Advances in Intelligent Systems and Computing

Volume 678

Series editor

Janusz Kacprzyk, Polish Academy of Sciences, Warsaw, Poland
e-mail: kacprzyk@ibspan.waw.pl

About this Series

The series "Advances in Intelligent Systems and Computing" contains publications on theory, applications, and design methods of Intelligent Systems and Intelligent Computing. Virtually all disciplines such as engineering, natural sciences, computer and information science, ICT, economics, business, e-commerce, environment, healthcare, life science are covered. The list of topics spans all the areas of modern intelligent systems and computing.

The publications within "Advances in Intelligent Systems and Computing" are primarily textbooks and proceedings of important conferences, symposia and congresses. They cover significant recent developments in the field, both of a foundational and applicable character. An important characteristic feature of the series is the short publication time and world-wide distribution. This permits a rapid and broad dissemination of research results.

Advisory Board

Chairman

Nikhil R. Pal, Indian Statistical Institute, Kolkata, India
e-mail: nikhil@isical.ac.in

Members

Rafael Bello Perez, Universidad Central "Marta Abreu" de Las Villas, Santa Clara, Cuba
e-mail: rbellop@uclv.edu.cu

Emilio S. Corchado, University of Salamanca, Salamanca, Spain
e-mail: escorchado@usal.es

Hani Hagras, University of Essex, Colchester, UK
e-mail: hani@essex.ac.uk

László T. Kóczy, Széchenyi István University, Győr, Hungary
e-mail: koczy@sze.hu

Vladik Kreinovich, University of Texas at El Paso, El Paso, USA
e-mail: vladik@utep.edu

Chin-Teng Lin, National Chiao Tung University, Hsinchu, Taiwan
e-mail: ctlin@mail.nctu.edu.tw

Jie Lu, University of Technology, Sydney, Australia
e-mail: Jie.Lu@uts.edu.au

Patricia Melin, Tijuana Institute of Technology, Tijuana, Mexico
e-mail: epmelin@hafsamx.org

Nadia Nedjah, State University of Rio de Janeiro, Rio de Janeiro, Brazil
e-mail: nadia@eng.uerj.br

Ngoc Thanh Nguyen, Wroclaw University of Technology, Wroclaw, Poland
e-mail: Ngoc-Thanh.Nguyen@pwr.edu.pl

Jun Wang, The Chinese University of Hong Kong, Shatin, Hong Kong
e-mail: jwang@mae.cuhk.edu.hk

More information about this series at http://www.springer.com/series/11156

Sabu M. Thampi · Sri Krishnan
Juan Manuel Corchado Rodriguez
Swagatam Das · Michal Wozniak
Dhiya Al-Jumeily
Editors

Advances in Signal Processing and Intelligent Recognition Systems

Proceedings of Third International Symposium on Signal Processing and Intelligent Recognition Systems (SIRS-2017), September 13–16, 2017, Manipal, India

Springer

Editors
Sabu M. Thampi
School of CS/IT
Indian Institute of Information Technology and Management
Trivandrum, Kerala
India

Sri Krishnan
Department of Electrical and Computer Engineering
Ryerson University
Toronto, ON
Canada

Juan Manuel Corchado Rodriguez
Department of Computer Science
University of Salamanca
Salamanca, Salamanca
Spain

Swagatam Das
Electronics and Communication Sciences Unit
Indian Statistical Institute
Kolkata, West Bengal
India

Michal Wozniak
Department of Systems and Computer Networks
Wroclaw University of Science and Technology
Wroclaw
Poland

Dhiya Al-Jumeily
Faculty of Engineering and Technology
Liverpool John Moores University
Liverpool
UK

ISSN 2194-5357 ISSN 2194-5365 (electronic)
Advances in Intelligent Systems and Computing
ISBN 978-3-319-67933-4 ISBN 978-3-319-67934-1 (eBook)
DOI 10.1007/978-3-319-67934-1

Library of Congress Control Number: 2017952864

© Springer International Publishing AG 2018
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, express 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.

Printed on acid-free paper

This Springer imprint is published by Springer Nature
The registered company is Springer International Publishing AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

This edited volume contains a selection of refereed and revised papers originally presented at the third International Symposium on Signal Processing and Intelligent Recognition Systems (SIRS'17). The symposium was held in Manipal Institute of Technology, Manipal University, Manipal, India, during September 13–16, 2017. SIRS'17 provided a forum for the sharing, exchange, presentation, and discussion of original research results in both methodological issues and different application areas of signal processing, computer vision, and pattern recognition.

We would like to thank all authors for their contributions to the program and for their contributions to these proceedings. The technical program of SIRS'17 comprises of 41 papers (24 regular papers and 17 short papers). These papers were selected by the program committee with additional help from external expert reviewers from 111 submissions. Each of them was reviewed by two or more referees. The authors were asked to address each and every comment made by the referees for improving the quality of their papers.

We are also deeply grateful to the many people who volunteered their hard work to ensure this successful symposium. We would like to express our gratitude to the program committee and external reviewers, who worked very hard in reviewing papers and providing suggestions for their improvements. Many thanks go to all the chairs, and their involvement and support have added greatly to the quality of the symposium. We also wish to thank all the members of the Advisory Committee, whose work and commitment were invaluable. We would like to express our sincere gratitude to local organizing committees that have made this event a success. We would also like to express our thanks to the keynote speakers and tutorial presenters. The EDAS conference system proved very helpful during the submission, review, and editing phases.

We wish to express our sincere thanks to Thomas Ditzinger, Senior Editor, Engineering/Applied Sciences Springer-Verlag, and Janusz Kacprzyk, Series Editor, for their help and cooperation.

We hope these proceedings will serve as a valuable reference for researchers and practitioners in the related fields.

Sabu M. Thampi
Sri Krishnan
Juan Manuel Corchado Rodriguez
Swagatam Das
Michal Wozniak
Dhiya Al-Jumeily

Organization

Committee

Chief Patron

Ramdas M. Pai	Manipal University, India

Patrons

H.S. Ballal	Manipal University
H. Vinod Bhat	Manipal University
V. Surendra Shetty	Manipal University
Narayan Sabhahit	Manipal University
G.K. Prabhu	MIT, Manipal University
B.H.V. Pai	MIT, Manipal University

Honorary Chair

K.R. Rao	University of Texas at Arlington, USA

General Chair

Sri Krishnan	Ryerson University, Toronto, Canada

Program Chairs

Juan Manuel Corchado Rodriguez	University of Salamanca, Spain
Michal Wozniak	Wroclaw University, Warsaw, Poland
Dhiya Al-Jumeily	Liverpool John Moores University, UK
Swagatam Das	Indian Statistical Institute, Kolkata, India

Advisory Committee

Teodiano Freire Bastos Filho	Universidade Federal do Espírito Santo, Vitoria, Brazil
Janusz Kacprzyk	Polish Academy of Sciences, Poland
Sankar K. Pal	Indian Statistical Institute, Kolkata, India
Nallanathan Arumugam	King's College London, UK
P. Nagabhushan	University of Mysore, India
Soura Dasgupta	The University of Iowa, USA
Ronald R. Yager	Machine Intelligence Institute, Iona College, USA
Jamila Mustafina	Kazan Federal University, Russia
Selwyn Piramuthu	University of Florida, USA
El-Sayed El-Alfy	King Fahd University of Petroleum and Minerals, Saudi Arabia
Abir Hussain	Liverpool John Moores University, UK
Laszlo T. Koczy	Szechenyi Istvan University, Gyor, Hungary
Ngoc Thanh Nguyen	Wroclaw University of Technology, Wroclaw, Poland
David Zhang	The Hong Kong Polytechnic University, Hong Kong
Millie Pant	Indian Institute of Technology Roorkee, India
Naeem Radi	Al Khawarizmi University College, UAE
Ibrahim Al-Jumaili	Al-Anbar University, Iraq

Steering Committee Chair

Sabu M. Thampi	IIITM-Kerala, India

Organizing Chair

Hareesha K.S.	Manipal Institute of Technology (MIT) - Manipal University, India

Organizing Co-chairs

Ashalatha Nayak	Manipal Institute of Technology, Manipal University
Balachandra	Manipal Institute of Technology, Manipal University

Organizing Secretaries

Renuka A.	Manipal Institute of Technology, Manipal University
Preetham Kumar	Manipal Institute of Technology, Manipal University
Poornima PK	Manipal Institute of Technology, Manipal University

Organized by

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

In association with

LIVERPOOL JOHN MOORES UNIVERSITY

Contents

Signal and Image Processing

Removal of BW and Respiration Noise in abdECG for fECG Extraction 3
Jeffy Joseph, J. Rolant Gini, and K.I. Ramachandran

Early Stage Detection of Diabetic Retinopathy Using an Optimal Feature Set 15
S.D. Shirbahadurkar, Vijay M. Mane, and D.V. Jadhav

Exploring Cepstral Coefficient Based Sleep Stage Scoring Method for Single-Channel EEG Signal Using Machine Learning Technique . . . 24
S. Rajalakshmi and R. Venkatesan

Non Linear Tracking Using Unscented Kalman Filter 38
P. Sudheesh and M. Jayakumar

An Analysis on the Influence that the Position and Number of Control Points Have on MLS Registration of Medical Images 47
Hema P. Menon

Component Characterization of Western and Indian Classical Music . . . 57
Shivam Sharma, Seema Ghisingh, and Vinay Kumar Mittal

Design and Performance Analysis of Step Graded Dielectric Profile High Gain Flexible Textile Antennas for Radiolocation Military and Aeronautical Radio Navigation Applications 70
Kirtan Kaur, Sneh Kanwar Singh Sidhu, Aman Nag, Raveena Bhatoa, and Ekambir Sidhu

An Experimental Setup of DSA Algorithm Suitable for High Bandwidth Data Transfer Using USRP and GNU Radio Companion . . . 81
S. Naveen Naik and B. Malarkodi

Influence of Filter Bank Structure on the Statistical Significance of Coefficients in Cepstral Analysis for Acoustic Signals 91
Akhil Jose, Justin Joseph, Glan Devadhas, and M.M. Shinu

Particle Filtering Technique for Fast Fading Shadow Power Estimation in Wireless Communication 105
S. Jaiyant Gopal, J.P. Anita, and P. Sudheesh

A Novel Cyclic Convolution Based Regularization Method for Power-Line Interference Removal in ECG Signal 116
V.G. Sujadevi, K.P. Soman, S. Sachin Kumar, and Neethu Mohan

Object Detection and Localization Using Compressed Sensing 127
Poonam Ashok Deotale and Preetida Vinayakray-Jani

Vehicle License Plate Detection Using Image Segmentation and Morphological Image Processing 142
Wasif Shafaet Chowdhury, Ashikur Rashid Khan, and Jia Uddin

An Improved Approach for Securing Document Images Using Dual Cover 155
R.E. Vinodhini, P. Malathi, and T. Gireesh Kumar

Dependency of Various Color and Intensity Planes on CNN Based Image Classification 167
Rajan Sachin, V. Sowmya, D. Govind, and K.P. Soman

Epigraphic Document Image Enhancement Using Retinex Method 178
H.T. Chandrakala and G. Thippeswamy

Improved Microaneurysm Detection in Fundus Images for Diagnosis of Diabetic Retinopathy 185
V. Dharani and R. Lavanya

Intelligent Recognition Techniques and Applications

Swarm Robots in a Closed Loop Visual Odometry System by Using Visible Light Communication 201
Dhiraj Patil, Kewal Shah, Udit Patadia, Nilay Sheth, Rahul Solanki, and Anshuman Singh

An Adaptive Neuro-Fuzzy Inference System Based Situation Awareness Assessment in VLC Enabled Connected Cars 213
P. Balakrishnan, Gnana Guru Ganesan, Ezhilarasi Rajapackiyam, and Umamakeswari Arumugam

Speech Recognition Using Feed Forward Neural Network and Principle Component Analysis 228
Nusrat Momo, Abdullah, and Jia Uddin

Machine Learning-Based Method and Its Performance Analysis for Occupancy Detection in Indoor Environment 240
Sachin Kumar, Shobha Rai, Rampal Singh, and Saibal K. Pal

Identifying Issues in Estimating Parameters from Speech Under Lombard Effect 252
M. Aiswarya, D. Pravena, and D. Govind

Classification of Alzheimer and MCI Phenotypes on MRI Data Using SVM 263
K.R. Kruthika, Rajeswari, Akshay Pai, and H.D. Maheshappa

Real-Time Traffic Light Signal Recognition System for a Self-driving Car 276
Nakul Agarwal, Abhishek Sharma, and Jieh Ren Chang

RGB-Depth Image Based Human Detection Using Viola-Jones and Chan-Vese Active Contour Segmentation 285
Puji Lestari and Hans-Peter Schade

Choice of the Scheduling Technique Taking into Account the Subcontracting Optimization 297
Konstantin Aksyonov, Anna Antonova, and Natalia Goncharova

Feature Based Opinion Mining for Restaurant Reviews 305
Nithin Y.R and Poornalatha G.

Exploring the Significance of Low Frequency Regions in Electroglottographic Signals for Emotion Recognition 319
S.G. Ajay, D. Pravena, D. Govind, and D. Pradeep

Tamil Speech Emotion Recognition Using Deep Belief Network(DBN) 328
M. Srikanth, D. Pravena, and D. Govind

Unsupervised Auditory Saliency Enabled Binaural Scene Analyzer for Speaker Localization and Recognition 337
R. Venkatesan and A. Balaji Ganesh

Applying Machine Learning Techniques for Sentiment Analysis in the Case Study of Indian Politics 351
Annapurna P. Patil, Dimple Doshi, Darshan Dalsaniya, and B.S. Rashmi

An Efficient Method for Detecting Electrical Spark and Fire Flame from Real Time Video 359
Sonia Corraya and Jia Uddin

Speaker-Independent Automatic Speech Recognition System for Mobile Phone Applications in Punjabi 369
Puneet Mittal and Navdeep Singh

ReviseOnTheGo – Immersive Mobile Applications for Accelerated Mathematics Learning 383
Atharva Kimbahune, Sanjay Kimbahune, and Snehal Kimbahune

Analysis of the Electric Arc Furnace Workshop Logistic Processes Using Multiagent Simulation 390
Konstantin Aksyonov, Anna Antonova, and Natalia Goncharova

Development of Intelligent Petrol Supplies Planning System 398
K.A. Aksyonov, A.L. Nevolina, H.L. Ayvazyan, and O.P. Aksyonova

A Model for an Emotional Respondent Robot 406
Ayşe E. Sancar and Elena Battini Sönmez

A Combined Feature Extraction Method for Automated Face Recognition in Classroom Environment 417
Md. Shafiqul Islam, Asif Mahmud, Azmina Akter Papeya, Irin Sultana Onny, and Jia Uddin

A Low Cost Intelligent Smart System for Real Time Child Monitoring in the School 427
Pruthvi Raj Myakala, Rajasree Nalumachu, and V.K. Mittal

Optimized Cost-Based Biomedical Workflow Scheduling Algorithm in Cloud 439
N. Mohanapriya and G. Kousalya

Automated Electric Bill Generation System Using Internet of Things 449
Shreyas H.N., Nikhil Aatrei M, Sumesh S. Iyer, and Prakash P

Author Index 459