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E. S. Gopi • P Maheswaran
Editors

Proceedings of the International Conference on Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication

MDCWC 2023

International Conference on Machine Learning, Deep
Learning and Computational Intelligence for Wireless
Communication

 Springer

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*Dedicated to Past, Present and Future
Students*

Preface

Due to the availability of high-speed computing systems, there is a huge scope to still raise the standard of wireless communication in terms of massive connectivity, capacity enhancement, ultra-high reliability, and low latency using machine learning (ML), deep learning (DL) and computational intelligence (CI) algorithms. There is a requirement in bringing out the wireless research community and machine learning research community to submit their findings integrating ML, DL and CI for wireless communication. With this as an objective, the First International Conference on Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication (MDCWC2020) was launched during 22nd to 24th October 2020 as a virtual event at NIT, Tiruchirappalli. The proceedings of MDCWC2020 were published as the Lecture Notes in Electrical Engineering by Springer (<https://link.springer.com/book/10.1007/978-981-16-0289-4>). Later MDCWC2021 was launched as the special session during IEEE International conference on Information and Automation for Sustainability (ICIAFS) during 11th August to 13th August 2021. Later MDCWC2022 was launched as the long virtual workshop during 30th May to 24th June 2022.

As the sequel, Second International Conference MDCWC2023 was conducted as the Hybrid event during 22nd to 24th June 2023. This book consists of the reviewed papers of MDCWC2023 grouped under the following topics: (a) Machine Learning, Deep Learning and Computational Intelligence Algorithms; (b) Wireless Communication Systems; (c) Mobile Data Applications. We thank those directly and indirectly involved in executing the hybrid event MDCWC2023 successfully. Thanks

Convener and Programme Chair
MDCWC2023
NITT
June, 2023

Dr. E. S. Gopi

About the Book

The Second International Conference on Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication 2023 (MDCWC2023) has attracted 158 papers from across India and the globe. Out of this, 53 papers are selected for presentation and publication. The aim of the conference is to showcase the state-of-the-art research in the areas where machine learning, deep learning, computational intelligence, and wireless communications intersect. The accepted papers cover the topics which are divided into three parts, viz. Part I Machine Learning, Deep Learning, and Computational Intelligence, Part II Wireless Communications, and Part III Mobile Data Application. Brief summary of the papers in the aforementioned parts is given below:

Part I Machine Learning, Deep Learning, and Computational Intelligence:

This part covers the application of machine learning algorithms to various applications such as protection from privacy threats, speech recognition, usage of artificial intelligence in controlling pests in agriculture, etc. Further, an integrated optimization technique with support vector machine for feature selection is proposed using binary particle swarm optimization along with binary successive approximation. A finite impulse response predictor system based on artificial intelligence is also proposed. A work in this part uses predictive models on text data for human personality prediction. A dehazing algorithm named Channel-Pixel-Spatial Feature Fusion Network (CPSNet) is also proposed. Moreover, topics like sensor data fusion, adaptive learning in neural network architecture, improvement of energy efficiency by employing ant colony algorithm and cat swarm optimization algorithm are covered in this part.

Part II Wireless Communications:

In this part, different machine learning techniques are applied to address different aspects of wireless communications. Intrusion detection in 5G technologies by integrating long-short term memory and particle swarm optimization is carried out. The performance of polar decoding using linear code mapping with feedback-based ANN is analysed in one of the works. Improved random forest algorithm is used to classify the packets in software-defined networks in another work. Further, this part also covers topics such as optimal data transmission path in wireless sensor

networks using machine learning, blockchain-based solution for KYC, bit error rate performance of OFDM index modulation under various channel models, non-orthogonal multiple access for IoT, improved wireless indoor localization with deep learning algorithms, design of antenna parameters using machine learning, and dual mode OFDM index modulation for wireless communications.

Part III Mobile Data Application:

This part covers state-of-the-art research on the application of image processing and signal processing with machine learning in health care and other areas. Topics such as surface water-body extraction from satellite image, macular degeneration detection in retina, lung disease classification from CT images, machine learning-based women safety solutions with alert system, smart agriculture using IoT, breast cancer detection with deep learning and bio-inspired optimization algorithm, malaria parasite detection and COVID-19 detection based on deep learning, automatic license plate reading on vehicles, sentiment classification and analysis based on YouTube comments, application of machine learning for prediction of diabetes and heart disease, etc. are also covered in this part.

Overall, the scientific findings of the authors and the applications of various algorithms to address problems in real-life applications in different domains have given a complete coverage to the wide range of topics that come under the gamut of machine learning, deep learning, and computational intelligence and their application in wireless communications.

Thanks

Coordinator

MDCWC2023

National Institute of Technology, Tiruchirappalli, India

June, 2023

Dr. P Maheswaran

Organization

Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication (MDCWC 2023) is the second international online workshop organized by the Pattern Recognition and the Computational Intelligent Division, Department of Electronics and Communication Engineering, National Institute of Technology Tiruchirappalli. It was conducted completely in the Hybrid mode from 22nd to 24th June 2023

The keynote speakers include the following: (a) Prof. Arumugam Nallanathan, Professor of Wireless Communications, FIEEE, FIET, CEng, Web of Science Highly Cited Researcher, Founding Head of Communication Systems Research (CSR) Group, School of Electronic Engineering and Computer Science, Queen Mary University of London, on “Federated Learning for Energy Limited Wireless Networks” (b) Dr. Jithin Jagganathan, Chief Scientist of Technology, ANDRO Computational Solutions, LLC, Founding Director of Marconi-Rosenblatt AI/ML Innovation Lab Adjunct Assistant Professor, Department of Electrical Engineering at the University at Buffalo IEEE Senior Member, IEEE Region 1 Technological Innovation Awardee AFCEA International Meritorious Rising Star Awardee, AFCEA 40 Under 40, on “Radio Frequency Models Machine Learning for Edge Deployment: How to Design AI/ML Models for NextG Wireless Applications”.

The invited talk includes the following: (a) Dr. Prabhat Kumar Sharma, Department of Electronics and Communication Engineering, Visvesvaraya National Institute of Technology, Nagpur, India, on “Biological and Molecular Communications: Fundamentals, Evolution and Role in 6G and Beyond Communication”. (b) Dr. G. Swaminathan, Department of Electronics and Communication Engineering, Indian Institute of Technology Indore, on “Automatic Code and Interleaver Classification Using Conventional and ML Techniques”. (c) Dr. Rahul Meshram, Department of Electrical Engineering, Indian Institute of Technology Madras, on “Reinforcement learning algorithms for restless Multi-armed Bandit Problem”. (d) Dr. Narayanan C Krishnan, Head, Department of Data Science, Indian Institute of Technology Palakkad, on “GAN – Characterizing Its Convergence and Its Application to Zero-Shot Learning”. Workshop was conducted by Chandhar Research Labs, Chennai.

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Contents

Part I Machine Learning, Deep Learning and Computational Intelligence	
A Novel Hierarchical Clustering Technique to Analyze Style and Content Factorization During Image Recognition	3
R. Harine Rajashree, K. Sundarakantham, and S. Mercy Shalinie	
Exploring Model-Level Transfer Learning to Improve the Recognition of Sinhala Speech	17
Lakshika Nanayakkara and Ruvan Weerasinghe	
Metaheuristics Feature Selection Algorithms for Identification and Classification of Mango Pests Diseases	29
Muthaiah Uchimuthu, Veeramani Sonai, S. Chitra, and Ram Vinod Roy	
An Integrated Optimization Technique with SVM for Feature Selection	39
Teena Mittal	
A Constant Binomial Coefficient Difference Equation Based FIR Predictor System for Signal Processing and Data Mining	49
Munaza Ramzan and G. M. Rather	
Generating Synthetic Text Data for Improving Class Balance in Personality Prediction	59
Dhruvil Lakhtaria, Durga Supriya H. L., Radhika Chhabra, Rohit Taparia, and Anand Kumar M.	
CPSNet: Channel Pixel Spatial Feature Fusion Network for Image Dehazing	71
D. Pushpalatha and P. Prithvi	
ATCBCB: A Novel Optimizer for Neural Network Architectures	79
Shubhankar Bhakta, Utpal Nandi, Kuheli Ray Mahapatra, Moirangthem Marjit Singh, Sudipta Kr Ghosal, and Bachchu Paul	

Application of Dempster-Shafer Theory in Sensor Data Fusion	91
Pushpanjali Kumari, S. R. N. Reddy, and Richa Yadav	
Examining the Ant Colony Algorithm and the Cat Swarm Algorithm to Improve Energy Efficiency	103
A. Kannappan and R. M. Bommi	
Machine Learning-Based Online Visual Tracking with Multi-featured Adaptive Kernel Correlation Filter	113
P. Ranjithkumar and S. Nivethini	
 Part II Wireless Communication	
Integrating Long Short-Term Memory and Particle Swarm Optimization for Intrusion Detection in 5G Technologies	125
B. Hariprasad and K. P. Sridhar	
Performance Analysis of Polar Decoding Using Linear Code Mapping with Feedback Based ANN Architecture	139
Kotturi Sai Harshitha and E. S. Gopi	
Packet Classification Using Improved Random Forest Algorithm	157
Veeramani Sonai and Indira Bharathi	
A Machine Learning Perspective of Optimal Data Transmission in Wireless Sensor Networks (WSN)	169
Veeramani Sonai, Indira Bharathi, and Muthaiah Uchimuthu	
Blockchain and IPFS-Based Solution for KYC	177
Sheetal Phatangare, Omkar Patil, Pratik Patil, Tanishk Patil, and Pranav Waghmare	
Analysis and Comparison of BER Performance of OFDM-IM Under Various Fading Channels Using Conventional Detectors	187
Chilupuri Anusha and S. Anuradha	
A Survey of Non-orthogonal Multiple Access for Internet of Things and Future Wireless Networks	199
Bibekananda Panda, Dhayan Dhananjaya Senanayake, S. Athukoralalage Manuli Thisara Gunathilake, and Poonam Singh	
Improved 3D Wireless Indoor Localization with Deep Learning Algorithms	211
M. W. P. Maduranga, H. K. I. S. Lakmal, Valmiki Tilwari, W. A. A. M. Wanniarachchi, and W. M. S. R. B. Wijayarathne	
Implementing Machine Learning for Design and Evaluation of Antenna Parameters	223
G. Sahaya Stalin Jose, P. Brindha, and J. Merin Joshiba	

A MIMO Dual-Mode Homogenous OFDM IM System for Next-Generation Communications	235
Bandi Narasimha Rao and Anuradha Sundru	
Probability Boosted Regression for Intrusion Detection in Cyberactive Space	247
R. Latha and R. M. Bommi	
Part III Mobile Data Application	
Surface Water Body Extraction for Landsat-8 (OLI) Imagery Using Water-Indices Methods and SCM Techniques	263
B. Chandrababu Naik, Bairam Ravi Kumar, K. Vasu Babu, K. Purushotham Prasad, and K. Sai Venu Prathap	
Automated Age-Related Macular Degeneration Diagnosis in Retinal Fundus Images via ViT	271
Niranjana Vannadil and Priyanka Kokil	
Traffic Light Simulation Using ALP	281
Gopal D. Upadhye, Ramesh G. Bhopale, Rushikesh D. Borse, Tushar K. Bhalchim, and Rajas S. Bhise	
DNN-ILD: A Transfer Learning-Based Deep Neural Network for Automated Classification of Interstitial Lung Disease from CT Images ...	293
Sanjib Saha and Debashis Nandi	
Image Manipulation Detection Using Augmentation and Convolutional Neural Networks	311
Annant Maheshwari, Rishi Jain, Ritika Mahapatra, Saagar Palakuru, and M. Anand Kumar	
Smart Women Safety Solution with Alert System Using Machine Learning Approach	321
Jyoti Kanjalkar, Shruti Hiremath, Prerana Kokane, Sakshi Korhale, Himani Malani, and Pramod Kanjalkar	
Cyberbullying Detection Using BiLSTM Model	339
M. S. Lekshmi, Ashna Mariya Shaji, and Sreekumar K. Amrita	
Smart Agriculture Using Internet of Things	351
C. Srinivasan, P. Sridhar, S. Evangeline Priyaa, A. Gifta Gold Wise, and R. Kaviya	
Breast Cancer Detection from Mammograms Using Deep Learning and Bio-inspired Optimization Algorithm	361
Mehvish Firdous, Sanjay Sharma, and Anuj Mahajan	

Detection of Echinoderms Underwater Using Deep Learning Network ... 375
Utkarsh Srivastava, Adithya Balaji, S. Yogesh, C. K. Kalyaan,
R. Narayanamoorthi, and Samiappan Dhanalakshmi

Malaria Parasite Detection Using Deep Learning 387
Sunil Jorwal, Ankit, Aman Tibrewal, Kumar Saurav, and Smriti Agarwal

**FiltDeepNet: Architecture for COVID Detection based on Chest
X-Ray Images..... 399**
S. Sethu Selvi, Nikhil Agarwal, Paarth Barkur, Yash Mishra,
and Abhishek Kumar

Novel Approaches to Automatic License Plate Reading (ALPR) 413
Akshay Prakash, Ashin Babu, and A. G. Hari Narayanan

**Crop Prediction Expert System with Ensemble Machine
Learning Technique..... 423**
Sumana De

**A Comparative Analysis of Single Image-Based Face Morphing
Attack Detection..... 435**
G. R. Chalini and K. V. Kanimozhi

**Classifiers for Sentiment Analysis of YouTube Comments: A
Comparative Study 443**
Naeema Nahas, P. Swetha, and R. Nandakumar

**Traffic Monitoring System Detecting Overspeed and Accidents
from Video Input Using OpenCV and Digital Image Processing 453**
Anashwara Muralidharan, Swathi Chandran, P. Krishnapriya,
and K. Sreekumar

**An Experimental Comparative Analysis of Human Abnormal
Action Identification on “SAIAZ” Video Dataset Using SVM,
ResNet50, and LSTM Model..... 467**
S. Manjula and M. Sharmila Begum

**Comparative Study on Malicious URL Using Classifiers
and Boosting Algorithms 485**
Bhadra Jithesh Nair, E. Kavya, and R. Nandakumar

Automation in Natural Rubber Latex Harvesting Field: A Review 497
Hanna Shukoor, M. S. Suchithra, and Jayakrushna Sahoo

**Feature Selection-Based Machine Learning Model for Malware
Detection 509**
Lubna Javaid Haji and Sudesh Kumar

Application of Machine Learning Algorithm for Prediction of Diabetes and Heart Diseases 521
A. Apoorva, C. R. Archana, T. Teena, P. Vanitha, and R. Chandrasekaran

Damage Detection on Historical Structure Using Image Processing 533
M. S. Nisha, Cassandra Baptista, A. Nikhil, and Pradum Behl

Eye Disease Classification Using VGG-19 Architecture 545
G. Ravi, M. Prasanth, and S. Rajendran

Automatic Photo Enhancer Using Machine Learning and Deep Learning with Python 553
S. Saravanan, Hemal Shingloo, Nameera Sajid, Navneet Lamba, Akshyansu Pritam, and Anupam Srivastava

Robust Touch-Free Palm Vein Sensor Authentication System 565
Vijayakumar Ponnusamy, R. Madhava, E. Balasabarish, Kosuri Harshitha Durga, and M. Sangeetha

An Effective Machine Learning-Based Malware Detection Approach 575
Kunjal Singh, Siddhant Thapliyal, Neha Tripathi, Mohammad Wazid, and D. P. Singh

Exploring the Performance of Various Classification Algorithms for Masked Face Recognition Using CNN-Based Features 585
T. Geethu Krishna, Krishna Anil, and K. Sreekumar

Chess Game Using Assembly Language Programming 593
Gopal D. Upadhye, Al-Hussain Hakim Shaikh, Akshay Jadhav, Aakash Matkar, and Anish Bonde

Deep Artificial Neural Network for Software Effort Estimation 605
A. G. Priya Varshini, K. Anitha Kumari, E. Sneha, M. Sampathkumar, and D. Janarthanababu

“Legal Owl”: An Application for Machine-Generated Legal Aid Using NLP 615
Sangita Jaybhaye, Anoushka Mudkhedkar, Siddhi Chavan, Vedant Bhosle, and Arnab Mukkawar

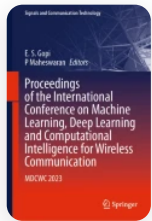
Index 627

[Home](#) > [Proceedings of the International Conference on Machine Learning, Deep Learning and Computational Intelligence for Wireless Communication](#) > Conference paper

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Abstract

Interstitial lung disease (ILD) is a term commonly used to refer to several types of lung disorders that are harmful to humans. ILD is challenging to categorize. Analyzing the type of ILD from computed tomography (CT) images by radiologists is very time-consuming. Computer-aided diagnostic (CAD) technology has been constructed to excite detection. This work introduces one such method that relies on convolutional neural networks (CNN) to detect ILD from chest CT images. We examined domain-specific neural networks and pre-trained neural networks for problem-solving. We introduced various approaches to enhance a CNN's capability in categorizing ILD. We have proposed a new deep neural network (DNN) based on the modified DenseNet121 with hyper-parameter tuning and fivefold cross-validation. The performance of the proposed model is measured using accuracy and confusion matrix. The test accuracy of four types of detection (pulmonary fibrosis, hypersensitivity pneumonitis, tuberculosis, and healthy lung) on ResNet50, VGG16, and modified DenseNet121 models are 62%, 86.2%, and 89.6%, respectively. The proposed method has achieved better training, validation, and test accuracy on the MedGIFT ILD dataset and outperforms the state-of-the-art models.

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