Lecture Notes in Electrical Engineering 778

Ankur Choudhary
Arun Prakash Agrawal
Rajasvaran Logeswaran
Bhuvan Unhelkar *Editors*

Applications of Artificial Intelligence and Machine Learning

Select Proceedings of ICAAAIML 2020

Springer

Lecture Notes in Electrical Engineering

Volume 778

Series Editors

Leopoldo Angrisani, Department of Electrical and Information Technologies Engineering, University of Napoli Federico II, Naples, Italy
Marco Arteaga, Departament de Control y Robótica, Universidad Nacional Autónoma de México, Coyoacán, Mexico
Bijaya Ketan Panigrahi, Electrical Engineering, Indian Institute of Technology Delhi, New Delhi, Delhi, India
Samarjit Chakraborty, Fakultät für Elektrotechnik und Informationstechnik, TU München, Munich, Germany
Jiming Chen, Zhejiang University, Hangzhou, Zhejiang, China
Shanben Chen, Materials Science and Engineering, Shanghai Jiao Tong University, Shanghai, China
Tan Kay Chen, Department of Electrical and Computer Engineering, National University of Singapore, Singapore, Singapore
Rüdiger Dillmann, Humanoids and Intelligent Systems Laboratory, Karlsruhe Institute for Technology, Karlsruhe, Germany
Haibin Duan, Beijing University of Aeronautics and Astronautics, Beijing, China
Gianluigi Ferrari, Università di Parma, Parma, Italy
Manuel Ferre, Centre for Automation and Robotics CAR (UPM-CSIC), Universidad Politécnica de Madrid, Madrid, Spain
Sandra Hirche, Department of Electrical Engineering and Information Science, Technische Universität München, Munich, Germany
Faryar Jabbari, Department of Mechanical and Aerospace Engineering, University of California, Irvine, CA, USA
Limin Jia, State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University, Beijing, China
Janusz Kacprzyk, Systems Research Institute, Polish Academy of Sciences, Warsaw, Poland
Alaa Khamis, German University in Egypt El Tagamoa El Khames, New Cairo City, Egypt
Torsten Kroeger, Stanford University, Stanford, CA, USA
Yong Li, Hunan University, Changsha, Hunan, China
Qilian Liang, Department of Electrical Engineering, University of Texas at Arlington, Arlington, TX, USA
Ferran Martín, Departament d'Enginyeria Electrònica, Universitat Autònoma de Barcelona, Bellaterra, Barcelona, Spain
Tan Cher Ming, College of Engineering, Nanyang Technological University, Singapore, Singapore
Wolfgang Minker, Institute of Information Technology, University of Ulm, Ulm, Germany
Pradeep Misra, Department of Electrical Engineering, Wright State University, Dayton, OH, USA
Sebastian Möller, Quality and Usability Laboratory, TU Berlin, Berlin, Germany
Subhas Mukhopadhyay, School of Engineering & Advanced Technology, Massey University, Palmerston North, Manawatu-Wanganui, New Zealand
Cun-Zheng Ning, Electrical Engineering, Arizona State University, Tempe, AZ, USA
Toyoaki Nishida, Graduate School of Informatics, Kyoto University, Kyoto, Japan
Federica Pascucci, Dipartimento di Ingegneria, Università degli Studi "Roma Tre", Rome, Italy
Yong Qin, State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University, Beijing, China
Gan Woon Seng, School of Electrical & Electronic Engineering, Nanyang Technological University, Singapore, Singapore
Joachim Speidel, Institute of Telecommunications, Universität Stuttgart, Stuttgart, Germany
Germano Veiga, Campus da FEUP, INESC Porto, Porto, Portugal
Haitao Wu, Academy of Opto-electronics, Chinese Academy of Sciences, Beijing, China
Junjie James Zhang, Charlotte, NC, USA

The book series *Lecture Notes in Electrical Engineering* (LNEE) publishes the latest developments in Electrical Engineering - quickly, informally and in high quality. While original research reported in proceedings and monographs has traditionally formed the core of LNEE, we also encourage authors to submit books devoted to supporting student education and professional training in the various fields and applications areas of electrical engineering. The series cover classical and emerging topics concerning:

- Communication Engineering, Information Theory and Networks
- Electronics Engineering and Microelectronics
- Signal, Image and Speech Processing
- Wireless and Mobile Communication
- Circuits and Systems
- Energy Systems, Power Electronics and Electrical Machines
- Electro-optical Engineering
- Instrumentation Engineering
- Avionics Engineering
- Control Systems
- Internet-of-Things and Cybersecurity
- Biomedical Devices, MEMS and NEMS

For general information about this book series, comments or suggestions, please contact leontina.dicecco@springer.com.

To submit a proposal or request further information, please contact the Publishing Editor in your country:

China

Jasmine Dou, Editor (jasmine.dou@springer.com)

India, Japan, Rest of Asia

Swati Meherishi, Editorial Director (Swati.Meherishi@springer.com)

Southeast Asia, Australia, New Zealand

Ramesh Nath Premnath, Editor (ramesh.premnath@springernature.com)

USA, Canada:

Michael Luby, Senior Editor (michael.luby@springer.com)

All other Countries:

Leontina Di Cecco, Senior Editor (leontina.dicecco@springer.com)

**** This series is indexed by EI Compendex and Scopus databases. ****

More information about this series at http://www.springer.com/series/7818

Ankur Choudhary · Arun Prakash Agrawal ·
Rajasvaran Logeswaran · Bhuvan Unhelkar
Editors

Applications of Artificial Intelligence and Machine Learning

Select Proceedings of ICAAAIML 2020

Springer

Editors
Ankur Choudhary
Department of Computer Science
and Engineering
Sharda University
Greater Noida, Uttar Pradesh, India

Arun Prakash Agrawal
Department of Computer Science
and Engineering
Sharda University
Greater Noida, Uttar Pradesh, India

Rajasvaran Logeswaran
Asia Pacific Centre for Analytics (APCA),
Asia Pacific University of Technology
and Innovation (APU)
Kuala Lumpur
Malaysia

Bhuvan Unhelkar
Information Technology
University of South Florida Sarasota–
Manatee Campus
Sarasota, FL, USA

ISSN 1876-1100 ISSN 1876-1119 (electronic)
Lecture Notes in Electrical Engineering
ISBN 978-981-16-3066-8 ISBN 978-981-16-3067-5 (eBook)
https://doi.org/10.1007/978-981-16-3067-5

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2021
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

ICAAAIML-2020

General Chair

Prof. Parma Nand, Dean, School of Engineering & Technology, Sharda University, Greater Noida, India
Prof. Rajasvaran Logeswaran, Head, Asia Pacific Centre for Analytics (APCA), Asia Pacific University of Technology and Innovation (APU), Kuala Lumpur, Malaysia
Prof. Bhuvan Unhelkar, Professor, University of South Florida, USA

General Co-Chair

Prof. Nitin Rakesh, Head of Department, Department of CSE, Sharda University, Greater Noida, India

Convener & Conference Chair

Prof. Ankur Choudhary, School of Engineering & Technology, Sharda University, Greater Noida, India
Prof. Arun Prakash Agrawal, School of Engineering & Technology, Sharda University, Greater Noida, India

Organizing Chairs

Prof. Rani Astya, SET, Sharda University, Greater Noida, India
Prof. Gaurav Raj, SET, Sharda University, Greater Noida, India
Prof. Abhishek Singh Verma, SET, Sharda University, Greater Noida, India

Publicity Chairs

Prof. Vishal Jain, SET, Sharda University, Greater Noida, India
Prof. Ranjeet Rout, National Institute of Technology, Srinagar, India

Preface

Artificial intelligence (AI) has become a buzzword in the last two decades. The capability of digital computers or computer-controlled robots to perform activities, viz. reasoning, finding importance, summing up, and gaining knowledge, from experience is called artificial intelligence. Systems that are blessed with intellectual processes—earlier considered a characteristic of humans only—are called artificially intelligent systems. Unlike passive machines, artificially intelligent algorithms make decisions by frequently utilizing real-time data. AI systems join the data from a wide range of sources—sensors, remote inputs, or digital information—analyze the data instantly, derive insights from this data, and follow it up. AI is an exciting horizon in the world of computer science, empowering technology to advance in ways never before possible.

Machine learning (ML), deep learning, and neural networks are the three fundamental concepts of AI. While AI and machine learning are sometimes considered interchangeable terms, AI covers a broad domain with the rest of the terms as a subset of it. Machine learning is a part of AI that enables machines to learn without explicitly programming them to perform a task.

Keeping in view the importance of AI and ML in today's era, ICAAAIML'2020 provided a forum for researchers, engineers, and practitioners from computer science, data analytics, medical informatics, biomedical engineering, healthcare engineering, and other engineering disciplines to share and exchange their knowledge and progresses of current research issues, technologies, and recent advances and applications of AI in various domains.

This proceedings volume includes 54 articles selected from those presented at ICAAAIML'2020, addressing a wide spectrum of important issues such as artificial intelligence and its applications in smart education, big data and data mining, challenges of smart cities future research directions, image/video processing, machine learning applications in smart healthcare, manufacturing, security and privacy challenges and data analytics, soft computing and smart infrastructure and resource development and management using artificial intelligence and machine learning. The editors would like to thank all the authors for their excellent work and the reviewers from all over the world for their valuable critiques and commitment to

help the authors in improving the quality of their manuscripts. Special thanks are extended to Springer for publishing this proceedings volume and to our families for their support.

Greater Noida, India — Ankur Choudhary
Greater Noida, India — Arun Prakash Agrawal
Kuala Lumpur, Malaysia — Rajasvaran Logeswaran
Sarasota, USA — Bhuvan Unhelkar

Contents

Artificial Intelligence and Its Applications in Smart Education

Building a Language Data Set in Telugu Using Machine Learning Techniques to Address Suicidal Ideation and Behaviors in Adolescents 3
K. Soumya and Vijay Kumar Garg

Feature Selection and Performance Comparison of Various Machine Learning Classifiers for Analyzing Students' Performance Using Rapid Miner 13
Vikas Rattan, Varun Malik, Ruchi Mittal, Jaiteg Singh, and Pawan Kumar Chand

Internet of Things (IoT) Based Automated Light Intensity Model Using NodeMcu ESP 8266 Microcontroller 23
Shyla and Vishal Bhatnagar

Handwritten Mathematical Symbols Classification Using WEKA 33
Sakshi, Shivani Gautam, Chetan Sharma, and Vinay Kukreja

Enhancing Sociocultural Learning Using Hyperlocal Experience 43
Smriti Rai and A. Suhas

Subsequent Technologies Behind IoT and Its Development Roadmap Toward Integrated Healthcare Prototype Models 57
Priya Dalal, Gaurav Aggarwal, and Sanjay Tejasvee

Big Data and Data Mining

Bug Assignment-Utilization of Metadata Features Along with Feature Selection and Classifiers 71
Asmita Yadav

Role of Artificial Intelligence in Detection of Hateful Speech for Hinglish Data on Social Media 83
Ananya Srivastava, Mohammed Hasan, Bhargav Yagnik, Rahee Walambe, and Ketan Kotecha

From Web Scraping to Web Crawling 97
Harshit Nigam and Prantik Biswas

Selection of Candidate Views for Big Data View Materialization 113
Akshay Kumar and T. V. Vijay Kumar

A Machine Learning Approach to Sentiment Analysis on Web Based Feedback 127
Arnav Bhardwaj and Prakash Srivastava

Forecasting of Stock Price Using LSTM and Prophet Algorithm 141
Neeraj Kumar, Ritu Chauhan, and Gaurav Dubey

Towards a Federated Learning Approach for NLP Applications 157
Omkar Srinivas Prabhu, Praveen Kumar Gupta, P. Shashank, K. Chandrasekaran, and D. Usha

Challenges of Smart Cities Future Research Directions

Analysis of Groundwater Quality Using GIS-Based Water Quality Index in Noida, Gautam Buddh Nagar, Uttar Pradesh (UP), India 171
Kakoli Banerjee, M. B. Santhosh Kumar, L. N. Tilak, and Sarthak Vashistha

An Artificial Neural Network Based Approach of Solar Radiation Estimation Using Location and Meteorological Details 189
Amar Choudhary, Deependra Pandey, and Saurabh Bhardwaj

Applications of Machine Learning and Artificial Intelligence in Intelligent Transportation System: A Review 203
Divya Gangwani and Pranav Gangwani

Analyzing App-Based Methods for Internet De-Addiction in Young Population 217
Lakshita Sharma, Prachi Hooda, Raghav Bansal, Shivam Garg, and Swati Aggarwal

Revolution of AI-Enabled Health Care Chat-Bot System for Patient Assistance 229
Rachakonda Hrithik Sagar, Tuiba Ashraf, Aastha Sharma, Krishna Sai Raj Goud, Subrata Sahana, and Anil Kumar Sagar

Air Quality Prediction Using Regression Models 251
S.K. Julfikar, Shahajahan Ahamed, and Zeenat Rehena

Anomaly Detection in Videos Using Deep Learning Techniques 263
Akshaya Ravichandran and Suresh Sankaranarayanan

Unsupervised Activity Modelling in a Video 277
Aman Agrawal

Performance Comparison of Various Feature Extraction Methods for Object Recognition on Caltech-101 Image Dataset 289
Monika, Munish Kumar, and Manish Kumar

Leukemia Prediction Using SVNN with a Nature-Inspired Optimization Technique 305
Biplab Kanti Das, Prasanta Das, Swarnava Das, and Himadri Sekhar Dutta

Selection of Mobile Node Using Game and Graph Theory for Video Streaming Application 321
Bikram P. Bhuyan and Sajal Saha

Attentive Convolution Network-Based Video Summarization 333
Deeksha Gupta and Akashdeep Sharma

Static Video Summarization: A Comparative Study of Clustering-Based Techniques 347
Deeksha Gupta, Akashdeep Sharma, Pavit Kaur, and Ritika Gupta

A Review: Hemorrhage Detection Methodologies on the Retinal Fundus Image 365
Niladri Sekhar Datta, Koushik Majumder, Amritayan Chatterjee, Himadri Sekhar Dutta, and Sumana Chatterjee

A Study on Retinal Image Preprocessing Methods for the Automated Diabetic Retinopathy Screening Operation 375
Amritayan Chatterjee, Niladri Sekhar Datta, Himadri Sekhar Dutta, Koushik Majumder, and Sumana Chatterjee

FFHIApp: An Application for Flash Flood Hotspots Identification Using Real-Time Images 385
Rohit Iyer, Parnavi Sen, and Ashish Kumar Layek

Infrastructure and Resource Development and Management Using Artificial Intelligence and Machine learning

An Optimized Controller for Zeta Converter-Based Solar Hydraulic Pump 401
K. Sudarsana Reddy, B. Sai Teja Reddy, K. Deepa, and K. Sireesha

Automated Detection and Classification of COVID-19 Based on CT Images Using Deep Learning Model 419
A. S. Vidyun, B. Srinivasa Rao, and J. Harikiran

Comparative Study of Computational Techniques for Smartphone Based Human Activity Recognition 427
Kiran Chawla, Chandra Prakash, and Aakash Chawla

Machine Learning Techniques for Improved Breast Cancer Detection and Prognosis—A Comparative Analysis 441
Noushaba Feroz, Mohd Abdul Ahad, and Faraz Doja

Multiclass Classification of Histology Images of Breast Cancer Using Improved Deep Learning Approach 457
Jyoti Kundale and Sudhir Dhage

Enhancing the Network Performance of Wireless Sensor Networks on Meta-heuristic Approach: Grey Wolf Optimization 469
Biswa Mohan Sahoo, Tarachand Amgoth, and Hari Mohan Pandey

Deep Learning-Based Computer Aided Customization of Speech Therapy 483
Sarthak Agarwal, Vaibhav Saxena, Vaibhav Singal, and Swati Aggarwal

Face Mask Detection Using Deep Learning 495
Sandip Maity, Prasanta Das, Krishna Kumar Jha, and Himadri Sekhar Dutta

Deep Learning-Based Non-invasive Fetal Cardiac Arrhythmia Detection 511
Kamakshi Sharma and Sarfaraz Masood

Security and Privacy Challenges and Data Analytics

Minimizing Energy Consumption for Intrusion Detection Model in Wireless Sensor Network 527
Gauri Kalnoor and S. Gowrishankar

A Blockchain Framework for Counterfeit Medicines Detection 539
Tejaswini Sirisha Mangu and Barnali Gupta Banik

Static and Dynamic Learning-Based PDF Malware Detection classifiers—A Comparative Study 551
N. S. Vishnu, Sripada Manasa Lakshmi, and Awadhesh Kumar Shukla

MOLE: Multiparty Open Ledger Experiment, Concept and Simulation Using BlockChain Technology 573
Rahul Johari, Kanika Gupta, and Suyash Jai

Intrusion Detection Based on Decision Tree Using Key Attributes of Network Traffic 583
Ritu Bala and Ritu Nagpal

An Extensive Review of Wireless Local Area Network Security Standards 591
Sudeshna Chakraborty, Maliha Khan, Amrita, Preeti Kaushik, and Zia Nasseri

Security Concerns at Various Network Phases Through Blockchain Technology 605
Anju Devi, Geetanjali Rathee, and Hemraj Saini

Smart Infrastructure and Resource Development and Management Using Artificial Intelligence and Machine learning

Developing an Evaluation Model for Forecasting of Real Estate Prices 619
Ruchi Mittal, Praveen Kumar, Amit Mittal, and Varun Malik

Memetic Optimal Approach for Economic Load Dispatch Problem with Renewable Energy Source in Realistic Power System 629
Shivani Sehgal, Aman Ganesh, and Vikram Kumar Kamboj

High-Throughput and Low-Latency Reconfigurable Routing Topology for Fast AI MPSoC Architecture 643
Paurush Bhulania, M. R.Tripathy, and Ayoub Khan

Comparison of Various Data Center Frameworks 655
Monalisa Kushwaha, Archana Singh, B. L. Raina, and Avinash Krishnan Raghunath

Soft Computing

A New Solution for Multi-objective Optimization Problem Using Extended Swarm-Based MVMO 669
Pragya Solanki and Himanshu Sahu

Improving Software Maintainability Prediction Using Hyperparameter Tuning of Baseline Machine Learning Algorithms 679
Kirti Lakra and Anuradha Chug

Karaoke Machine Execution Using Artificial Neural Network 693
R. Sripradha, Plauru Surya, Payreddy Supraja, and P. V. Manitha

A Review on Deep Learning Models for Short-Term Load Forecasting 705
Ksh. Nilakanta Singh and Kh. Robindro Singh

An Evolutionary Approach to Combinatorial Gameplaying Using Extended Classifier Systems 723
Karmanya Oberoi, Sarthak Tandon, Abhishek Das, and Swati Aggarwal