation Scheme for XGPON based Mobile Fronthaul for Small Cell CRAN

Garima, Vivekanand Jha, Rakesh Kumar Singh

Abstract: Time division multiplexing passive optical networks (TDM-PON) have emerged as a promising technology for mobile fronthaul for small cell CRAN. The performance of such TDM-based PON mobile fronthaul for small cell CRAN greatly depends on efficient dynamic bandwidth allocation (DBA) mechanisms. In this paper, a novel DBA mechanism based on the concept of dynamic service interval for ITU-based TDM-PON (XG-PON) for mobile fronthaul has been proposed. The proposed scheme is implemented using network simulator -3 (NS-3) simulation tool for evaluation of network performance parameters. The performance evaluation of the proposed DBA against the existing schemes such as optimized round robin (ORR) and Group-GIANT DBA shows a significant improvement in upstream mean delay, packet loss ratio and grant-request ratio. In addition to this, the proposed scheme shows that larger number of ONU(RRH) can be supported by the network for front haul uplink traffic transmitted via XG-PON in small cell CRAN.

For details refer DOI: <https://doi.org/10.1016/j.osn.2022.100674>

Periocular biometrics: A survey

Punam Kumari, Seeja K.R.

Abstract: Periocular region is the feature rich region around the eye which may include features like eyelids, eyelashes, eyebrows, tear duct, eye shape, skin texture and many more. Periocular region based authentication system is a good trade-off between face and iris based biometric authentication systems as they need high user cooperation. This paper provides a comprehensive survey of periocular biometrics and a deep insight of various aspects such as utility of periocular region as a stand-alone modality, periocular region and its fusion with iris, application of periocular region in smart phone authentication and the role of periocular region in soft biometric classification etc. The paper also provides an outlook over possible future research in the area of periocular biometrics.

For details refer to <https://doi.org/10.1016/j.jksuci.2019.06.003>

Subject independent emotion recognition from EEG using VMD and deep learning

Pallavi Pandey, Seeja K.R.

Abstract: Emotion recognition from Electroencephalography (EEG) is proved to be a good choice as it cannot be mimicked like speech signals or facial expressions. EEG signals of emotions are not unique and it varies from person to person as each one has different emotional responses to the same stimuli. Thus EEG signals are subject dependent and proved to be effective for subject dependent emotion recognition. However, subject independent emotion recognition plays an important role in situations like emotion recognition from paralyzed or burnt face, where EEG of emotions of the subjects before the incidents are not available to build the emotion recognition model. Hence there is a need to identify common EEG patterns corresponds to each emotion independent of the subjects. In this paper, a subject independent emotion recognition technique is proposed from EEG signals using Variational Mode Decomposition (VMD) as a feature extraction technique and Deep Neural Network as the classifier. The performance evaluation of the proposed method with the

benchmark DEAP dataset shows that the combination of VMD and Deep Neural Network performs better compared to the state of the art techniques in subject-independent emotion recognition from EEG.

For details refer to <https://doi.org/10.1016/j.jksuci.2019.11.003>

Personalized ranking of products using aspect-based sentiment analysis and Plithogenic sets Devendra Kumar Tayal, Sumit Kumar Yadav & Divya Arora

Abstract: The availability of the content on the web has increased enormously in the last decade. Many reviews are written by the users on the e-commerce websites for the products they buy. These reviews are read by customers who are interested in buying those products. Sometimes, these reviews are in thousands which makes it difficult to read them. Customers also want to search reviews based on their preferred aspects to make a buying decision. In this paper, a novel approach for Multi-Criteria Decision Making (MCDM) for multi-aspect based personalized ranking of the products is proposed. It characteristically uses customer preferences as one of the inputs for decision-making. Opinions on various aspects are extracted using Aspect-Based Sentiment Analysis (ABSA) which becomes the second input to the framework which uses Plithogenic sets. This model uniquely incorporating varying customer preferences by mapping them to plithogenic degree of contradictions and modelling linguistic uncertainties in online reviews to create a personalized ranking of products using plithogenic aggregation. It has been shown empirically that our approach outperforms the existing MCDM approaches namely TOPSIS (Technique for Order Preference by Similarity to Ideal Solution) and WSM (Weighted Sum Model) and some of the state-of-the-art methods.

For details refer to <https://doi.org/10.1007/s11042-022-13315-y>

FFT based ensembled model to predict ranks of higher educational institutions Nidhi Agarwal & Devendra K. Tayal

Abstract: Predicting international rankings has always been a demanding area for Universities and Higher Educational Institutions (HEIs) all over the world in the recent decade. In this research work, a novel tool EnFFtRP (Ensembled Fast Fourier Transformed Ranking Prediction) is developed for predicting international ranks of various universities and HEIs. It uses a hybrid ensembled model in duology with the Fast Fourier Transformation (FFT). Ensemble model improves the prediction accuracies which are elevated further using FFT. The fourier processing algorithm, being an influential computational concept for data anatomy is a novel approach applied to the ensembled model. A combination of six base models Decision Tree, Support Vector Machine, Multilayer Perceptron, K-Nearest Neighbour, Random Forest and Logistic Regression are deployed for the construction of ensembled model. The data set being used is Shanghai World Ranking University Dataset for 14 years ranging from 2005 to 2018. It is split into training and test data set. The training data set is considered from year 2005–2014 and the test dataset from 2015 to 2018. It is empirically established that proposed tool produces highly promising prediction parameters as accuracies (95%), specificities (94.41%), sensitivities (95.54%), Productively Predicted Values (94.94%), Non-Productively Predicted Values (95.07%), F1-score (97.40%) and Kappa score (0.90) as compared to obtained by similar models like RSFT and others. To the best of our knowledge, till now no tool exists which can predict the ranks of HEIs with this much high predictive power.

For details refer DOI: <https://doi.org/10.1007/s11042-022-13180-9>

PSCLS: provably secure certificateless signature scheme for IoT device on cloud Vijay Kumar Yadav, Nitish Andola, Shekhar Verma & S. Venkatesan

Abstract: Internet of things (IoT) devices are being used to provide services to different spheres of society. These devices gather data from industries and forward their data to the cloud server to minimize data storage and processing. In IoT, the cloud plays an important role because IoT is a resource constraint device with limited battery and memory. In order to handle this, IoT devices gather the data and send it to the cloud server so that space will be available for IoT data at the IoT device. Apart from this, IoT devices are computationally inefficient. For example, sometimes users want huge computation of IoT data, but due to the limited computation power of IoT devices, users cannot get the results. To overcome this issue, IoT device collaborates with the cloud server and outsource the data to it. The cloud server has huge computational power; it uses the

received data, performs the computation, and sends it back to the IoT device. Authentication of the outsourced IoT data is a serious concern in the industrial IoT network. Several certificateless signature (CLS) schemes have been proposed to provide for data authentication in the IoT network. Current CLS schemes either suffer from the huge computation overhead or adversarial attacks. To solve these problems, we propose a provably secure certificateless signature (PSCLS) scheme. The PSCLS scheme's security depends on the computational Diffie-Hellman problem in the random oracle model with a tight reduction. The scheme requires only one pairing operation, and it is secure from adversarial attacks. We analyzed the PSCLS scheme's performance with the other existing CLS schemes in terms of computation and communication costs. The results prove that the PSCLS scheme performs better than the other existing CLS schemes.

For details refer to <https://doi.org/10.1007/s11227-022-04795-8>

A new model based on the extended COPRAS method for improving performance during the accreditation process of Indian Higher Educational Institutions Nidhi Agarwal & Devendra K. Tayal

Abstract: The standard of any country in the global world is dependent highly on the intellect content of the people. This intellect content is in turn dependent exclusively upon the quality of the higher education in the country. The aim of this research work is to perform an empirical evaluation to rank various quality parameters suggested by the National Board of Accreditation. This national board was established in India in 1994 by the All India Council for Technical Education with the main motive of assessing the quality of various Higher Educational Institutions. It provides marks to institutions out of 1000 on the basis of 10 parameters, which are further subdivided into 75 subparameters. This research work helps to guide educational institutions to access their weak points during and before applying for this accreditation to recover from them timely and in the most effective manner. An extended model of fuzzy COPRAS (COMplex PROportional ASsessment) is proposed as an improved multicriteria decision-making approach to first identify and then set preferences to help institutions improve their data related to accreditation key indicators. The work is divided into four steps. First, all the critical evaluation factors for the accreditation process are identified in consultation with senior, experienced and qualified academicians. They are then converted into fuzzy triangular numeric values and crisp weights. Lingual values and corresponding fuzzy weights of various preference key indicators are then identified and converted into crisp weights. Further critical factors are divided into price and profit values. Finally, key indicators are ranked using extended fuzzy COPRAS. A comparative ranking analysis is generated as end result through fuzzy COPRAS, TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) and WASPAS (Weighted Aggregated Sum Product Assessment) approaches, which shows that the proposed model generates better ranking results. The proposed model is applicable to any accreditation process with a varied set of parameters and their sub parameters.

For details refer DOI: <https://doi.org/10.1002/cae.22602>

Cryptographically secure privacy-preserving authenticated key agreement protocol for an IoT network: A step towards critical infrastructure protection Vidyotma Thakur, Gaurav Indra, Nitin Gupta, Pushpita Chatterjee, Omar Said & Amr Tolba

Abstract: The idea of the Internet of Things (IoT) network has been created as a result of the coordination of different developments, constant handling, intellectual capacity, item sensors, and inserted frameworks. Recently, IoT devices have made big impact on industrial critical infrastructures. However, security and privacy of IoT critical infrastructure still, is the big concern. Therefore, to address the vulnerabilities of the existing frameworks, this paper proposes a cryptographically secure privacy preserving authenticated key agreement scheme for a IoT network through an elliptical curve, which generates a mutual key between the user and the device. The safety review and systematic testing of the system using the Automated Validation of Internet Security Protocols and Applications (AVISPA) method have been carried out to show the protection quality of the system. The quality review reveals that the scheme is lightweight and effective. By comparison, the proposed scheme is found to be comparable to the related works, and the current framework offers additional features such as Key Compromise Impersonate Attack Resistance, Established Session Key Protection, Key Replication Resistance, in addition to existing features.

For details refer DOI: <https://doi.org/10.1007/s12083-021-01236-w>

A tree classifier based network intrusion detection model for Internet of Medical Things

Karan Gupta, Deepak Kumar Sharma, Koyel Datta Gupta, Anil Kumar

Abstract: Healthcare is one of the key areas of prospect for the Internet of Things (IoT). To facilitate better medical services, enormous growth in the field of the Internet of Medical Things (IoMT) is observed recently. Despite the numerous benefits, the cyber threats on connected healthcare devices can compromise privacy and can also cause damage to the health of the concerned patient. The massive demand for IoMT devices with seamless and effective medical facilities for the large-scale population requires a robust secured model to ensure the privacy and safety of patients in this network. However, designing security models for IoMT networks is very challenging. An effort has been made in this work, to design a tree classifier-based network intrusion detection model for IoMT networks. The proposed system effectively reduces the dimension of the input data to speed up the anomaly detection procedure while maintaining a very high accuracy of 94.23%.

For details refer to <https://doi.org/10.1016/j.compeleceng.2022.108158>

Comprehensive performance analysis of dynamic bandwidth allocation schemes for XG-PON system

Garima, Vivekanand Jha, Rakesh Kumar Singh

Abstract: 10-Gigabit passive optical network (XG-PON) has emerged as an effective architecture to meet today's growing demand for bandwidth in the family of next-generation passive optical networks (NG-PON). It supports various quality of services such as voice, video live streaming, network browsing, etc., where these services demand bandwidth, which is limited. To overcome this limitation, bandwidth management schemes are employed by central authorities such as optical line terminals (OLT). Several dynamic bandwidth allocation (DBA) schemes exist for XG-PON in the literature, but these lack in detailed information about XG-PON and a comparison of various DBA schemes in one place. Therefore, this paper presents a detailed architecture of XG-PON and comprehensively reviews the existing dynamic bandwidth allocation schemes for the XG-PON system. This paper further identifies and implements majorly adopted bandwidth allocation schemes such as GIANT, X-GIANT, IACG, and EBU using a pre-existing module of XG-PON in the network simulator 3 (NS-3) simulation framework. The results have been obtained in two phases having different traffic scenarios, where, in phase 1, the load of all ONUs has been increased simultaneously, and in phase 2, the load of only one ONU has been increased. The obtained results have been analysed in terms of various network performance metrics. Hence, this paper reviews the available DBA schemes and provides a comprehensive analysis of the identified important DBA schemes.

For details refer to <https://doi.org/10.1016/j.osn.2022.100711>

A novel dynamic bandwidth allocation scheme towards improving the performance of XG-PON system

Garima, Vivekanand Jha, Rakesh Kumar Singh

Abstract: Time division multiplexed passive optical networks (TDM-PONs) such as EPON, XG-PON, XGS-PON, etc. have become widely accepted network architectures for meeting the bandwidth requirement of high-end consumer applications. The available bandwidth is still limited and needs to be utilized efficiently. There are scenarios when one ONU may completely dominate the network bandwidth leading to starvation of another ONUs. This may happen for an ONU in every allocation cycle. This enforces the OLT to provide such a fair allocation scheme that would provide a chance to different ONUs during polling and scheduling mechanism. This paper presents two novel DBA schemes namely the analytic hierarchy process proportional allocation scheme (AHP-PAS) and weighted sum model proportional allocation scheme (WSM-PAS) to determine the order of a transmission container (T-CONT) of an ONU for polling and scheduling. The proposed schemes are implemented in the network simulator (NS-3) and compared with the existing proportional allocation scheme (PAS) for inter-ONU and intra-ONU. The obtained results confirm that the proposed DBA schemes significantly improve the network performance in terms of delay fairness index, upstream mean delay, packet loss ratio, and packet jitter for T-CONT 2, 3, and 4.

For details refer to <https://doi.org/10.1016/j.osn.2022.100715>

Deep feature extraction for document forgery detection with convolutional autoencoders

Garima Jaiswal, Arun Sharma, Sumit Kumar Yadav

Abstract: Document forgery is a significant problem for ages due to paper-based documents' pervasive use. Classical destructive approaches for this problem, such as chromatography and electrophoresis, cannot be implemented as they flaw the document under analysis. Hyperspectral imaging - non-destructive approach that assists in finding the unique features of an image under investigation through their unique spectral signatures. It captures multiple narrow-band images at the electromagnetic spectrum, which is difficult through conventional imaging. Deep learning approaches for hyperspectral images have attained state-of-the-art results for solving many complex and challenging problems. Supervised classification of hyperspectral images is a tedious task since obtaining image labels and labeling the training data is a time-consuming and expensive process. In this paper, an unsupervised approach for classification of hyperspectral document images is proposed.

For details refer to <https://doi.org/10.1016/j.compeleceng.2022.107770>

DFD-SS: Document Forgery Detection using Spectral – Spatial Features for Hyperspectral Images

Garima Jaiswal, Arun Sharma, Sumit Kumar Yadav

Abstract: In the present era of machines and edge-cutting technologies, still document frauds persist. They are done intuitively by using almost identical inks, that it becomes challenging to detect them—this demands an approach that efficiently investigates the document and leaves it intact. Hyperspectral imaging is one such a type of approach that captures the images from hundreds to thousands of spectral bands and analyzes the images through their spectral and spatial features, which is not possible by conventional imaging. Deep learning is an edge-cutting technology known for solving critical problems in various domains. Utilizing supervised learning imposes constraints on its usage in real scenarios, as the inks used in forgery are not known prior. Therefore, it is beneficial to use unsupervised learning. An unsupervised feature extraction through a Convolutional Autoencoder (CAE) followed by Logistic Regression (LR) for classification is proposed (CAE-LR). Feature extraction is evolved around spectral bands, spatial patches, and spectral-spatial patches. We inspected the impact of spectral, spatial, and spectral-spatial features by mixing inks in equal and unequal proportion using CAE-LR on the UWA writing ink hyperspectral images dataset for blue and black inks. Hyperspectral images are captured at multiple correlated spectral bands, resulting in information redundancy handled by restoring certain principal components. The proposed approach is compared with eight state-of-art approaches used by the researchers. The results depicted that by using the combination of spectral and spatial patches, the classification accuracy enhanced by 4.85% for black inks and 0.13% for blue inks compared to state-of-art results. In the present scenario, the primary area concern is to identify and detect the almost similar inks used in document forgery, are efficiently managed by the proposed approach.

For details refer to <https://doi.org/10.1016/j.jvcir.2022.103690>

Explainable Artificial Intelligence for Cybersecurity

Deepak Kumar Sharma, Jahanavi Mishra, Aeshit Singh, Raghav Govil,
Gautam Srivastava, Jerry Chun-Wei Lin

Abstract: Recently, numerous Machine Learning (ML) algorithms have been applied in many areas of cybersecurity. However, most of these systems can only be seen as a black box to users. To improve our understanding of such systems, adversarial machine learning approaches can be used. The main features are detected by analyzing the extent of such changes, which helps in identifying the main reasons for misclassification. In this paper, the presented approach has obtained satisfactory results that accurately explains the reasons for misclassifications. Some features of the presented method can be applied to any classifier with defined gradients without the need for modifications. The proposed model can be extended to perform more diagnoses and it can be used for a deeper analysis of systems, obtaining more than 95% accuracy classification on the used datasets in the experiments.

For details refer to <https://doi.org/10.1016/j.compeleceng.2022.108356>

Remembering past and predicting future: a hybrid recurrent neural network based recommender system

Saumya Bansal & Niyati Baliyan

Abstract: Traditional recommender systems (RS) assume users' taste to be static (taste remains same over time) and reactive (a change in taste cannot be predicted and is observed only after it occurs). Further, traditional RS restricts the recommendation process to candidate items generation. This work aims to explore two phases of RS, i.e., Candidate Generation as well as Candidate Ranking. We propose a RS from a multi-objective (short-term prediction, long-term prediction, diversity, and popularity bias) perspective which was previously overlooked. The sequential and non-sequential behavior of users is exploited to predict future behavioral trajectories with the consideration of short-term and long-term prediction using recurrent neural networks and nearest neighbors approach. Further, a novel candidate ranking method is introduced to prevent users from being entangled in recommended items. On multiple datasets, largest being MovieLens (ML) 1M, our model shows excellent results achieving a hit rate and short-term prediction success of 58% and 71% respectively on ML 1M. Further, it implicitly handles two important parameters, i.e., diversity and item popularity with a success rate of 59.22% and 34.28% respectively.

For details refer to <https://doi.org/10.1007/s12652-022-04375-x>

FakeNewsIndia: A benchmark dataset of fake news incidents in India, collection methodology and impact assessment in social media

Apoorva Dhawan, Malvika Bhalla, Deeksha Arora, Rishabh Kaushal, Ponnurangam Kumaraguru

Abstract: Online Social Media platforms (OSMs) have become an essential source of information. The high speed at which OSM users submit data makes moderation extremely hard. Consequently, besides offering online networking to users, the OSMs have also become carriers for spreading fake news. Knowingly or unknowingly, users circulate fake news on OSMs, adversely affecting an individual's offline activity. To counter fake news, several dedicated websites (referred to as fact-checkers) have sprung up whose sole purpose is to identify and report fake news incidents. There are well-known datasets of fake news; however, not much work has been done regarding credible datasets of fake news in India. Therefore, we design an automated data collection pipeline to collect fake incidents reported by fact-checkers in this work. We gather 4,803 fake news incidents from June 2016 to December 2019 reported by six popular fact-checking websites in India and make this dataset (FakeNewsIndia) available to the research community. We find 5,031 tweets on Twitter and 866 videos on YouTube mentioned in these 4,803 fake news incidents. Further, we evaluate the impact of fake news incidents on the two prominent OSM platforms, namely, Twitter and YouTube. We use popularity metrics based on engagement rate and likes ratio to measure impact and categorize impact into three levels — low, medium, and high. Our learning models use features extracted from text, images, and videos present in the fake news incident articles written by fact-checking websites. Experiments show that we can predict the impact (popularity) of videos (appearing on fake news incident articles) on YouTube more accurately (with baseline accuracy ranging from 86% to 92%) as compared to the impact (popularity) of tweets on Twitter (with baseline accuracy of 37% to 41%). We need to build more intelligent models that predict tweets' impact, appearing in fact-checking incident articles on Twitter as future work.

For details refer to <https://doi.org/10.1016/j.comcom.2022.01.003>

Breast cancer classification using snapshot ensemble deep learning model and t-distributed stochastic neighbor embedding

Nonita Sharma, K. P. Sharma, Monika Mangla & Rajneesh Rani

Abstract: The current work aims to analyse the historical data pertaining to breast cancer to detect and predict the disease. For the same, authors employ t-distributed stochastic neighbor embedding (t-SNE), a well-established dimensionality reduction method. The authors also suggest implementing the snapshot ensembling technique to create an efficient model that potentially assists medical professionals in disease diagnosis. Employing t-SNE enables the generation of improved scatter plots in addition to cost optimization. Further, the current manuscript also uses a snapshot ensemble deep learning framework that integrates the predictions through various base models leading to accuracy enhancement. The proposed model is

implemented on the Wisconsin Breast Cancer Dataset(WBCD) that is openly accessible at UCI Machine Repository. During the experimental evaluation, proposed model yields an accuracy of 86.6%, higher than the state-of-art models like averaging, weighted averaging, stacked ensemble, and Polyak Rupert that yield an accuracy of 81%, 81.7%, 84.7%, and 82.2% respectively and hence establishes the competence of proposed model. The obtained result is highly encouraging and resultantly opens the avenue for implementing the proposed model in real life at large.

For details refer to <https://doi.org/10.1007/s11042-022-13419-5>

Modified minimum spanning tree based vertical fragmentation, allocation and replication approach in distributed multimedia databases

Deepak Kumar Sharma, Utsha Sinha, Aditi Gupta & Manju Khari

Abstract: Distributed Multimedia Database Systems have become an indispensable part of modern world organizations that increased demand for reliable, scalable, and expeditiously accessible information processing systems, data has evolved in multiple media forms having found many application areas across industries that calls for optimal storage, processing and retrieval methodologies in a distributed fashion. The solution mainly relies on the optimization of database design structure in which data fragmentation, allocation and replication play eminent roles. The presented scheme employs a method of vertical fragmentation using enhanced CRUD matrix and Fibonacci heap to efficiently fragment the database into clusters. The fragments are then allocated and replicated at different network nodes depending on the manipulates and reads operation at respective sites, taking into consideration the cost factor. With the use of Fibonacci heap, the amortized complexity of the proposed algorithm has come down to $O(E + V \log V)$ in contrast to the previous works of enhanced Prim's algorithm in vertical fragmentation which offered a complexity of $O(E \log V)$ where E denotes the number of edges and V , the number of vertices. This approach generates all the fragments at once and without the use of any predetermined parameters and does not involve the use of a query log. The proposed approach also considers communication and site storage costs for optimal allocation and replication thus minimizing the overall system costs.

For details refer to <https://doi.org/10.1007/s11042-022-13541-4>

A comprehensive survey on gait analysis: History, parameters, approaches, pose estimation, and future work

Dimple Sethi, Sourabh Bharti, Chandra Prakash

Abstract: Human gait is a periodic motion of body segments—the analysis of motion and related studies is termed gait analysis. Gait Analysis has gained much popularity because of its applications in clinical diagnosis, rehabilitation methods, gait biometrics, robotics, sports, and biomechanics. Traditionally, subjective assessment of the gait was conducted by health experts; however, with the advancement in technology, gait analysis can now be performed objectively and empirically for better and more reliable assessment. State-of-the-art semi-subjective and objective techniques for gait analysis have limitations that can be mitigated using advanced machine learning-based approaches. This paper aims to provide a narrative and a comprehensive analysis of cutting-edge gait analysis techniques and insight into clinical gait analysis. The literature of the previous surveys during the last decade is discussed. This paper presents an elaborated schema, including gait analysis history, parameters, machine learning approaches for marker-based and marker-less analysis, applications, and performance measures. This paper also explores the pose estimation techniques for clinical gait analysis that open future research directions in this area.

For details refer to <https://doi.org/10.1016/j.artmed.2022.102314>

FbHash-E: A time and memory efficient version of FbHash similarity hashing algorithm

Author links open overlay panel

Monika Singh, Anviksha Khunteta, Mohona Ghosh, Donghoon Chang, Somitra Kumar Sanadhya

Abstract: With the rapid advancements in digital technologies and the exponential growth of digital artifacts, automated filtering of cybercrime data for digital investigation from a variety of resources has become the need of the hour. Many techniques primarily based on the “Approximate Matching” approach have been proposed in the literature to address this challenging task. In the year 2019, Chang et al. proposed one such algorithm - FbHash: A New Similarity Hashing Scheme for Digital Forensics that was shown to produce the best correlation results compared to other existing techniques and also resist active adversary attack, unlike others. However, no performance analysis of the tool was given. In this work, we show that the current design structure of FbHash is slower and memory intensive compared to its peers. We then propose a novel Bloom filter based efficient version, i.e., FbHash-E that has a much lower memory footprint and is computationally faster compared to FbHash. While the speed of FbHash-E is comparable to other state-of-the-art tools, it is resistant (like its predecessor) to “intentional/intelligent modifications that can fool the tool” attacks, unlike its peers. Our version thus renders FbHash-E fit for practical use-cases. We perform various modification tests to evaluate the security and correctness of FbHash-E. Our experiment results show that our scheme is secure against active attacks and detects similarity with 87% accuracy. Compared to FbHash, there is only 3% drop in accuracy results. We demonstrate the sensitivity and robustness of our proposed scheme by performing a variety of containment and resemblance tests. We show that FbHash-E can correlate files with up to 10% random-noise with 100% detection rate and is able to detect commonality as small as 1% between the two documents with an appropriate similarity score. We also show that our proposed scheme performs best to identify similarities between different versions of software or program files. We also introduce a new test, i.e., consistency test, and exhibit that our tool produces consistent results across all files under a fixed category with very low standard deviation, unlike other tools where standard deviation under a fixed test varies significantly. This shows that our tool is more robust and stable against different modifications.

For details refer to <https://doi.org/10.1016/j.fsidi.2022.301375>

Gravitational search algorithm-driven missing links prediction in social networks

Ankita Singh, Nanhay Singh

Abstract: The increased usage of online social networks in recent days attracts the attention of researchers. That makes analysis of social networks a significant concern. Link prediction is one of the problem of social networks, where links are predicted between users by analyzing the relationships between the nodes. As the size and usability of the social network grows, the accurate prediction of connections with limited public information is a challenge. This article introduces a novel approach for predicting missing links using a nature-inspired method, the gravitational search algorithm. We selected seven real-world networks and five widely used algorithms and also considered the sparsity of networks for the experimental evaluation of the proposed approach. The proposed GSA-driven algorithm has shown a better or comparable AUC result than the other standard algorithms on these networks.

For details refer to <https://doi.org/10.1002/cpe.6901>

Temperature sensitive Analytical Analysis of Gate - Stack DM Nanowire FET(4H-SiC)

Neeraj, Shobha Sharma, Anubha Goel, Sonam Rewari, R.S. Gupta

Abstract: This paper presents an analytical study and effect of temperature (T=100K,200K,300K,400K) on various parameters of Gate- Stack dual metal nanowire field-effect transistor (Gate- Stack DM NW FET (4H-SiC) and Gate – Stack dual metal nanowire field- effect transistor (Gate – Stack DM NW FET(Si). The parabolic approximation is used to solve the 2D Poisson's equation for surface potential, electric field, drain current (Ids), transconductance(gm), output conductance(gd) and analog performance is evaluated. Electron concentration, electron velocity, drain induced barrier lowering, DIBL and noise figure, (NF) have also been investigated for a fair comparison and shows that 4H-SiC based Gate- Stack DM NW FET device is more insensitive to temperature changes than the Silicon-based Gate- Stack DM NW FET. Furthermore, Gate- Stack DM NW FET (4H-SiC) has better electrical performance with temperature variation than Gate – Stack DM NW

FET device is more insensitive to temperature changes than the Silicon-based Gate- Stack DM NW FET. Furthermore, Gate- Stack DM NW FET (4H-SiC) has better electrical performance with temperature variation than Gate – Stack DM NW FET(Si). The simulations have been carried out using the ATLAS 3D device simulator. Analytical results are in close agreement with the simulated results.

For details refer to <https://doi.org/10.1002/jnm.3065>

Long Boosted Memory Algorithm for Intelligent Spectrum Sensing in 5G and Beyond Systems

Parnika Kansal, M. Gangadharapa & Ashwni Kumar

Abstract: Forthcoming wireless generations, namely the fifth generation and beyond, are experiencing various roll-out, planning, and implementation issues due to spectrum insufficiency. This spectrum shortage arises due to the growing number of wireless subscribers, significant traffic demands, inefficient spectrum distribution, and coexistence problems. The recognition of a free spectrum for wireless communication services is a critical requirement. So, the free spectrum can be predicted and modelled by using the spectrum sensing functionality of cognitive radio in the potential sub-THz band (0.1–1 THz) for beyond fifth-generation networks. Owing to the excellent prediction and classifying capabilities of deep learning, this research applies deep learning for spectrum sensing. The spectrum sensing data is a time-series sequence of binary 1(busy slots) and binary 0(free slots). To achieve this, a novel Long Boosted Memory Algorithm (LBMA) has been proposed here. Long Short-Term Memory (LSTM) are weak predictors unable to model long-term dependencies like a future prediction of primary user presence based on past time stamps and prone to overfitting. So, multiple weak LSTM predictors have been integrated to form a strong predictor not prone to overfitting using the AdaBoost technique for estimating robust spectrum predictions. LBMA uses input vectors like RSSI, the distance between cognitive radio user and gateways, and energy vectors to train the model. LBMA has been compared and evaluated with the existing deep learning methods based on metrics like Training time, Accuracy, sensitivity, specificity, detection probability, cross-validation and Time Complexity under different SNR scenarios (0 to 20 dB). The simulated results indicate that the proposed LBMA has outperformed the existing algorithms with an accuracy of 99.3, a sensitivity of 93.1, specificity of 92.9, sensing time of 1.7599 s with the lowest time complexity, and a training time of 56 s.

For details refer DOI: <https://doi.org/10.1007/s10922-022-09652-w>

Analyzing the Impact of Different Composite Dielectrics on Performance Parameters of a Magnetic Tunnel Junction Memory Device

Reshma Sinha & Jasdeep Kaur

Abstract: The popularity gained by magnetic tunnel junction (MTJ) devices in recent years has made the analysis of various effects on MTJs necessary. This paper describes a comparative analysis of the addition of high-K dielectrics (HfO₂ or ZrO₂ or TiO₂ or h-BN or Ta₂O₅) along with the MgO dielectric layer as MgO–HfO₂/ZrO₂/TiO₂/h-BN/Ta₂O₅–MgO to form a composite dielectric layer (CDL). Utilizing these CDL, we have presented a double-barrier penta-layer MTJ device by introducing CDL between CoFeB ferromagnetic layers and Fe ferromagnetic layers. First, the crystallographic analysis of the materials has been performed using the first-principles computation in density functional theory for predicting material behavior. Furthermore, the simulations were executed using a non-equilibrium Green's function (NEGF)-based simulator. This NEGF-based quantum transport simulator has been used for calculating the various critical transport characteristics of an MTJ such as tunneling magnetoresistance (TMR), differential tunneling magnetoresistance, and spin-transfer torque (STT, both in-plane and out-of-plane) along with other properties such as resistance and differential resistance for both parallel and antiparallel states by giving material parameters and geometric dimensions of an MTJ as inputs. When compared to the traditional tri-layer MTJ devices (CoFeB–MgO–CoFeB and Fe–MgO–Fe), CoFeB–CDL–CoFeB, and Fe–CDL–Fe are found to be superior in terms of both high TMR ratio and low switching current. We have also included the temperature-related analysis for all the MTJ devices. Among all the MTJ models investigated, the highest TMR ratio found at 13 K is for Ta₂O₅ and TiO₂-based CDL MTJ for Fe-based MTJ models, with 1218% and 1246%, respectively.

For details refer to <https://doi.org/10.1007/s11664-022-09841-y>

Construction of compact two-port throne-shaped antenna with dual stopbands and high isolation for Ultrawideband Multiple-Input Multiple-Output wireless communication systems

Megha Agarwal, Jasdeep Kaur Dhanoa, Mukesh Kumar Khandelwal

Abstract: A throne-shaped compact ultrawideband (UWB) two-port multiple-input multiple-output (MIMO) antenna operating from 2.9 to 11.5 GHz is introduced. Dual-band rejections are created at the center frequency of 5.5 and 7.5 GHz by embedding U-slot on the feedline and split ring resonator (SRR) on the ground plane to eliminate interference with narrowband systems of these frequencies, respectively. Low mutual coupling of -22 dB is obtained almost throughout the full band by etching a rectangular slot in a cone-shaped stub. Procedures for achieving the UWB band as well as two stopbands are discussed in detail. Current distribution, gain and radiation pattern for the proposed antenna are also studied. Peak gain of 2.51 dBi and radiation efficiency greater than 73% is obtained. Diversity parameters confirming the MIMO characteristics are also investigated. Experimental results are obtained through a practical model in the anechoic chamber to validate the simulations.

For details refer to <https://doi.org/10.1002/dac.5195>

Peri-ictal and non-seizure EEG event detection using generated metadata

Megha Agarwal, Jasdeep Kaur Dhanoa, Mukesh Kumar Khandelwal

Abstract: Lack of open access, seizure specific database has hindered the development of Automated Seizure Detection System (ASDS) along with state-of-the-art feature selection and classification methods. Available databases contain noise, artefacts, different length time EEG segments, associated comorbidities, clinical settings, and epilepsy/ seizure types etc. Pre-processing of such continuous EEG segments requires significant amount of time and may feed redundant information (with reference to a seizure event) to the classification model leading to inaccurate, real time seizure event detection systems. Hence, this paper proposes a metadata generation of large EEG databases (here, CHB-MIT EEG scalp database v.1.0.0) for ASDS. We elucidate the need to generate seizure sensitive data through peri-ictal and non-seizure EEG segments. This paper performs multi-variate analysis and two-class (non-seizure and seizure event) classification between these fixed length and time EEG segments from SVM and k-NN classifier. We thoroughly analyzed the variation and dependence of different kernels, cost function, gamma, and degree for SVM based pipeline. The proposed pipeline has been compared with state-of-the-art pipelines and has achieved good classification score. Such methods will help in development of generalized approach towards handling large EEG databases and machine learning applications for seizure detection and prediction.

For details refer to <https://doi.org/10.1002/dac.5195>

SiC-based analytical model for gate-stack dual metal nanowire FET with enhanced analog performance

Neeraj, Anubha Goel, Shobha Sharma, Sonam Rewari, Radhey Shyam Gupta

Abstract: In this paper, silicon carbide-based analytical model for gate-stack dual metal nanowire field effect transistor (gate-stack DM NW FET) has been analyzed by solving the 2D Poisson's equation using parabolic approximation method for electric potential, subthreshold current and subthreshold slope. The results have been examined for various silicon carbide film depth and channel length. The results predicted by the analytical model have excellent agreement with simulated results obtained by ATLAS 3D device simulator. A gate-stack having high k-dielectric material, that is, Hafnium oxide (HfO₂) along with aluminum oxide (Al₂O₃) has been used. Also, performance characteristics of gate-stack DM NW FET have been compared with the performance characteristics of nanowire field effect transistor (NW FET), Nanowire field effect transistor (NW FET) (SiC) and dual metal nanowire field effect transistor (DM NW FET) (SiC). It is so proved that our proposed device, that is, gate-stack DM NW FET (4H-SiC) exhibits superior performance in terms of drain current (I_{ds}), transconductance (g_m), output conductance (g_d) and cut off frequency (f_T) than the existing devices.

For details refer to <https://doi.org/10.1002/jnm.2986>

Investigating the significance of color space for abnormality detection in wireless capsule endoscopy images

Nidhi Goel, Samarjeet Kaur, Deepak Gunjan, S.J. Mahapatra

Abstract: Wireless Capsule Endoscopy is a non-invasive and painless procedure to examine the gastrointestinal tract of human body. An experienced clinician takes 2-3 h for a complete examination of approximately 57,000–1,00,000 images received during the procedure. To reduce this time, deep neural networks/models/architectures are being explored for developing computer aided diagnosis systems for abnormality detection in wireless capsule endoscopy images, which are taken in poor illuminated environment. Though colour and texture plays an important role in highlighting the features that help in abnormality detection; existing deep neural network models consider all the images in default RGB format. Existing deep learning models for this task are highly complex and computationally extensive due to having millions of training parameters. Thus, the presented work proposes a CNN based framework, TICT-CNN (Transforming Input Color Space in Tandem with Convolutional Neural Network) for binary classification of WCE images. The proposed TICT-CNN framework initially performs data augmentation and color space conversion on-the-fly before the CNN is trained for binary classification of images. The performance of different colour spaces has been thoroughly analyzed for classification of WCE images through objective parameters and feature maps. All the experimental analysis and ablation study has been done on a real dataset obtained from All India Institute of Medical Sciences, Delhi (AIIMS Delhi). A cross- dataset analysis has also been performed on a standard KID dataset. Analysis performed on real data obtained from AIIMS Delhi depicts that the performance of HSV colour space outperforms state-of-the-art approaches. The performed analysis also reflects that a simple yet efficient step of choosing the right color space can reduce the trainable parameters by 2 to 6 times and can lead to diagnosis time of only 0.02 s/frame.

For details refer to <https://doi.org/10.1016/j.bspc.2022.103624>

Dilated CNN for abnormality detection in wireless capsule endoscopy images

Nidhi Goel, Samarjeet Kaur, Deepak Gunjan & S. J. Mahapatra

Abstract: Wireless capsule endoscopy is a non-invasive and painless procedure to examine the gastrointestinal tract of human body, and an experienced clinician takes 2–3 hours for complete examination. To reduce this diagnosis time, the present work proposes a lightweight CNN model for binary classification of WCE images. The proposed model has a strong backbone of CNN in the primary branch complemented by resolution preserving dilated convolution layers in secondary branches. The proposed model extracts multiple features at different scales and finally fuses them together to fetch the dominant global feature that aids in binary classification problem. A new dataset has been created in collaboration with All India Institute of Medical Sciences, Delhi. The efficacy of the proposed model has been verified using the developed dataset using various subjective and objective parameters. Feature maps generated at each branch have been thoroughly analyzed to understand the quality of learning. Thorough experimental analysis indicates that the proposed model yields an accuracy of 0.96, sensitivity of 0.93 and specificity of 0.97 on real data collected from AIIMS Delhi. To verify the efficacy of the proposed dilated CNN, extensive analysis has been done using standard KID dataset as well. For a fair comparison, these datasets have also been used for pre-trained inception net model. Thorough analysis indicates that the proposed architecture performs well both for AIIMS dataset and the standard KID dataset. Result analysis also reflects that the proposed dilated CNN architecture outperforms the performance of pre-trained inception net model.

For details refer to <https://doi.org/10.1007/s00500-021-06546-y>

An improved source follower per detector ROIC for HgCdTe infrared photodiodes

Manik Dangi, Raghvendra Sahai Saxena & Vandana Niranjana

Abstract: A new readout circuit for HgCdTe based Infrared photodiodes has been proposed. In this work, the conventional source follower per detector (SFD) architecture of the readout integrated circuit (ROIC) has been suitably modified to improve the performance. The SFD unit cell has a shortcoming of unstable detector bias voltage that makes it non-linear and affects the injection efficiency. In this paper, to overcome the shortcoming of conventional SFD, a high output impedance cascode amplifier has been introduced between the detector and the input transistor of the conventional SFD circuit, which boosts the efficiency of the conventional circuit. The proposed topology improves intrinsic gain by providing high output resistance that boosts the injection of charge carriers from the detector to the interface circuit. The use of cascode structure in the source follower also improves the noise performance and intrinsic gain of the interface circuit resulting in the enhancement of its overall performance. Using the simulation-based analysis performed on LTSPICE circuit simulator for 180 nm standard CMOS process technology, it has been shown that the proposed circuit results in the injection efficiency > 99% even with the detector of low dynamic resistance of $\sim 2 \text{ M}\Omega$ and therefore it is suitable for the complete range of SWIR to VLWIR HgCdTe infrared photodiodes.

For details refer to <https://doi.org/10.1007/s00542-022-05342-4>

Radiation-Sensitive AlGaIn/GaN MOS-HEMT-Based Dosimeter

Ruby Mann, Sonam Rewari, Praveen Pal, Shobha Sharma & R. S. Gupta

Abstract: An AlGaIn/GaN MOS-HEMT (metal oxide semiconductor–high electron mobility transistor)-based dosimeter has been proposed to demonstrate and evaluate the impact of absorbed doses of radiations by virtue of interface trap charges at the interface of SiO₂/AlGaIn. The effect of various radiation doses induced ($N_t = -3 \times 10^{12} \text{ cm}^{-2}$ to $+3 \times 10^{12} \text{ cm}^{-2}$) has been studied in terms of various electrical parameters, such as channel conductance (g_d), drain current (I_{ds}), transconductance (g_m), and threshold voltage (V_{th}). Variations in the drain current and channel potential, and a significant shift in the threshold voltage, have been observed. Threshold voltage and drain current increase proportionally to the radiation dose induced due to the addition of positive charges on the surface, leading to increased charge carrier concentration in two-dimensional electron gas (2DEG). Modifying the electron mobility/or density by the effects of induced radiation affects the functionality of the 2DEG-based device. The maximum changes in output conductance, drain current, threshold voltage change, drain-on sensitivity, and transconductance observed for the proposed sensor are 69%, 0.073 A, 593 mV, 0.314, and 0.018 S, respectively. The effects of variation in gate length on the threshold voltage sensitivity and sensor drain current have been studied.

For details refer to <https://doi.org/10.1007/s11664-022-09795-1>

Discrete cosine transform interpolation based design of two-dimensional FIR fractional order digital differentiator

Shilpa garg, Richa Yadav & Manjeet Kumar

Abstract: In this paper a two-dimensional (2-D) DCT interpolation based method for the designing of a 2-D fractional order digital differentiator (FODD) is presented. The modeling of the FODD is achieved in the form of a finite impulse response (FIR) filter. Here, Grunwald-Letnikov partial fractional derivative of two variable function with discrete cosine transform (DCT) interpolation is used to estimate the impulse response of an ideal 2-D FODD. Here, 2-D DCT-II and DCT-III methods are employed to evaluate the optimal values of coefficients of the 2-D fractional order differentiator. Simulation results demonstrate that the proposed method surpasses the existing method in terms of integral square magnitude error (ISME). The simulated results reflect that the improved response gives a much reduced error of 0.0404 and 0.0165 using 2-D DCT-II and DCT-III methods respectively. The proposed 2-D FODD is applied on an image for edge detection to demonstrate the effectiveness of the method.

For details refer to <https://doi.org/10.1007/s11045-022-00846-8>

Improved performance recycling folded cascode OTA using multipath positive feedback and pseudo differential pair for biasing

Annu Dabas, Richa Yadav & Maneesha Gupta

Abstract: An improved performance recycling folded cascode (IPRFC) operational transconductance amplifier (OTA) is presented in this paper. It utilizes the pseudo differential pair at input stage to improve the slew rate and endorses the positive feedback in the current mirror load to enhance the transconductance of OTA. Further, the positive feedback is split into two paths which further increase the transconductance and output resistance which improves the frequency response of OTA. The splitting of the current in two paths also improves the linearity of the RFC OTA. The proposed tailoring in the structure exhibits a notable increment in transconductance as it results in boosted gain, unity gain bandwidth and slew rate of conventional recycling folded cascode (RFC) OTA. The noise measured is also comparatively low even though the input differential pair consists of NMOS transistor. Mentor Graphics Eldo simulation tool is used to design and simulate the proposed circuit under 0.18 μm CMOS technology and $\pm 1 \text{ V}$ power supply. The results illustrate that the proposed circuit has boosted gain of 83.79 dB and unity gain bandwidth of 21.15 MHz driving the capacitive load of 15 pF. The power dissipated by the amplifier is 84 μW . The outcomes also fairly validate the figure of merit and show significant improvement in sensitivity of temperature on the proposed IPRFC OTA.

For details refer to <https://doi.org/10.1007/s12046-022-01907-1>

Organic light emitting transistors: performance analysis and high performance device

Bushra Abbas & Kanchan Sharma

Abstract: In the field of optoelectronics, Organic Light Emitting Transistors (OLET) symbolise a new era. The OLET is a bifunctional device that combines the switching and amplification capabilities of organic field effect transistors with the electroluminescent capabilities of organic light emitting diodes in a single device. Organic semiconductor materials are important for optoelectronic devices because of their low cost, light weight, and flexible production procedures. OLETs play a vital role in the field of high mobility organic semiconductors and the fabrication of high performance organic optoelectronic devices as organic optoelectronic devices progress. The performance of OLETs with anthracene as an organic semiconductor material is discussed in detail in this research paper. The performance of OLETs is evaluated using a state-of-the-art Atlas Silvaco 2-D Simulator in terms of driving current, mobility, and current-on-off ratio. The device's output properties are also examined, and these values are then compared to the available dataset. The parameter values are as follows: I_{ds} of 17 μA 17 μA , mobility of $12 \times 10^{-2} \text{ cm}^2/\text{Vs}$ $12 \times 10^{-2} \text{ cm}^2/\text{Vs}$ and on-off ratio of 107/107. We have also calculated power consumption value (0.54 mW). We can see that this device has much higher mobility value and lower power consumption value which makes it the better performance device.

For details refer DOI: <https://doi.org/10.1007/s10470-022-02102-2>

Modelling and Analyzing the Performance of Journal Bearing with TiO₂ and CuO Nanoparticle as Lubricant Additives

Neha Deepak Saxena & Nathi Ram Chauhan

Abstract: Current paper discussed the performance characteristics of TiO₂ and CuO nanolubricant on the journal bearing. This research paper develops the viscosity model for determining the correlation between viscosity and temperature for SAE 20W40 engine oil and analysing the performance characteristics of the journal bearing. Integrating nanoparticles in traditional lube engine oil shows significant effect in the performance characteristic of journal bearing. The computed result shows that accumulations of nanoparticles amplify the viscosity of base engine oil and in turn improves the performance characteristics of journal bearing.

For details refer DOI: <https://doi.org/10.1134/S0965544122100036>

Fault detection in rotating elements by using fuzzy integrated improved local binary pattern method

Ekta Yadav & V. K. Chawla

Abstract: An infrared thermography method is a promising tool for defect detection in rotating machines, as this approach is a non-intrusive and no-contact kind of approach. Although the performance of infrared thermography is limited by strong noise signals and the irrelevant information found in infrared images. This issue can be efficiently addressed by using an image segmentation process that can enhance feature extraction in infrared thermography image analysis. In this paper, an image segmentation process named fuzzy integrated improved local binary pattern (ILBP-Fuzzy) for fault detection is proposed to enhance feature extraction in the thermography images. In the ILBP-Fuzzy method, the thermal image is first converted into a grey-scale image and thereafter, a median filter is applied to make the image noise-free. Later on, the region of interest is identified and the fault is detected by the application of the suggested ILBP-Fuzzy approach. In this work, two cases are performed. The first one is on synthetic images and the other one is on thermography images. In case 1, a synthetic image (star image) is used to evaluate the effectiveness of the edge detection method. The outcomes from the suggested approach are compared with other methods and various parameters such as accuracy, jacquard similarity index, sensitivity, dice similarity index, and specificity are calculated. In case 2, the proposed method is tested on three types of industrial thermo-graphic images of bearings named as healthy, fault-initialized, and unhealthy for estimating the capability of the ILBP-Fuzzy approach. From the results, it is evident that the ILBP-Fuzzy approach provides superior performance to identify the conditions of the rotating elements in a machine as compared to other segmentation methods such as IHLBP, Sobel, Canny, Laplace of Gaussian, Otsu and LTIHLBP method.

For details refer to <https://doi.org/10.1007/s40430-022-03916-x>

Misalignment and Surface Irregularities Effect in MR Fluid Journal Bearing

Krishnkant Sahu, Satish C. Sharma & Nathi Ram Chauhan

Abstract: Misalignment is a major issue that hampers the satisfactory operation of the journal bearing system. Perfect alignment of the journal bearing system is rather difficult to achieve due to various reasons. In actual reality, there is always some amount of misalignment that exists. In recent times, smart lubricants have come up in a big way application concerning fluid film journal bearings. The performance of fluid film bearings gets greatly affected due to misaligned journal conditions and bearing surface irregularities. The present study deals with magnetorheological (MR) lubricant behavior fluid in a hybrid slot-entry journal bearing system (SEJBs) operating under misaligned journal conditions with bearing surface irregularities. The numerically simulated result reveals that due to journal misalignment conditions, the fluid film thickness is reduced, whereas, the value of fluid film damping coefficient and frictional torque gets increased. The mutual effect of bearing surface irregularities and MR lubricant enhances the value of minimum fluid film thickness thereby reducing the chances of metal to metal contact. Further, the combined influence of MR lubricant and surface irregularities increases the damping capabilities of bearing system which helps to damp out the oscillating vibration and large excitation under dynamic circumstances.

For details refer DOI: <https://doi.org/10.1016/j.ijmecsci.2022.107196>

Statistical analysis and ANN modelling of tribological performance of aluminium hybrid composites fabricated by PM method

Mohd Azmal Hussain, Aasiya Parveen, Nathi Ram Chauhan, Mohd Suhaib & Mohammad Waseem

Abstract: This study represents the wear behaviour of the aluminium hybrid composites developed through powder metallurgy. The pure Al-matrix powder was blended with Si₃N₄/ZrO₂ ceramic powders in a high-centrifugal ball mill and then compacted at three different compaction pressure. The sintering of the composites was done in an environment-controlled tube furnace at 500 °C for 1 h. The effect of wt% of the reinforcement, compaction pressure and applied load was investigated on the wear results performed on the pin-on-disc setup. The Analysis of variance (ANOVA) and artificial neural network (ANN) was used for the wear loss results prediction. The ANOVA results revealed that load is a highly influential parameter for wear loss followed by reinforcement and compaction pressure. Furthermore, an ANN model using feed-forward backpropagation analysis was built which found that the predicted and experimental results are close.

For details refer DOI: <https://doi.org/10.1088/2051-672X/ac7db1>

Analyzing barriers to green logistics in context of Circular Economy and Industry 4.0 in the context of Indian manufacturing industry.

Deepti Chhabra and Rajesh Kr Singh

Abstract: In the current era of Industry 4.0 and Circular economy, green logistics have become necessary for being sustainable. Adopting green logistics practices is a challenging task for the manufacturing industry, specifically in developing countries like India. In this study, we identified 16 barriers to implementing green logistics in the Indian manufacturing industry in reference to Industry 4.0 and circular economy. Data was collected from experts through a questionnaire-based survey. The decision-making trial and evaluation laboratory (DEMATEL) technique was applied to examine the degree of influence and interaction among the barriers. It also helped in the classification of barriers into cause-and-effect categories. To validate the findings, a sensitivity analysis had also been carried out. The findings would help manufacturing organizations in developing strategies for implementing green logistics to achieve long term sustainability.

For details refer DOI: <https://doi.org/10.1080/13675567.2022.2134847>

Coexistent scheduling in the tandem flow path configuration of a flexible manufacturing system by using an advanced grey wolf optimizer

V. K. Chawla, A.K. Chanda, S. Angra & A. Bonyadi

Abstract: The use of material handling robots (MHRs) for efficient material handling operations in the flexible manufacturing systems (FMS) has gained wide popularity and acceptability across the automated production industries. The coexistent scheduling between jobs and MHRs improves the overall efficiency of the FMS significantly. In the present study, the coexistent scheduling between the MHRs and the jobs under production in the FMS is carried out by using an advanced grey wolf optimization (AGWO) algorithm. The proposed FMS layout is made up of the tandem flow path configurations for the movements of MHRs. The FMS constitutes six flexible manufacturing cells (FMCs) partitioned in six zones and served by six MHRs deployed in each partitioned zone for efficient material handling operations. To develop the coexistent schedule between MHRs and jobs, a combined objective function is formulated by combining the two diverging objectives and solved by using the AGWO algorithm. The combined objective function yield for coexistent production scheduling in FMS, operating with nineteen work centers (WC) and six MHRs to produce thirty-six types of jobs and sixty-six types of jobs in varying batch production quantities is also reported in the paper.

For details refer DOI: <https://doi.org/10.24200/sci.2020.54152.3618>

Optimization of MWCNTs/Al nanocomposite fabrication process parameters for mass density and hardness

Md Zakir Hussain, Sabah Khan and Urfi Khan

Abstract: Engineering materials and their development are essential for a civilized society, and they have always played a key role in the industrialization of a country. The performance of materials can be increased by selecting appropriate fabrication process parameters. In this paper, the effect of fabrication processing parameters on multi-responses of lightweight material, namely, functionalized multiwalled carbon nanotubes-aluminum nanocomposite have been investigated through Taguchi-based grey relational analysis. Ethanol wt. %, milling time, compaction pressure, and sintering temperature were considered controlled parameters. Phase, surface morphology, and chemical compositions of the nanocomposite have been analyzed by X-ray diffraction, scanning electron microscopy, and energy-dispersive X-ray techniques. The scanning electron microscope images revealed that the optimal parameter combination is essential for decreasing void and crack formation during the powder metallurgy process and increasing the material performance index. Grey relational analysis was performed to evaluate optimal sample fabrication processing parameters by using grey relational grade as performance index measurement. The most influential parameter was investigated using main effect plots, interaction plots, contour plots, and analysis of variance. The results show that the optimal combination of sample fabrication parameters is A1B2C3D3. The results also show that the compaction pressure has a stronger correlation to the responses with a 46.92% contribution followed by sintering temperature. The % error between the predicted and experimental grey relational grades at the optimum-level combination is 1.83%. The Monte Carlo simulation data distribution plots show that the ranges of experimental mass density and hardness values are consistent with estimated simulated model values. Further, a regression equation has also been developed to establish the predictive model for the grey relational grade. The model analysis shows that the predictive model is adequate for evaluating grey relational grades. Therefore, this study confirms that the proposed approach can be a useful tool for improving materials' performance.

For details refer to <https://doi.org/10.1177/09544062221084204>

A hybrid learning-based genetic and grey-wolf optimizer for global optimization

Ankush Jain, Surendra Nagar, Pramod Kumar Singh & Joydip Dhar

Abstract: The grey-wolf optimizer (GWO) is a comparatively recent and competent algorithm in Swarm Intelligence (SI) to solve numerical and real-world optimization problems. However, the biggest challenge is the quick stabilization of its search agents to the local optima. Therefore, to bring effectiveness in the global search, it is imperative to relocate the leading agents through the procreation of their positions in the search space. This paper proposes GL-GWO, a genetic learning (GL)-based GWO, which imitates the genetic offspring generation scheme to improve the intelligence of GWO's leading agents. The GL scheme expedites the global effectiveness of leading agents by constructing the exemplars for them through genetic operators using their historical information. The obtained exemplars are well diversified and highly intelligent; therefore, the rest of the population's global searchability and search efficiency are enhanced under their guidance. The GL-GWO is tested on widely adopted 20 benchmark functions from the IEEE-CEC-2005 dataset and 38 functions from the IEEE-CEC-2014 dataset. The efficacy of GL-GWO is tested on four real-world engineering problems, namely recommendation systems, face image super-resolution, tension/compression spring, and welded beam. The obtained results on benchmark functions and considered engineering problems conclude that the GL-GWO is an efficient, effective, and reliable algorithm for solving real-world optimization problems.

For details refer to <https://doi.org/10.1007/s00500-022-07604-9>

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S.No.	Author Name	Paper Title	Journal with Publication Details
DEPARTMENT OF INFORMATION TECHNOLOGY			
1.	Srishti Maheshwari, Shubhangi Aggarwal, Rishabh Kaushal	A novel SMS spam dataset and bi-directional transformer based short-text representations for SMS spam detection	Journal of Information and Decision Sciences 2022
2.	Siddhi Mishra, Abhigya Verma, Kavita Meena, Rishabh Kaushal	Public reactions towards Covid-19 vaccination through twitter before and after second wave in India	Social Network Analysis and Mining 12, 2022
3.	Manmeet Kaur, Priyanka Daryani, Megha Varshney, Rishabh Kaushal	Detection of fake images on whatsapp using socio-temporal features	Social Network Analysis and Mining 12, 2022
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING			
4.	Naaïma Suroor, Arunima Jaiswal, Nitin Sachdeva	Stack Ensemble Oriented Parkinson Disease Prediction Using Machine Learning Approaches Utilizing Grid Search CV-Based Hyper Parameter Tuning	Critical Reviews in Biomedical Engineering 50, 39-58, 2022
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING			
5.	Greeshma Arya, Aaishani De, Renu Singh	Blurred Image Classification	TELEMATIQUE 21, 7297-7320, 2022
6.	Bandana Pal, Shruti Jain	Novel Discrete Component Wavelet Transform for detection of cerebrovascular diseases	Sadhana 47, 2022

A novel SMS spam dataset and bi-directional transformer based short-text representations for SMS spam detection

Srishti Maheshwari, Shubhangi Aggarwal, Rishabh Kaushal

Abstract: Short Message Service (SMS) is a form of exchanging short messages over mobile phones without the Internet. Unfortunately, the SMS services popularity is exploited to send irrelevant and malicious messages to entrap users into scams and frauds. In this work, we investigate the performance of state-of-the-art Bi-directional encoder representations from transformers for short-text messages in SMS data. For evaluation, we curate a novel augmented SMS spam dataset by extending a classical SMS spam dataset to further categorize spam SMS messages into four fine-grained categories, namely, indecent, malicious, promotional, and updates. We perform experiments on the standard benchmark SMS dataset of spam & non-spam and on our curated multi-class SMS spam dataset. We find that BERT based short-text representations outperform the baseline traditional approach of using handcrafted text-based features by 15-30% for different machine learning algorithms in terms of accuracy on multi-class SMS spam dataset.

For Details refer DOI: <https://doi.org/10.1109/ACCESS.2021.3081479>

Public reactions towards Covid-19 vaccination through twitter before and after second wave in India

Siddhi Mishra, Abhigya Verma, Kavita Meena, Rishabh Kaushal

Abstract: Social media have a significant impact on opinion building in public. Vaccination in India started in January 2021. We have seen many opinions towards vaccination of the people, as vaccination is one of the most crucial steps toward the fight against COVID-19. In this paper, we have compared the public's sentiments towards COVID vaccination in India before the second wave and after the second wave. We worked by extracting tweets regarding vaccination in India, building our datasets. We extracted 5977 tweets before the second wave and 42,936 tweets after the second wave. We annotated the collected tweets into four categories, namely Pro vaccine, Anti vaccine, Hesitant and Cognizant. We built a baseline model for sentiment analysis and have used multiple classification techniques among which Random Forest using the TF-IDF vectorization technique gave the best accuracy of 69% using max-features and n-estimators as parameters.

For Details refer DOI: <https://doi.org/10.1007/s13278-022-00885-w>

Detection of fake images on WhatsApp using socio-temporal features

Manmeet Kaur, Priyanka Daryani, Megha Varshney, Rishabh Kaushal

Abstract: Social Media Platforms (SMPs) in general and messaging platforms, namely WhatsApp, have changed how people connect. Unfortunately, SMPs are often used to spread fake information. We focus on images shared on the WhatsApp platform; our goal is to detect whether the image is fake. Our main contribution is in terms of feature engineering. Given an image and meta-data, we compute three features: (1) image content-based features, (2) temporal features using the time stamps at which images were shared, and (3) social context features based on the users who shared images. We provide these features into machine learning models to predict whether the input is fake or not. We evaluate our approach on a fact-checked WhatsApp image dataset released in 2020 gathered during 2.5 months containing 810K and 34K images shared on WhatsApp by 63K and 17K WhatsApp users in India and Brazil. We observed that temporal and social contextual features are essential predictors for fake image detection. Counter-intuitively, we found that image content features derived by CNNs using raw images are not giving promising results in comparison with socio-temporal features, but they are better than random prediction. Our best model uses ensemble learning which fuses the outcomes of Support vector machines, Random Forest, and Logistic Regression using socio-temporal features.

For Details refer DOI: <https://doi.org/10.1007/s13278-022-00883-y>

Stack Ensemble Oriented Parkinson Disease Prediction Using Machine Learning Approaches Utilizing GridSearchCV-Based Hyper Parameter Tuning

Naaima Suroor, Arunima Jaiswal, Nitin Sachdeva

Abstract: Since the coronavirus came into existence and brought the entire world to a standstill, there have been drastic changes in people's lives that continue to affect them even as the pandemic recedes. The isolation reduced physical activity and hindered access to non-COVID related healthcare during lockdown and the ensuing months brought increased attention to mental health and the neurological disorders that might have been exacerbated. One nervous system disorder that affects the elderly and needs better awareness is Parkinson's disease. We have machine learning and a growing number of deep learning models to predict, and detect its onset; their scope is not completely exhaustive and can still be optimized. In this research, the authors highlight techniques that have been implemented in recent years for prediction of the disease. Models based on the less redundantly used classifiers-naive Bayes, logistic regression, linear-support vector machine, kernelizing support vector machine, and multilayer perceptron-are initially implemented and compared. Based on limitations of the results, an ensemble stack model of hyper-tuned versions using GridSearchCV out of the top performing supervised classifiers along-with extreme gradient boosting classifier is implemented to further improve overall results. In addition, a convolutional neural network-based model is also implemented, and the results are analyzed using two epoch values to compare the performance of deep learning models. The benchmark datasets-UCI Parkinson's data and the spiral and wave datasets-have been used for machine and deep learning respectively. Performance metrics like accuracy, precision, recall, support, and F1 score are utilized, and confusion matrices and graphs are plotted for visualization. 94.87% accuracy was achieved using the stacking approach.

For Details refer DOI: <https://doi.org/10.1615/CritRevBiomedEng.2022044813>

Blurred Image Classification

Greeshma Arya, Aaishani De, Renu Singh

Abstract: Without incorporating any human assistance at any stage, picture categorization is a crucial component of image processing for computer vision and machine learning. Investigations into high profile crimes sometimes include the classification and identification of digital images extracted from CCTV footage. In this research, we investigate the picture categorization and detection of extremely pixelated, fuzzy images that are captured from CCTV footage of cameras placed in public areas. This paper demonstrates how artificial intelligence and deep learning principles can be used to accomplish this. To identify blurry images, we have developed a model that combines the Tensorflow architecture with the Convolutional Neural Network (CNN) and Sequential models. For our learning model, 60,000 photos of various object classes were collected and divided into the test dataset and training dataset categories. In order to get the findings, a custom neural network using the architecture of a convolutional neural network and the Keras API is used to forecast which class a specific blurred image belongs to.

For Details refer DOI: <https://doi.org/10.1109/ICMEW.2017.8026291>

Novel Discrete Component Wavelet Transform for detection of cerebrovascular diseases

Bandana Pal, Shruti Jain

Abstract: Detection and diagnosis of a disease with a single image can be tedious and difficult for doctors but with the adaptation of medical image fusion, a path for additional improvements can be paved. The objective of this research is to implement different fusion algorithms based on conventional and proposed hybrid techniques. Based on performance metrics it has been observed that the novel method, Discrete Component Wavelet Transform (DCWT) shows remarkable results in comparison to the traditional techniques. As per the enhancement methods, Binarization, Median Filter, and Contrast Stretching have been considered to compare the contrast performance with Contrast Limited Adaptive Histogram Equalization. Certain modifications to each enhancement method were made related to the selection of parameters. Thus, better qualitative and quantitative values were observed in Discrete Component Wavelet Transform. The different attributes were calculated from the fused images which were classified using various machine learning techniques. Maximum accuracy of 97.87% and 95.74% is obtained using Discrete Component Wavelet Transform for Support Vector Machine (SVM) and k Nearest Neighbor (kNN) (k = 4) respectively considering the combination of both features Grey Level Difference Statistics and shape.

For Details refer DOI: <https://doi.org/10.1007/s12046-022-02016-9>

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