Lecture Notes in Artificial Intelligence 10023

Subseries of Lecture Notes in Computer Science

LNAI Series Editors

Randy Goebel
University of Alberta, Edmonton, Canada
Yuzuru Tanaka
Hokkaido University, Sapporo, Japan
Wolfgang Wahlster
DFKI and Saarland University, Saarbrücken, Germany

LNAI Founding Series Editor

Joerg Siekmann
DFKI and Saarland University, Saarbrücken, Germany

More information about this series at http://www.springer.com/series/1244

Cheng-Lin Liu · Amir Hussain
Bin Luo · Kay Chen Tan
Yi Zeng · Zhaoxiang Zhang (Eds.)

Advances in Brain Inspired Cognitive Systems

8th International Conference, BICS 2016
Beijing, China, November 28–30, 2016
Proceedings

Springer

Editors
Cheng-Lin Liu
Institute of Automation
Chinese Academy of Sciences
Beijing
China

Amir Hussain
Computing Science and Mathematics
University of Stirling
Stirling
UK

Bin Luo
Anhui University
Anhui
China

Kay Chen Tan
National University of Singapore
Singapore
Singapore

Yi Zeng
Institute of Automation
Chinese Academy of Sciences
Beijing
China

Zhaoxiang Zhang
Institute of Automation
Chinese Academy of Sciences
Beijing
China

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Artificial Intelligence
ISBN 978-3-319-49684-9 ISBN 978-3-319-49685-6 (eBook)
DOI 10.1007/978-3-319-49685-6

Library of Congress Control Number: 2016957381

LNCS Sublibrary: SL7 – Artificial Intelligence

© Springer International Publishing AG 2016
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.

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

Welcome to the proceedings of BICS 2016 – the 8th International Conference on Brain Inspired Cognitive Systems. BICS has now become a well-established conference series on brain-inspired cognitive systems around the world, with growing popularity and increasing quality. BICS 2016 followed on from BICS 2004 (Stirling, Scotland, UK), BICS 2006 (Island of Lesvos, Greece), BICS 2008 (Sao Luis, Brazil), BICS 2010 (Madrid, Spain), BICS 2012 (Shenyang, China), BICS 2013 (Beijing, China), and BICS 2015 (Hefei, China). Beijing, as the capital of the People's Republic of China, is the nation's political, economic, and cultural center as well as China's most important center for international trade and communications.

This volume of *Lecture Notes in Artificial Intelligence* constitutes the proceedings of BICS 2016. In this context, BICS 2016 aimed to provide an open academic forum for researchers, engineers, and students to discuss the emerging areas and challenges, to present the state of the art of brain-inspired cognitive systems research and applications in diverse fields, and to exchange their fantastic ideas. The conference featured plenary lectures given by world-renowned scholars, regular sessions with broad coverage, and some special sessions focusing on popular and timely topics.

The conference received 43 submissions from more than 129 authors in 19 countries and regions across four continents. Based on a rigorous review process carried out by the Program Committee members and reviewers, 32 high-quality papers were selected for publication in the conference proceedings. These papers cover many topics of brain-inspired cognitive systems – related research including biologically inspired systems, cognitive neuroscience, models of consciousness, and neural computation.

Many organizations and volunteers made great contributions toward the success of this event. We are grateful to the Institute of Automation of the Chinese Academy of Sciences for their financial support and the Institute of Electrical and Electronic Engineers (IEEE) for their technical support. We would also like to sincerely thank all the committee members for their great efforts and time in organizing the event. Special thanks go to the Program Committee members and reviewers whose insightful reviews and timely feedback ensured the high quality of the accepted papers and the smooth flow of the symposium. We would also like to thank the publisher, Springer, for their cooperation in publishing the proceedings in the prestigious series of *Lecture Notes in Artificial Intelligence*. Finally, we would like to thank all the speakers, authors, and participants for their support.

November 2016

Cheng-Lin Liu
Amir Hussain
Bin Luo
Kay Chen Tan
Yi Zeng
Zhaoxiang Zhang

Organization

General Chairs

Cheng-Lin Liu	Institute of Automation, Chinese Academy of Sciences, China
Amir Hussain	Stirling University, Scotland, UK

Program Chairs

Bin Luo	Anhui University, China
Kay Chen Tan	National University of Singapore, Singapore

Publicity Chairs

Cesare Alippi	Politecnico di Milano, Italy
Haibo He	University of Rhode Island, USA
Hussein Abbass	University of New South Wales, Australia
Erik Cambria	NTU, Singapore

Local Organization Chair

Yi Zeng	Institute of Automation, Chinese Academy of Sciences, China

Publication Chair

Zhaoxiang Zhang	Institute of Automation, Chinese Academy of Sciences, China

Program Committee

Andrew Abel	Stirling University, Scotland, UK
Peter Andras	Keele University, UK
Xiang Bai	Huazhong University of Science and Technology, China
Vladimir Bajic	KAUST, Thuwal, Saudi Arabia
Yanchao Bi	Beijing Normal University, China
Erik Cambria	Nanyang Technological University, Singapore
Lihong Cao	Communication University of China, China
Mingming Cheng	Nankai University, China
Yongsheng Dong	Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, China

Marcos Faundez Zanuy	Tecnocampus, Barcelona, Spain
Yachuang Feng	Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, China
Alexander Gelbukh	CIC IPN, Mexico
Hugo Gravato Marques	ETH Zurich, Zurich, Switzerland
Claudius Gros	Goethe University Frankfurt, Germany
Xiaolin Hu	Tsinghua University, China
Tiejun Huang	Peking University, China
Amir Hussain	Stirling University, Scotland, UK
Rongrong Ji	Xiamen University, China
Yi Jiang	Institute of Psychology, Chinese Academy of Sciences, China
Jingpeng Li	Stirling University, Scotland, UK
Yongjie Li	University of Electronic Science and Technology of China, China
Cheng-Lin Liu	Institute of Automation, Chinese Academy of Sciences, China
Huaping Liu	Tsinghua University, China
Weifeng Liu	China University of Petroleum, China
Xiaoqiang Lu	Xi'an Institute of Optics and Precision Mechanics, Chinese Academy of Sciences, China
Bin Luo	Anhui University, China
Mufti Mahmud	University of Padova, Italy
Zeeshan Malik	Stirling University, Scotland, UK
Deyu Meng	Xi'an Jiaotong University, China
Junaid Qadir	National University of Sciences and Technology, Islamabad
Simone Scardapane	Sapienza University of Rome, Italy
Bailu Si	Shenyang Institute of Automation, Chinese Academy of Sciences, China
Mingli Song	Zhejiang University, China
Dacheng Tao	University of Technology, Sydney, Australia
Yonghong Tian	Peking University, China
Isabel Trancoso	INESC-ID, Portugal
Stefano Vassanelli	University of Padova, Italy
Liang Wang	Institute of Psychology, Chinese Academy of Sciences, China
Zhijiang Wang	Institute of Mental Health, Peking University, China
Qi Wang	Northwestern Polytechnical University, China
Hui Wei	Fudan University, China
Jonathan Wu	University of Windsor, Canada
Qiang Wu	University of Technology Sydney, Australia
Erfu Yang	University of Strathclyde, Glasgow, UK
Tianming Yang	Institute of Neuroscience, China
Shan Yu	Institute of Automation, Chinese Academy of Sciences, China

Yi Zeng	Institute of Automation, Chinese Academy of Sciences, China
Zhaoxiang Zhang	Institute of Automation, Chinese Academy of Sciences, China
Daoqiang Zhang	Nanjing University of Aeronautics and Astronautics, China
Li Zhang	University of Birmingham, Birmingham, UK
Yifeng Zhang	Institute of Neuroscience, China
Bing Zhou	Sam Houston State University, USA
Jun Zhu	Tsinghua University, China

Contents

An Improved Recurrent Network for Online Equality-Constrained Quadratic Programming 1
Ke Chen and Zhaoxiang Zhang

Towards Robot Self-consciousness (I): Brain-Inspired Robot Mirror Neuron System Model and Its Application in Mirror Self-recognition 11
Yi Zeng, Yuxuan Zhao, and Jun Bai

Implementation of EEG Emotion Recognition System Based on Hierarchical Convolutional Neural Networks 22
Jinpeng Li, Zhaoxiang Zhang, and Huiguang He

Can Machine Generate Traditional Chinese Poetry? A Feigenbaum Test 34
Qixin Wang, Tianyi Luo, and Dong Wang

Decoding Visual Stimuli in Human Brain by Using Anatomical Pattern Analysis on fMRI Images 47
Muhammad Yousefnezhad and Daoqiang Zhang

An Investigation of Machine Learning and Neural Computation Paradigms in the Design of Clinical Decision Support Systems (CDSSs) 58
Summrina K. Wajid, Amir Hussain, Bin Luo, and Kaizhu Huang

A Retina Inspired Model for High Dynamic Range Image Rendering 68
Xian-Shi Zhang and Yong-Jie Li

Autoencoders with Drop Strategy 80
Cong Hu and Xiao-Jun Wu

Detecting Rare Visual and Auditory Events from EEG Using Pairwise-Comparison Neural Networks 90
Min Wang, Hussein A. Abbass, Jiankun Hu, and Kathryn Merrick

Compressing Deep Neural Network for Facial Landmarks Detection 102
Dan Zeng, Fan Zhao, and Yixin Bao

Learning Optimal Seeds for Salient Object Detection 113
Huiling Wang, Lixiang Xu, and Bin Luo

A Spiking Neural Network Based Autonomous Reinforcement Learning Model and Its Application in Decision Making 125
Guixiang Wang, Yi Zeng, and Bo Xu

Classification of Spatiotemporal Events Based on Random Forest 138
Hongmin Li, Guoqi Li, and Luping Shi

Visual Attention Model with a Novel Learning Strategy and Its Application to Target Detection from SAR Images 149
Fei Gao, Xiangshang Xue, Jun Wang, Jinping Sun, Amir Hussain, and Erfu Yang

Modified Cat Swarm Optimization for Clustering 161
Saad Razzaq, Fahad Maqbool, and Amir Hussain

Deep and Sparse Learning in Speech and Language Processing: An Overview 171
Dong Wang, Qiang Zhou, and Amir Hussain

Time-Course EEG Spectrum Evidence for Music Key Perception and Emotional Effects 184
Hongjian Bo, Haifeng Li, Lin Ma, and Bo Yu

A Possible Neural Circuit for Decision Making and Its Learning Process 196
Hui Wei, Yijie Bu, and Dawei Dai

A SVM-Based EEG Signal Analysis: An Auxiliary Therapy for Tinnitus 207
Pei-Zhen Li, Juan-Hui Li, and Chang-Dong Wang

Passive BCI Based on Sustained Attention Detection: An fNIRS Study 220
Zhen Zhang, Xuejun Jiao, Jin Jiang, Jinjin Pan, Yong Cao, Hanjun Yang, and Fenggang Xu

Incremental Learning Vector Quantization for Character Recognition with Local Style Consistency 228
Yuan-Yuan Shen and Cheng-Lin Liu

A Novel Fully Automated Liver and HCC Tumor Segmentation System Using Morphological Operations 240
Liaqat Ali, Amir Hussain, Jingpeng Li, Newton Howard, Amir A. Shah, Unnam Sudhakar, Moiz Ali Shah, and Zain U. Hussain

A New Biologically-Inspired Analytical Worm Propagation Model for Mobile Unstructured Peer-to-Peer Networks 251
Hani Alharbi, Khalid Aloufi, and Amir Hussain

EEG Brain Functional Connectivity Dynamic Evolution Model: A Study via Wavelet Coherence 264
Chunying Fang, Haifeng Li, and Lin Ma

Predicting Insulin Resistance in Children Using a Machine-Learning-Based Clinical Decision Support System 274
Adam James Hall, Amir Hussain, and M. Guftar Shaikh

An Ontological Framework of Semantic Learner Profile in an E-Learning System 284
T. Sheeba and Reshmy Krishnan

Incremental PCANet: A Lifelong Learning Framework to Achieve the Plasticity of both Feature and Classifier Constructions 298
Wang-Li Hao and Zhaoxiang Zhang

PerSent: A Freely Available Persian Sentiment Lexicon 310
Kia Dashtipour, Amir Hussain, Qiang Zhou, Alexander Gelbukh, Ahmad Y.A. Hawalah, and Erik Cambria

Low-Rank Image Set Representation and Classification 321
Youxia Cao, Bo Jiang, Zhuqiang Chen, Jin Tang, and Bin Luo

A Data Driven Approach to Audiovisual Speech Mapping 331
Andrew Abel, Ricard Marxer, Jon Barker, Roger Watt, Bill Whitmer, Peter Derleth, and Amir Hussain

Continuous Time Recurrent Neural Network Model of Recurrent Collaterals in the Hippocampus CA3 Region 343
Ashraya Samba Shiva and Amir Hussain

Sparse-Network Based Framework for Detecting the Overlapping Community Structure of Brain Functional Network 355
Xuan Li, Zilan Hu, and Haixian Wang

Author Index 367