Lecture Notes in Networks and Systems

Volume 798

Series Editor

Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Advisory Editors

Fernando Gomide, Department of Computer Engineering and Automation—DCA, School of Electrical and Computer Engineering—FEEC, University of Campinas—UNICAMP, São Paulo, Brazil

Okyay Kaynak, Department of Electrical and Electronic Engineering, Bogazici University, Istanbul, Türkiye

Derong Liu, Department of Electrical and Computer Engineering, University of Illinois at Chicago, Chicago, USA
Institute of Automation, Chinese Academy of Sciences, Beijing, China

Witold Pedrycz, Department of Electrical and Computer Engineering, University of Alberta, Alberta, Canada
Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland

Marios M. Polycarpou, Department of Electrical and Computer Engineering, KIOS Research Center for Intelligent Systems and Networks, University of Cyprus, Nicosia, Cyprus

Imre J. Rudas, Óbuda University, Budapest, Hungary

Jun Wang, Department of Computer Science, City University of Hong Kong, Kowloon, Hong Kong

The series "Lecture Notes in Networks and Systems" publishes the latest developments in Networks and Systems—quickly, informally and with high quality. Original research reported in proceedings and post-proceedings represents the core of LNNS.

Volumes published in LNNS embrace all aspects and subfields of, as well as new challenges in, Networks and Systems.

The series contains proceedings and edited volumes in systems and networks, spanning the areas of Cyber-Physical Systems, Autonomous Systems, Sensor Networks, Control Systems, Energy Systems, Automotive Systems, Biological Systems, Vehicular Networking and Connected Vehicles, Aerospace Systems, Automation, Manufacturing, Smart Grids, Nonlinear Systems, Power Systems, Robotics, Social Systems, Economic Systems and other. Of particular value to both the contributors and the readership are the short publication timeframe and the world-wide distribution and exposure which enable both a wide and rapid dissemination of research output.

The series covers the theory, applications, and perspectives on the state of the art and future developments relevant to systems and networks, decision making, control, complex processes and related areas, as embedded in the fields of interdisciplinary and applied sciences, engineering, computer science, physics, economics, social, and life sciences, as well as the paradigms and methodologies behind them.

Indexed by SCOPUS, INSPEC, WTI Frankfurt eG, zbMATH, SCImago.

All books published in the series are submitted for consideration in Web of Science.

For proposals from Asia please contact Aninda Bose (aninda.bose@springer.com).

Subarna Shakya · João Manuel R. S. Tavares ·
Antonio Fernández-Caballero · George Papakostas
Editors

Fourth International Conference on Image Processing and Capsule Networks

ICIPCN 2023

Springer

Editors
Subarna Shakya
Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering
Tribhuvan University
Lalitpur, Nepal

Antonio Fernández-Caballero
Universidad de Castilla-La Mancha
Albacete, Spain

João Manuel R. S. Tavares
Faculdade de Engenharia
Universidade do Porto
Porto, Portugal

George Papakostas
Department of Computer Science
International Hellenic University
Kavala, Greece

ISSN 2367-3370 ISSN 2367-3389 (electronic)
Lecture Notes in Networks and Systems
ISBN 978-981-99-7092-6 ISBN 978-981-99-7093-3 (eBook)
https://doi.org/10.1007/978-981-99-7093-3

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2023

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.
The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.
The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Paper in this product is recyclable.

We would like to dedicate this proceeding to all members of advisory committee and program committee for providing their excellent guidance. We also dedicate this proceeding to the members of the review committee for their excellent cooperation throughout the conference. We also record our sincere thanks to all the authors and participants.

Preface

It is our pleasure to welcome you to the 4th International Conference on Image Processing and Capsule Networks [ICIPCN 2023] organized on August 10–11, 2023. A major goal and feature of the conference is to bring academia and industries together to share and exchange their significant research experiences and results in the field of imaging science, with a particular interest on the capsule network algorithms and models by discussing the practical challenges encountered and solutions adopted to it.

This conference will deliver a technically productive experience to the budding researchers in the field of image processing and capsule networks by stimulating a good awareness on this emerging research field. ICIPCN promises to provide a produce a bright landscape for the image processing research works, while the response received, and research eagerness witnessed, have truly exceeded our expectations. At the end of the conference event, we are overwhelmed with the high level of satisfaction.

The response for the conference event has been increasing at an unprecedented rate both from Thailand and overseas. Due to the professional expertise of both internal and external reviewers, the papers have been selectively accepted based on their extensive research and publication quality. We have received a total submission of 366 out of which only 48 papers were accepted for publication based on its research effectiveness and applicability. We would also like to extend our thanks to the members of the organizing committee for their hard work in delivering spontaneous response to all the conference participants.

We are now enthusiastic to get the proceedings of the ICIPCN conference event covered by Springer. We also appreciate all the authors of ICIPCN 2023 for their timely response to all the queries raised from the conference.

Finally, we would like to thank the Springer publications for producing this volume.

Lalitpur, Nepal — Prof. Dr. Subarna Shakya
Porto, Portugal — Dr. João Manuel R. S. Tavares
Albacete, Spain — Dr. Antonio Fernández-Caballero
Kavala, Greece — Dr. George Papakostas

Contents

Modern Challenges and Limitations in Medical Science Using Capsule Networks: A Comprehensive Review 1
Milind Shah, Nikunj Bhavsar, Kinjal Patel, Kinjal Gautam, and Mayur Chauhan

Studies on Movie Soundtracks Over the Last Five Years 27
Sofía Alessandra Villar-Quispe and Adriana Margarita Turriate-Guzman

Blind Source Separation of EEG Signals Using Wavelet and EMD Decomposition 39
H. Massar, M. Miyara, B. Nsiri, and T. Belhoussine Drissi

Image Extraction Approaches for Density Count Measurement in Obstruction Renography Using Radiotracer 99mTc-DTPA 57
Pradnya N. Gokhale, Babasaheb R. Patil, and Sameer Joshi

Deep Short-Term Long Memory Technique for Respiratory Lung Disease Prediction 73
B. Dhiyanesh, Y. Baby Kalpana, S. Rajkumar, P. Saraswathi, R. Radha, and S. Suresh

Utilizing Satellite Imagery for Flood Monitoring in Urban Regions 89
Priyanka Sakpal, Shashank Bhosagi, Kaveri Pawar, Prathamesh Patil, and Pratham Ghatkar

Optimizing Permutations in Biclustering Algorithms 115
Aditya Shreeram, Tanmayee Samantaray, and Cota Navin Gupta

Extracting Graphs from Plant Leaf Venations Using Image Processing 131
Ashlyn Kim D. Balangcod and Jaderick P. Pabico

Multispectral Fusion of Multisensor Image Data Using PCNN for Performance Evaluation in Sensor Networks 145
S. Dharini and Sanjay Jain

U-Net-Based Segmentation of Coronary Arteries in Invasive Coronary Angiography 157
A. Azeroual, Y. El Ouahabi, W. Dhafer, M. H. El yousfi Alaoui, B. Nsiri, and A. Soulaymani

Change Detection for Multispectral Remote Sensing Images Using Deep Learning 169
M. Lasya, Radhesyam Vaddi, and S. K. Shabeer

Explainable AI for Black Sigatoka Detection 181
Yiga Gilbert, Emmy William Kayanja, Joshua Edward Kalungi, Jonah Mubuuke Kyagaba, and Ggaliwango Marvin

Modified U-Net and CRF for Image Segmentation of Crop Images 197
Shantanu Chakraborty, Rushikesh Sanap, Muddayya Swami, and V. Z. Attar

Securing Data in the Cloud: The Application of Fuzzy Identity Biometric Encryption for Enhanced Privacy and Authentication 213
Chandrasekar Venkatachalam, K. Manivannan, and Shanmugavalli Venkatachalam

Quantum Convolutional Neural Network for Agricultural Mechanization and Plant Disease Detection 225
Musa Genemo

Innovative Method for Alzheimer's Disease Detection Using Convolutional Neural Networks 239
Md. Sajid Anam Ifti, Md. Redwan Ahmed, S. M. Arafat Rahman, Sheikh Shemanto Afridi, Sanjeda Sara Jennifer, and Ahmed Wasif Reza

Segmentation of White Matter Lesions in MRI Images Using Optimization-Based Deep Neural Network 253
Puranam Revanth Kumar, Rajesh Kumar Jha, and P. Akhendra Kumar

A New Multi-level Hazy Image and Video Dataset for Benchmark of Dehazing Methods 269
Bedrettin Çetinkaya, Yücel Çimtay, Fatma Nazli Günay, and Gökçe Nur Yılmaz

Creative AI Using DeepDream 281
Rakhi Bhardwaj, Tanmay Kadam, Shubham Waghule, Sahil Shendurkar, and Bhakti Sarag

Tuberculosis Bacteria Detection Using Deep Learning Techniques 297
Sharmin Akther Rima, Meftahul Zannat, Samia Shameem Haque, Al Kawsar, Sanjeda Sara Jennifer, and Ahmed Wasif Reza

An Enhanced Real-Time System for Wrong-Way and Over Speed Violation Detection Using Deep Learning 309
A. Manasa and S. M. Renuka Devi

U-Net-Based Denoising Autoencoder Network for De-Speckling in Fetal Ultrasound Images 323
S. Satish, N. Herald Anantha Rufus, M. Antony Freeda Rani, and R. Senthil Rama

Galo Lexical Tone Recognition Using Machine Learning Approach 339
Bomken Kamdak, Gom Taye, and Utpal Bhattacharjee

Tea Leaf Disease Classification Using an Encoder-Decoder Convolutional Neural Network with Skip Connections 353
Swati Shinde and Sagar Lahade

Deep Learning-Based Classification of Lung Cancer Lesions in CT Scans: Comparative Analysis of CNN, VGG-16, and MobileNet Models 373
P. M. Hareesh and Sivaiah Bellamkonda

A Novel Fingerprint-Based Age Group Classification Approach Using DWT and DFT Analysis 389
Ashwini Sanjay Gaikwad and Vijaya B. Musande

Exploring the Potential Use of Infrared Imaging in Medical Diagnosis: Comprehensive Framework for Diabetes and Breast Cancer Screening 411
Asok Bandyopadhyay, Himanka Sekhar Mondal, Barnali Pal, Bivas Dam, and Dipak Chandra Patranabis

Precision Agriculture Through Stress Monitoring in Crops with Multispectral Remote Sensing Data 425
Konumuri Kalyan Suhas, G. Kalyani, and Mandava Venkata Sri Sai Surya

EEG Signal Feature Extraction Using Principal Component Analysis and Power Spectral Entropy for Multiclass Emotion Prediction 435
S. Babeetha and S. S. Sridhar

Semantic Image Segmentation of Agricultural Field Problem Areas Using Deep Neural Networks Based on the DeepLabV3 Model 449
Aleksey Rogachev, Ilya Belousov, and Dmitry Rogachev

A Unified Deep Learning Model for Multi-Satellite Image Classification of Land Use and Land Cover 463
M. S. Babitha, A. Diana Andushia, and A. Mehathab

Multi-class Plant Leaf Disease Classification on Real-Time Images Using YOLO V7 475
P. Sajitha, Diana A Andrushia, and S. S. Suni

City Road Anomaly Alert for Autonomous Vehicles: Pothole Dimension Estimation with YOLOv5 491
Varun Vinod Kulkarni, S. Vishal, Monish Mohanty, and Peeta Basa Pati

Craniofacial and Cervical Aesthetic Surgical Outcome Analysis Using Visual Similarity Metrics 511
S. Abhishek, Prathibha Prakash, T. Anjali, and Sundeep Vijayaraghavan

Brain Tumor Recognition from MRI Using Deep Learning with Data Balancing Methods and Its Explainability with AI 523
Abdullah Al Noman and Abu Shamim Mohammad Arif

Histopathology Breast Cancer Classification Using CNN 539
M. Venkateshwara Rao, Rajesh Saturi, D. Srinivas Goud, G. Srikanth Reddy, and N. Venkatesh

Automated Wave Height Measurement and Analysis Through Image Processing: A Computer Vision Approach for Oceanography 551
Medha Wyawahare, M. Selva Balan, Anvay Deshpande, Priyanka Acharya, Ankita Kumari, and Ashfan Khan

Enhanced Feature Fusion from Dual Attention Paths Using Feature Gating Mechanism for Scene Categorization of Aerial Images 563
G. Akila and R. Gayathri

Thermal Image-Based Fault Detection Using Machine Learning and Deep Learning in Industrial Machines: Issues-Challenges and Emerging Trends 581
Vaishnavi V. Kulkarni, Vishwanath R. Hulipalled, Mayuri Kundu, Jay B. Simha, and Shinu Abhi

AdaptPSOFL: Adaptive Particle Swarm Optimization-Based Layer Offloading Framework for Federated Learning 597
Rachit Verma and Shajulin Benedict

The Brain Tumors Identification, Detection, and Classification with AI/ML Algorithm with Certainty of Operations 611
Pranay Meshram, Tushar Barai, Mohammad Tahir, and Ketan Bodhe

A Dimensionality Reduction Method for the Fusion of NIR and Visible Image 629
Lokesh Gopinath and A. Ruhan Bevi

Hand Gesture-Based AI System for Accessing Windows Applications 647
Lakshmi Harika Palivela, V. Premanand, and Afruza Begum

FlameGuard: A Smart System for Forest Fire Detection and Control 665
Medha Wyawahare, Shreya Daga, Chashu Agrawal, Pranav Dalve, and Chirag Bhandari

Classification and Analysis of Chilli Plant Disease Detection Using Convolution Neural Networks 677
Zameer Gulzar, Sai Chandu, and K. Ravi

Sign Language Recognition Using Long Short-Term Memory Deep Learning Model 697
Prabhat Mali, Aman Shakya, and Sanjeeb Prasad Panday

Explainable Artificial Intelligence and Deep Transfer Learning for Skin Disease Diagnosis 711
James Mayanja, Enoch Hall Asanda, Joshua Mwesigwa, Pius Tumwebaze, and Ggaliwango Marvin

A Comparison Study Between Otsu's Thresholding, Fuzzy *C*-Means, and *K*-Means for Breast Tumor Segmentation in Mammograms 725
Moustapha Mohamed Saleck, Nagi Ould Taleb, Mohamed El Moustapha El Arby Chrif, and El Benany Mohamed Mahmoud

Author Index 735

Editors and Contributors

About the Editors

Subarna Shakya is currently a professor of Computer Engineering, Department of Electronics and Computer Engineering, Central Campus, Institute of Engineering, Pulchowk, Tribhuvan University, Coordinator (IOE), LEADER Project (Links in Europe and Asia for Engineering, Education, Enterprise, and Research Exchanges), ERASMUS MUNDUS. He received M.Sc. and Ph.D. degrees in Computer Engineering from the Lviv Polytechnic National University, Ukraine, 1996 and 2000 respectively. His research area includes e-government system, computer systems and simulation, distributed and cloud computing, software engineering and information system, computer architecture, information security for e-government, and multimedia system.

João Manuel R. S. Tavares graduated in Mechanical Engineering at the Universidade do Porto, Portugal, in 1992. He also earned his M.Sc. degree and Ph.D. degree in Electrical and Computer Engineering from the Universidade do Porto in 1995 and 2001 and attained his Habilitation in Mechanical Engineering in 2015. He is a senior researcher at the Instituto de Ciência e Inovação em Engenharia Mecânica e Engenharia Industrial (INEGI) and an associate professor at the Department of Mechanical Engineering (DEMec) of the Faculdade de Engenharia da Universidade do Porto (FEUP).

João Tavares is a co-editor of more than 55 books and co-author of more than 50 book chapters, 650 articles in international and national journals and conferences, and three international and three national patents. He has been a committee member of several international and national journals and conferences, is co-founder and co-editor of the book series *Lecture Notes in Computational Vision and Biomechanics* published by Springer, founder and editor-in-chief of the journal *Computer Methods in Biomechanics and Biomedical Engineering: Imaging and Visualization* published by Taylor & Francis, editor-in-chief of the journal *Computer Methods in Biomechanics and Biomedical Engineering* published by Taylor & Francis, and co-founder

and co-chair of the international conference series: CompIMAGE, ECCOMAS VipIMAGE, ICCEBS and BioDental. Additionally, he has been a (co-)supervisor of several M.Sc. and Ph.D. thesis and supervisor of several post-doc projects and has participated in many scientific projects both as researcher and as scientific coordinator.

Antonio Fernández-Caballero received his Master in Computer Science from the School of Computer Science at the Technical University of Madrid, Spain, and he received his Ph.D. from the Department of Artificial Intelligence of the National University for Distance Education, Spain. He is a full professor at the University of Castilla-La Mancha, Albacete, Spain. His interests enforce him to be part of the membership in National Society Networks AERFAI (Spanish Association of Pattern Recognition and Image Analysis), RTNAC (National Natural and Artificial Computation Network), RedAF (Physical Agents Network), AIPO (Association of Human–Computer Interaction) and Spanish Technology Platform on Robotics (Hisparob) and European networks euCognition (The European Network for the Advancement of Artificial Cognitive Systems), and SIMILAR (The European taskforce Creating human–machine interfaces SIMILAR to human–human communication).

George Papakostas received the Diploma degree in electrical and computer engineering in 1999 and the M.Sc. and Ph.D. degrees in electrical and computer engineering in 2002 and 2007, respectively, from the Democritus University of Thrace (DUTH), Greece. From 2007 to 2010, he served as an adjunct lecturer with the Department of Production Engineering and Management, DUTH. He currently serves as an adjunct assistant professor with the Department of Computer and Informatics Engineering, Technological Educational Institution, Eastern Macedonia and Thrace, Greece. In 2012, he was elected as a full professor in the aforementioned Department of Computer and Informatics Engineering. He has co-authored more than 70 publications in indexed journals, international conferences, and book chapters. His research interests include pattern recognition, computer/machine vision, computational intelligence, machine learning, feature extraction, evolutionary optimization, and signal and image processing.

Contributors

Shinu Abhi REVA Academy for Corporate Excellence (RACE) REVA University, Bangalore, India

S. Abhishek Department of Computer Science and Engineering, Amrita School of Computing, Amrita Vishwa Vidyapeetham, Amritapuri, India

Priyanka Acharya Vishwakarma Institute of Technology, Pune, Maharashtra, India

Sheikh Shemanto Afridi Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Chashu Agrawal Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India

P. Akhendra Kumar Department of Electronics and Communication Engineering, Faculty of Science and Technology (IcfaiTech), ICFAI Foundation for Higher Education, Hyderabad, India

G. Akila Department of Electronics and Communication Engineering, Meenakshi Sundararajan Engineering College, Chennai, India

Abdullah Al Noman Computer Science and Engineering Discipline, Khulna University, Khulna, Bangladesh

Diana A Andrushia Karunya Institute of Technology and Sciences, Coimbatore, India

T. Anjali Department of Computer Science and Engineering, Amrita School of Computing, Amrita Vishwa Vidyapeetham, Amritapuri, India

M. Antony Freeda Rani Department of Electrical and Electronics Engineering, DMI College of Engineering, Chennai, Tamil Nadu, India

S. M. Arafat Rahman Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Abu Shamim Mohammad Arif Computer Science and Engineering Discipline, Khulna University, Khulna, Bangladesh

Enoch Hall Asanda Makerere University, Kampala, Uganda

V. Z. Attar School of Computational Science, COEP Technological University, Pune, India

A. Azeroual Research Center STIS, M2CS, National Graduate School of Arts and Crafts of Rabat, Mohammed V University in Rabat, Rabat, Morocco;
Group of Biomedical Engineering and Pharmaceuticals Sciences, National Graduate School of Arts and Crafts of Rabat (ENSAM), Mohammed V University, Rabat, Morocco

S. Babeetha Department of Computing Technologies, College of Engineering and Technology, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India

M. S. Babitha Department of Electronics and Communication Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India

Y. Baby Kalpana CSE, P.A. College of Engineering and Technology, Pollachi, India

M. Selva Balan Central Water and Power Research Station, Pune, Maharashtra, India

Ashlyn Kim D. Balangcod Department of Mathematics and Computer Science, University of the Philippines Baguio, Baguio, Philippines

Asok Bandyopadhyay ICT and Servics Group, Centre For Development of Advanced Computing, Kolkata, India

Tushar Barai G.H.Raisoni College of Engineering Nagpur, Nagpur, Maharastra, India

Afruza Begum School of Computer Science Engineering, Vellore Institute of Technology, Chennai, India

T. Belhoussine Drissi Laboratory of Electrical and Industrial Engineering, Information Processing, Informatics, and Logistics (GEITIIL), Faculty of Science Ain Chock, University Hassan II—Casablanca, Casablanca, Morocco

Sivaiah Bellamkonda Computer Science and Engineering Department, Indian Institute of Information Technology, Kottayam, Kerala, India

Ilya Belousov Volgograd, Russian Federation

El Benany Mohamed Mahmoud Department of Mathematics and Computer Science, University of Nouakchott AL Aasriya, Nouakchott, Mauritania

Shajulin Benedict Indian Institute of Information Technology Kottayam, Kottayam District, Kerala, India

Chirag Bhandari Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India

Rakhi Bhardwaj Department of Computer Engineering, Vishwakarma Institute of Technology, Pune, India

Utpal Bhattacharjee Department of Computer Science and Engineering, Rajiv Gandhi University, Itanagar, Arunachal Pradesh, India

Nikunj Bhavsar Department of Computer Engineering, School of Engineering, P P Savani University, Kosamba, Surat, Gujarat, India

Shashank Bhosagi JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Ketan Bodhe G.H.Raisoni College of Engineering Nagpur, Nagpur, Maharastra, India

Bedrettin Çetinkaya Computer Engineering, Ted University, Ankara, Turkey

Shantanu Chakraborty Department of Computer Engineering and IT, COEP Technological University, Pune, India

Sai Chandu SR University, Warangal, Telangana, India

Yücel Çimtay Computer Engineering, Ted University, Ankara, Turkey

Mayur Chauhan Department of Computer Engineering, Gujarat Power Engineering and Research Institute (GPERI), Mehsana, Gujarat, India

Shreya Daga Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India

Pranav Dalve Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India

Bivas Dam Department of Instrumentation and Electronics, Jadavpur University, Kolkata, India

Anvay Deshpande Vishwakarma Institute of Technology, Pune, Maharashtra, India

W. Dhafer Research Center STIS, M2CS, National Graduate School of Arts and Crafts of Rabat, Mohammed V University in Rabat, Rabat, Morocco;
Group of Biomedical Engineering and Pharmaceuticals Sciences, National Graduate School of Arts and Crafts of Rabat (ENSAM), Mohammed V University, Rabat, Morocco

S. Dharini CMR Institute of Technology, Bengaluru, India

B. Dhiyanesh CSE, Dr. N.G.P. Institute of Technology, Coimbatore, India

A. Diana Andushia Department of Electronics and Communication Engineering, Karunya Institute of Technology and Sciences, Coimbatore, India

Mohamed El Moustapha El Arby Chrif Department of Mathematics and Computer Science, University of Nouakchott AL Aasriya, Nouakchott, Mauritania

Y. El Ouahabi Laboratory Health and Biology, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco

M. H. El yousfi Alaoui Research Center STIS, M2CS, National Graduate School of Arts and Crafts of Rabat, Mohammed V University in Rabat, Rabat, Morocco;
Group of Biomedical Engineering and Pharmaceuticals Sciences, National Graduate School of Arts and Crafts of Rabat (ENSAM), Mohammed V University, Rabat, Morocco

Kinjal Gautam Department of Computer Science and Engineering, School of Computer Science Engineering and Technology (SoCSET), ITM (SLS) Baroda University, Vadodara, Gujarat, India

R. Gayathri Department of Electronics and Communication Engineering, Sri Venkateswara College of Engineering, Sriperumbudur, India

Musa Genemo Gumushane University, Gumushane, Turkey

Pratham Ghatkar JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Yiga Gilbert Department of Computer Science, Makerere University, Kampala, Uganda

Pradnya N. Gokhale Sardar Patel College of Engineering, University of Mumbai, Mumbai, Maharashtra, India

Lokesh Gopinath Department of Electronics and Communication Engineering, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamil Nadu, India

Zameer Gulzar SR University, Warangal, Telangana, India

Fatma Nazli Günay Computer Engineering, Ted University, Ankara, Turkey

Cota Navin Gupta Neural Engineering Laboratory, Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, Guwahati, Assam, India

Samia Shameem Haque Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

P. M. Hareesh Computer Science and Engineering Department, Indian Institute of Information Technology, Kottayam, Kerala, India

N. Herald Anantha Rufus Department of Electronics and Communication Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, Tamil Nadu, India

Vishwanath R. Hulipalled School of C&IT, REVA University, Bangalore, India

Sanjay Jain CMR Institute of Technology, Bengaluru, India

Sanjeda Sara Jennifer Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Rajesh Kumar Jha Department of Electronics and Communication Engineering, Faculty of Science and Technology (IcfaiTech), ICFAI Foundation for Higher Education, Hyderabad, India

Sameer Joshi Miraj Nuclear Medicine AND Molecular Imaging Center, Miraj, Maharashtra, India

Tanmay Kadam Department of Computer Engineering, Vishwakarma Institute of Technology, Pune, India

Joshua Edward Kalungi Department of Computer Science, Makerere University, Kampala, Uganda

G. Kalyani Department of Information Technology, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, India

Bomken Kamdak Department of Computer Science and Engineering, Rajiv Gandhi University, Itanagar, Arunachal Pradesh, India

Al Kawsar Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Emmy William Kayanja Department of Computer Science, Makerere University, Kampala, Uganda

Ashfan Khan Vishwakarma Institute of Technology, Pune, Maharashtra, India

Vaishnavi V. Kulkarni School of CSE, REVA University, Bangalore, India; Department of Computer Science and Engineering, Amrita School of Computing Bengaluru, Amrita Vishwa Vidyapeetham, Bengaluru, India

Varun Vinod Kulkarni Department of Computer Science and Engineering, Amrita School of Computing Bengaluru, Amrita Vishwa Vidyapeetham, Bengaluru, India

Puranam Revanth Kumar Department of Electronics and Communication Engineering, Faculty of Science and Technology (IcfaiTech), ICFAI Foundation for Higher Education, Hyderabad, India

Ankita Kumari Vishwakarma Institute of Technology, Pune, Maharashtra, India

Mayuri Kundu School of CSE, REVA University, Bangalore, India

Jonah Mubuuke Kyagaba Department of Computer Science, Makerere University, Kampala, Uganda

Sagar Lahade Pimpri Chinchwad College of Engineering, Pune, India

M. Lasya Department of IT, VR Siddhartha Engineering College, Vijayawada, India

Prabhat Mali Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, Lalitpur, Bagmati, Nepal

A. Manasa Department of ECE, G. Narayanamma Institute of Technology and Science (for women), Hyderabad, Telangana, India

K. Manivannan Department of Computer Science and Engineering, Faculty of Engineering and Technology, Jain (Deemed-to-be University), Bengaluru, Karnataka, India

Ggaliwango Marvin Department of Computer Science, Makerere University, Kampala, Uganda

H. Massar Laboratory of Electrical and Industrial Engineering, Information Processing, Informatics, and Logistics (GEITIIL), Faculty of Science Ain Chock, University Hassan II—Casablanca, Casablanca, Morocco;
Research Center STIS, M2CS, National School of Arts and Crafts of Rabat (ENSAM), Mohammed V University in Rabat, Rabat, Morocco

James Mayanja Makerere University, Kampala, Uganda

A. Mehathab Data Scientist with Specialization in Remote Sensing, Expertz Lab Technologies, Kochi, Kerala, India

Pranay Meshram G.H.Raisoni College of Engineering Nagpur, Nagpur, Maharastra, India

M. Miyara Computer Science and Systems Laboratory (LIS), Faculty of Science Ain Chock, University Hassan II—Casablanca, Casablanca, Morocco

Moustapha Mohamed Saleck LAROSERI Laboratory, Department of Computer Sciences, Faculty of Sciences, University of Chouaib Doukkali, El Jadida, Morocco

Monish Mohanty Department of Computer Science and Engineering, Amrita School of Computing Bengaluru, Amrita Vishwa Vidyapeetham, Bengaluru, India

Himanka Sekhar Mondal ICT and Servics Group, Centre For Development of Advanced Computing, Kolkata, India

Vijaya B. Musande Department of Computer Science and Engineering, Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra, India

Joshua Mwesigwa Makerere University, Kampala, Uganda

B. Nsiri Research Center STIS, M2CS, National Graduate School of Arts and Crafts of Rabat (ENSAM), Mohammed V University in Rabat, Rabat, Morocco;
Group of Biomedical Engineering and Pharmaceuticals Sciences, National Graduate School of Arts and Crafts of Rabat (ENSAM), Mohammed V University, Rabat, Morocco

Nagi Ould Taleb Computer Sciences Department, Higher Institute of Digital, Nouakchott, Mauritania

Jaderick P. Pabico Institute of Computer Science, University of the Philippines Los Baños, College, Laguna, Philippines

Barnali Pal ICT and Servics Group, Centre For Development of Advanced Computing, Kolkata, India

Lakshmi Harika Palivela School of Computer Science Engineering, Vellore Institute of Technology, Chennai, India

Sanjeeb Prasad Panday Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, Lalitpur, Bagmati, Nepal

Kinjal Patel Faculty of Computer Applications and Information Technology, Gujarat Law Society University, Ahmedabad, Gujarat, India

Peeta Basa Pati Department of Computer Science and Engineering, Amrita School of Computing Bengaluru, Amrita Vishwa Vidyapeetham, Bengaluru, India

Babasaheb R. Patil VIMEET, University of Mumbai, Mumbai, Maharashtra, India

Prathamesh Patil JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Dipak Chandra Patranabis Department of Instrumentation and Electronics, Jadavpur University, Kolkata, India

Kaveri Pawar JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Prathibha Prakash Department of Computer Science and Engineering, Amrita School of Computing, Amrita Vishwa Vidyapeetham, Amritapuri, India

V. Premanand School of Computer Science Engineering, Vellore Institute of Technology, Chennai, India

R. Radha EEE, Study World College of Engineering, Coimbatore, India

S. Rajkumar Sona College of Technology, Salem, India

K. Ravi SR University, Warangal, Telangana, India

Md. Redwan Ahmed Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

S. M. Renuka Devi Department of ECE, G. Narayanamma Institute of Technology and Science (for women), Hyderabad, Telangana, India

Ahmed Wasif Reza Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Sharmin Akther Rima Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

Aleksey Rogachev Volgograd, Russian Federation

Dmitry Rogachev VNIIGiM named after Kostyakov, Moscow, Russian Federation

A. Ruhan Bevi Department of Electronics and Communication Engineering, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamil Nadu, India

Md. Sajid Anam Ifti Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh

P. Sajitha Karunya Institute of Technology and Sciences, Coimbatore, India

Priyanka Sakpal JSPM's Rajarshi Shahu College of Engineering, Pune, Maharashtra, India

Tanmayee Samantaray Neural Engineering Laboratory, Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, Guwahati, Assam, India

Rushikesh Sanap Department of Computer Engineering and IT, COEP Technological University, Pune, India

Ashwini Sanjay Gaikwad Department of Computer Science and Engineering, Jawaharlal Nehru Engineering College, Aurangabad, Maharashtra, India

Bhakti Sarag Department of Computer Engineering, Vishwakarma Institute of Technology, Pune, India

P. Saraswathi IT, Velammal College of Engineering and Technology, Madurai, India

S. Satish Department of Electronics and Communication Engineering, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai, Tamil Nadu, India

Rajesh Saturi Department of CSE, Vignana Bharathi Institute of Technology, Ghatkesar, Hyderabad, India

R. Senthil Rama Department of Electrical and Electronics Engineering, DMI College of Engineering, Nagercoil, Tamil Nadu, India

S. K. Shabeer Department of IT, VR Siddhartha Engineering College, Vijayawada, India

Milind Shah Department of Computer Science and Engineering, Krishna School of Emerging Technology and Applied Research (KSET), Drs. Kiran and Pallavi Patel Global University (KPGU), Vadodara, Gujarat, India

Aman Shakya Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering, Tribhuvan University, Lalitpur, Bagmati, Nepal

Sahil Shendurkar Department of Computer Engineering, Vishwakarma Institute of Technology, Pune, India

Swati Shinde Pimpri Chinchwad College of Engineering, Pune, India

Aditya Shreeram Neural Engineering Laboratory, Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati, Guwahati, Assam, India

Jay B. Simha REVA Academy for Corporate Excellence (RACE) REVA University, Bangalore, India

A. Soulaymani Laboratory Health and Biology, Faculty of Sciences, Ibn Tofail University, Kenitra, Morocco

S. S. Sridhar Department of Computing Technologies, College of Engineering and Technology, SRM Institute of Science and Technology, Chengalpattu, Tamil Nadu, India

G. Srikanth Reddy Department of CSE, Vignana Bharathi Institute of Technology, Ghatkesar, Hyderabad, India

D. Srinivas Goud Department of CSE, Vignana Bharathi Institute of Technology, Ghatkesar, Hyderabad, India

Konumuri Kalyan Suhas Department of Information Technology, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, India

S. S. Suni Ilahia College of Engineering and Technology, Ernakulam, India

S. Suresh CSE, KPR Institute of Engineering and Technology, Coimbatore, India

Mandava Venkata Sri Sai Surya Department of Information Technology, Velagapudi Ramakrishna Siddhartha Engineering College, Vijayawada, India

Muddayya Swami Department of Computer Engineering and IT, COEP Technological University, Pune, India

Mohammad Tahir G.H.Raisoni College of Engineering Nagpur, Nagpur, Maharastra, India

Gom Taye Department of Computer Science and Engineering, Rajiv Gandhi University, Itanagar, Arunachal Pradesh, India

Pius Tumwebaze Makerere University, Kampala, Uganda

Adriana Margarita Turriate-Guzman Universidad Privada del Norte, Lima, Peru

Radhesyam Vaddi Department of IT, VR Siddhartha Engineering College, Vijayawada, India

Chandrasekar Venkatachalam Department of Computer Science and Engineering, Faculty of Engineering and Technology, Jain (Deemed-to-be University), Bengaluru, Karnataka, India

Shanmugavalli Venkatachalam Department of Computer Science and Engineering, KSR College of Engineering, Tiruchengode, Tamil Nadu, India

N. Venkatesh School of CS & AI, SR University, Warangal Urban, Telangana, India

M. Venkateshwara Rao Department of CSE, Vignana Bharathi Institute of Technology, Ghatkesar, Hyderabad, India

Rachit Verma Indian Institute of Information Technology Kottayam, Kottayam District, Kerala, India

Sundeep Vijayaraghavan Department of Plastic and Reconstructive Surgery, Amrita School of Medicine, Kochi, India

Sofía Alessandra Villar-Quispe Universidad Privada del Norte, Lima, Peru

S. Vishal Department of Computer Science and Engineering, Amrita School of Computing Bengaluru, Amrita Vishwa Vidyapeetham, Bengaluru, India

Shubham Waghule Department of Computer Engineering, Vishwakarma Institute of Technology, Pune, India

Medha Wyawahare Vishwakarma Institute of Technology, Pune, Maharashtra, India;
Department of Electronics and Telecommunication Engineering, Vishwakarma Institute of Technology, Pune, India

Gökçe Nur Yılmaz Computer Engineering, Ted University, Ankara, Turkey

Meftahul Zannat Department of Computer Science and Engineering, East West University, Dhaka, Bangladesh