Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering

342

Editorial Board Members

Ozgur Akan

Middle East Technical University, Ankara, Turkey

Paolo Bellavista

University of Bologna, Bologna, Italy

Jiannong Cao

Hong Kong Polytechnic University, Hong Kong, China

Geoffrey Coulson

Lancaster University, Lancaster, UK

Falko Dressler

University of Erlangen, Erlangen, Germany

Domenico Ferrari

Università Cattolica Piacenza, Piacenza, Italy

Mario Gerla

UCLA, Los Angeles, USA

Hisashi Kobayashi

Princeton University, Princeton, USA

Sergio Palazzo

University of Catania, Catania, Italy

Sartai Sahni

University of Florida, Gainesville, USA

Xuemin (Sherman) Shen

University of Waterloo, Waterloo, Canada

Mircea Stan

University of Virginia, Charlottesville, USA

Xiaohua Jia

City University of Hong Kong, Kowloon, Hong Kong

Albert Y. Zomaya

University of Sydney, Sydney, Australia

More information about this series at http://www.springer.com/series/8197

Machine Learning and Intelligent Communications

5th International Conference, MLICOM 2020 Shenzhen, China, September 26–27, 2020 Proceedings



Editors
Mingxiang Guan
Shenzhen Institute of Information
Technology
Shenzhen, China

Zhenyu Na Sci & Tech, DianHang Bldg, Rm 321 Dalian Maritime Univ, Sch of Info Dalian, Liaoning, China

ISSN 1867-8211 ISSN 1867-822X (electronic) Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering ISBN 978-3-030-66784-9 ISBN 978-3-030-66785-6 (eBook) https://doi.org/10.1007/978-3-030-66785-6

© ICST Institute for Computer Sciences, Social Informatics and Telecommunications Engineering 2021 This work is subject to copyright. All rights are reserved 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 Switzerland AG The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

We are delighted to introduce the proceedings of the fifth edition of the 2017 European Alliance for Innovation (EAI) International Conference on Machine Learning and Intelligent Communications (MLICOM). This conference brought together researchers, developers and practitioners around the world who are leveraging and developing machine learning and intelligent communications.

The technical program of MLICOM2020 consisted of 56 full papers in oral presentation sessions in the main conference tracks. The conference tracks were: Track 1 - Intelligent resource (e.g., spectrum, power) allocation schemes; Track 2 - Applications of Neural Network & Deep Learning; Track 3 - Intelligent communications; Track 4 - Intelligent positioning and navigation systems; Track 5 - Intelligent space and terrestrial integrated networks; Track 6 - Machine learning algorithms & Intelligent networks; Track 7 - Machine learning and information processing in wireless sensor networks; Track 8 - Smart unmanned vehicular technology.

Coordination with the steering chairs, Imrich Chlamtac, Xin Liu and Xin-Lin Huang was essential for the success of the conference. We sincerely appreciate their constant support and guidance. It was also a great pleasure to work with such an excellent organizing committee team who worked hard in organizing and supporting the conference. The Technical Program Committee, led by our TPC Co-Chairs, Dr. Dean Luo and Dr. Zhenyu Na, completed the peer-review process of technical papers and made a high-quality technical program. We are also grateful to the Conference Manager, Karolina Marcinova, for her support and to all the authors who submitted their papers to the MLICOM2020 conference and workshops.

We strongly believe that the MLICOM conference provides a good forum for all researchers, developers and practitioners to discuss all science and technology aspects that are relevant to machine learning and intelligent communications. We also expect that future MLICOM conferences will be as successful and stimulating, as indicated by the contributions presented in this volume.

Mingxiang Guan

Conference Organization

Steering Committee

Imrich Chlamtac University of Trento, Italy

Xin Liu Dalian University of Technology, China

Xin-Lin Huang Tongji University, China

Organizing Committee

General Chair

Mingxiang Guan Shenzhen Institute of Information Technology

General Co-chairs

Zhiliang Xu Shenzhen Institute of Information Technology

Qing Guo Harbin Institute of Technology

TPC Chair and Co-chairs

Tingting Zhang

Gongliang Liu

Harbin Institute of Technology, Shenzhen

Harbin Institute of Technology, Weihai

Nan Zhao

Dalian University of Technology

Sponsorship and Exhibit Chairs

Shaohua Wu Harbin Institute of Technology, Shenzhen

Hui Li Hainan University

Dean Luo Shenzhen Institute of Information Technology

Local Chairs

Mingxiang Guan Shenzhen Institute of Information Technology Zhiliang Xu Shenzhen Institute of Information Technology

Workshops Chairs

Xinlin Huang Tongji University

Weidang Lu Zhejiang University of Technology Bo Li Harbin Institute of Technology, Weihai

Publicity and Social Media Chairs

Mu Zhou Chongqing University of Posts

and Telecommunications

Zhenyu Na Dalian Maritime University
Zhian Deng Harbin Engineering University

Publications Chairs

Mu Zhou Chongqing University of Posts

and Telecommunications

Zhenyu Na Dalian Maritime University
Zhian Deng Harbin Engineering University

Web Chairs

Yingjie Cui Shenzhen Institute of Information Technology

Lei Ning Shenzhen Technology University

Zhou Wu Shenzhen Institute of Information Technology

Technical Program Committee

Xuemei CaoShenzhen Institute of Information TechnologyLiming ChenElectric Power Research Institute. CSGZhang CongGuangdong Cantone Technology Co., Ltd.

Zhang Decheng South China Normal University

Yajing Deng
Harbin Institute of Technology, Shenzhen
Li Dongqing
Harbin Institute of Technology, Shenzhen

Yingzhe Dou Communication Research Center, Harbin Institute

of Technology

Li Feng Zhejiang Gongshang University
Jianxiang Feng Harbin Engineering University

Rui Feng Ludong University
Junqi Gao Heilongjiang University

Shi Gou Guangzhou Power Supply Company Xin Guan Harbin Institute of Technology

Guorong He Shezhen Institute of Information Technology

Cui Heng Liren College of Yanshan University

Boyu Hua Nanjing University of Aeronautics and Astronautics

Bian Ji Shandong Normal University Baihui Jiang Heilongjiang University

Mao Kai Nanjing University of Aeronautics and Astronautics Wang Le Shenzhen Institute of Information Technology

Dan Li Harbin Institute of Technology

Penghui Li Nanjing University of Aeronautics and Astronautics

Yue Liu Dalian Maritime University

Dean Luo Shenzhen Institute of Information Technology

Yingnan Lv Heilongjiang University

Xinxin Miao Communication Research Center, Harbin Institute

of Technology

Bao Peng Shenzhen Institute of Information Technology
Zhang Renfeng Jilin Institute of Architecture and Civil Engineering
Hanqin Shao Nanjing University of Posts and Telecommunications

Jian Wang Shenzhen Institute of Information Technology

Jun WangDalian Maritime UniversityXin WangDalian Maritime UniversityYi WangDalian Maritime University

Qiuming Zhu Nanjing University of Aeronautics and Astronautics

Contents

intelligent Resource (e.g., Spectrum, Power) Anocation Schemes	
Performance Optimization and Power Allocation of Amplify-and-Forward System with Multi-source	3
UAV-Assisted Spectrum Mapping System Based on Tensor Completion Scheme	16
A Two-Step Phase-Shifting Phase Retrieval Algorithm Based on Orthogonal Characteristics of Interfeograms	27
Research on Spectrum Allocation Strategy Based on Stackelberg Game in Ultra Dense Network	36
A D2D Resource Scheduling Algorithm Based on Position Relation in Cellular Network	47
Research on Fair Scheduling Algorithm of 5G Intelligent Wireless System Based on Machine Learning	53
Research on Anti-jamming Algorithm of Multi-antenna System Based on Artificial Intelligence Technology	59
A Radar-Communication Integrated Signal of OFDM Based on Four-Phase Code	65
An Empirical Comparison of Implementation Efficiency of Iterative and Recursive Algorithms of Fast Fourier Transform	73
Resource Optimization for UAV-Enabled Multichannel Internet of Things Xin Liu and Biaoiun Lai	82

A	\pi	plication	s of i	Neural	Network	and	Deep]	Learnii	ng

Hardware Design and Development of Intelligent Meter Data Acquisition Module Based on WIFI	95
Attention-Based Bidirectional Long Short-Term Memory Neural Network for Short Answer Scoring. Linzhong Xia, Mingxiang Guan, Jun Liu, Xuemei Cao, and Dean Luo	104
Automatic Scoring of L2 English Speech Based on DNN Acoustic Models with Lattice-Free MMI. Dean Luo, Mingxiang Guan, and Linzhong Xia	113
Self-organizing Map for Blood Vessel Segmentation of Fundus Images Jingdan Zhang, Le Wang, Yingjie Cui, Lili Guo, and Wuhan Jiang	123
Seizure Detection Using Deep Discriminative Multi-set Canonical Correlation Analysis	129
The Generation of Virtual Immunohistochemical Staining Images Based on an Improved Cycle-GAN. Shuting Liu, Xi Li, Aiping Zheng, Fan Yang, Yiqing Liu, Tian Guan, and Yonghong He	137
An Optimized SSD Target Detection Algorithm Based on K-Means Clustering	148
Decentralized Learning for Wireless Communication Systems	
Outage Probability Performance of Adaptive Cooperative Scheme with Delayed-Feedback	159
Dynamic Resource Allocation and Streaming in Mobile Edges: A Deep Reinforcement Learning Approach	170
Intelligent Antennas Design and Dynamic Configuration	
Light Intensity Data Collector Based on 51 Single Chip Microcomputer Qun Liu and Ming Tang	187
Back End Development of Classroom Management System Based on .Net Ying Jin and Chunwang Zhang	195

	Contents	xiii
Big Data Platform System of Students' Comprehensive Ability Soft Performance Test and Analysis		201
Smart Beamformer Based on Artificial Intelligence		208
Intelligent Communications		
Blind Recognition of TT&C Signals of Satellite Based on JTFA and Fast-ICA Algorithm		215
BLE Receiver with Fast DC Offset Cancellation and Carrier Frequence Compensation	•	222
An RGB-LED Driver with Feed-Forward Equalization Used for Pavisible Light Communication		228
Performance Analysis and Evaluation of Outdoor Visible Light Communication Reception		235
Simulation Study of Channel Number of Cochlear Implant in Quie J. Wang and Y. S. Chen	et State	242
Analysis and Design of Wireless Distributed Fountain Codes with Multiplicative Network Coding		250
A Real-Time RGB PAM-4 Visible Light Communication System on a Transceiver Design with Pre- and Post-equalizations Jian Kang, Xuanzheng Wang, Li Wang, Can Wang, and C. Patr		265
Kinoform Generated Combined with the Error Diffusion Method and the Dynamic Random Phase		271
Simulation System of Cochlear Implant		278

Intelligent Positioning and Navigation Systems

Assist GPS to Improve Accuracy Under Complex Road Conditions Using Sensors on Smart Phone	287
Indoor Localization Based on the LoRa Technology	304
Radar Target Detection Based on Information Theory	320
Research on Source Detection and Its Performance Analysis in Sensor Array	333
A Novel Parking Lot Occupancy Detection System Based on LED Sensing	346
Intelligent Space and Terrestrial Integrated Networks	
Outage Probability Analysis of UAV Assisted Satellite-Terrestrial Network	359
Design and Development of Intelligent Meter Data Acquisition Module Based on Bluetooth Technology	371
Multi Beam Forming Algorithms of LEO Constellation Satellite	380
Mars Exploration Oriented Design and Simulation of Relay Communication	389
GEO and IGSO Based Hybrid Global Coverage Satellite Constellation Design	395
Characteristics Analysis and Modeling of Satellite Mobile MIMO Channel	401
Co-channel Interference Between Satellite and 5G System in C Band Xinxin Miao and Mingchuan Yang	410

Machine Learning Algorithm and Intelligent Networks	
Energy PEC Enterprise Energy Management System Services	419
Intelligent Water Scheme Design Based on Artificial Intelligence, Internet of Things and Big Data Technology	424
Energy + Cloud: A New Energy Management System Tianyi Zheng	429
Smart Unmanned Vehicular Technology	
Implementation of Non-stationary Channel Emulator Based on USRP Dongyang Zhang, Kai Mao, Yang Yang, Benzhe Ning, and Qiuming Zhu	437
A V2V Channel Simulator for Velocity Variations in Non-isotropic Scattering Scenarios	447
Ray Tracing Based Path Loss Modeling for UAV-to-Ground mmWave Channels in Campus Scenario. Mengtian Yao, Xiaomin Chen, Jian Wang, Boyu Hua, Weizhi Zhong, Qiuming Zhu, and Jingwen Yang	459
A Novel Non-stationary Channel Model for UAV-to-Vehicle mmWave Beam Communications	471
Energy Efficient Communication of Fuel-Powered UAV Relay, Design of Positions and Power Allocation	485
Throughput Maximization for the System of UAV as Mobile Relay Between Moving Vehicles	492
Energy Optimization with Adaptive Transmit Power Control for UAV-Assisted Data Transmission in VANETs	505

xvi Contents

Late '	Track
--------	-------

Secure and Reliable D2D Communications with Active Attackers:	
A Game-Theoretic Perspective and Machine Learning Approaches	519
Yijie Luo, Yang Yang, Sixuan An, and Zhibin Feng	
Author Index	535