

Communications in Computer and Information Science

660

Commenced Publication in 2007

Founding and Former Series Editors:

Alfredo Cuzzocrea, Dominik Ślęzak, and Xiaokang Yang

Editorial Board

Simone Diniz Junqueira Barbosa

*Pontifical Catholic University of Rio de Janeiro (PUC-Rio),
Rio de Janeiro, Brazil*

Phoebe Chen

La Trobe University, Melbourne, Australia

Xiaoyong Du

Renmin University of China, Beijing, China

Joaquim Filipe

Polytechnic Institute of Setúbal, Setúbal, Portugal

Orhun Kara

TÜBİTAK BİLGEM and Middle East Technical University, Ankara, Turkey

Igor Kotenko

*St. Petersburg Institute for Informatics and Automation of the Russian
Academy of Sciences, St. Petersburg, Russia*

Ting Liu

Harbin Institute of Technology (HIT), Harbin, China

Krishna M. Sivalingam

Indian Institute of Technology Madras, Chennai, India

Takashi Washio

Osaka University, Osaka, Japan

More information about this series at <http://www.springer.com/series/7899>

Jian Chen · Yoshiteru Nakamori
Wuyi Yue · Xijin Tang (Eds.)

Knowledge and Systems Sciences

17th International Symposium, KSS 2016
Kobe, Japan, November 4–6, 2016
Proceedings

Editors

Jian Chen
Tsinghua University
Beijing
China

Yoshiteru Nakamori
School of Knowledge Science
JAIST
Nomi, Ishikawa
Japan

Wuyi Yue
Department of Information Science
Faculty of Science and Engineering
Konan University
Higashinada-ku, Kobe
Japan

Xijin Tang
Academy of Mathematics and Systems
Science
Chinese Academy of Sciences
Beijing
China

ISSN 1865-0929 ISSN 1865-0937 (electronic)
Communications in Computer and Information Science
ISBN 978-981-10-2856-4 ISBN 978-981-10-2857-1 (eBook)
DOI 10.1007/978-981-10-2857-1

Library of Congress Control Number: 2016954198

© Springer Nature Singapore Pte Ltd. 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 Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #22-06/08 Gateway East, Singapore 189721, Singapore

Preface

The annual International Symposium on Knowledge and Systems Sciences aims to promote the exchange and interaction of knowledge across disciplines and borders so as to explore new territories and new frontiers. With over 16 years of continuous endeavors, attempts to strictly define knowledge science may still be ambitious, but a very tolerant, broad-based, and open-minded approach to the discipline can be taken. Knowledge science and systems science can complement and benefit each other methodologically.

The First International Symposium on Knowledge and Systems Sciences (KSS 2000) was initiated and organized by the Japan Advanced Institute of Science and Technology (JAIST) in September of 2000. Since then KSS 2001 (Dalian), KSS 2002 (Shanghai), KSS 2003 (Guangzhou), KSS 2004 (JAIST), KSS 2005 (Vienna), KSS 2006 (Beijing), KSS 2007 (JAIST), KSS 2008 (Guangzhou), KSS 2009 (Hong Kong), KSS 2010 (Xi'an), KSS 2011 (Hull), KSS 2012 (JAIST), KSS 2013 (Ningbo), KSS 2014 (Sapporo), and KSS 2016 (Xi'an) have been held successfully, with contributions by many scientists and researchers from different countries. During the past 16 years, people interested in knowledge and systems sciences have formed a community, and an international academic society has existed for 13 years.

This year KSS will be held in during November 4–6, 2016, Kobe, Japan, to provide opportunities for presenting interesting new research results, facilitating interdisciplinary discussions, and leading to knowledge transfer under the theme of “Systems Approaches to Knowledge, Technology, and Service Management”. We are particularly fortunate to have three distinguished scholars to deliver the keynote speeches, which reflect the diverse features of KSS topics,

- Takayuki Ito (Nagoya Institute of Technology, Japan), “Crowd Decision-Making and Consensus Support System Based on Agent and AI Technologies”
- Tetsuo Sawaragi (Kyoto University, Japan), “Semiotic Analysis of Behavioral Knowledge and Skills for Cyber-Physical Co-Coaching”
- Alfred Taudes (Vienna University of Economics, Austria), “Production as a Service”

The organizers of KSS 2016 received 48 submissions, and finally 21 submissions were selected for the proceedings after a rigorous review process. The co-chairs of the international Program Committee made the final decision for each submission based on the reports from the reviewers, who came from Australia, China, France, Japan, New Zealand, and the USA.

To make this event possible, we received a lot support and help from many people and organizations. We would like to express our sincere thanks to the authors for their remarkable contributions, all the Technical Program Committee members for their time and expertise in reviewing the papers within a very tight schedule, and the publisher Springer for their professional help. This is the first time that KSS proceedings are

published as a CCIS volume by Springer. We greatly appreciate our three distinguished scholars for accepting our invitation to deliver keynote speeches to the symposium. Last but not least, we are indebted to the local organizers for their hard work for the symposium.

The conference facilitated not only cross-cultural learning and integration, but also academic achievements in the area of knowledge and systems sciences.

September 2016

Jian Chen
Yoshiteru Nakamori
Wuyi Yue
Xijin Tang

Organization

KSS 2016 is organized by the International Society for Knowledge and Systems Sciences and hosted by Konan University in Japan.

General Chairs

Jian Chen	Tsinghua University, China
Yoshiteru Nakamori	Japan Advanced Institute of Science and Technology, Japan
Wuyi Yue	Konan University, Japan

Program Committee Chairs

Van-Nam Huynh	Japan Advanced Institute of Science and Technology, Japan
Tieju Ma	East China University of Science and Technology, China
Xijin Tang	CAS Academy of Mathematics and Systems Science, China
Jiangning Wu	Dalian University of Technology, China

Technical Program Committee

Quan Bai	Auckland University of Technology, New Zealand
Meng Cai	Xidian University, China and Harvard University, USA
Jindong Chen	China Academy of Aerospace Systems Science and Engineering, China
Zengru Di	Beijing Normal University, China
Serge Galam	Sciences Po and CNRS, France
Van-Nam Huynh	Japan Advanced Institute of Science and Technology, Japan
Cheng-Siong Lee	Monash University, Australia
Xianneng Li	Dalian University of Technology, China
Yongli Li	Northeastern University, China
Zhenpeng Li	Dali University, China
Bo Liu	CAS Academy of Mathematics and Systems Science, China
William Liu	Auckland University of Technology, New Zealand
Yijun Liu	CAS Institute of Policy and Management, China
Tieju Ma	East China University of Science and Technology, China
Mina Ryoko	University of Tsukuba, Japan
Xijin Tang	CAS Academy of Mathematics and Systems Science, China
Jing Tian	Wuhan University of Technology, China
Haibo Wang	Texas A&M International University, USA
Mingzheng Wang	Dalian University of Technology, China
Cuiping Wei	Yangzhou University, China
Jiangning Wu	Dalian University of Technology, China
Haoxiang Xia	Dalian University of Technology, China
Hongbin Yan	East China University of Science and Technology, China

Yi Zeng	CAS Institute of Automation, China
Wen Zhang	Beijing University of Chemical Technology, China
Zhen Zhang	Dalian University of Technology, China
Xiaoji Zhou	Beijing Institute of Information and Control, China

Abstracts of Keynotes

Crowd Decision-Making and Consensus Support System Based on Agent and AI Technologies

Takayuki Ito

Department of Computer Science and Engineering,
Graduate School of Engineering, Nagoya Institute of Technology,
Gokiso, Showa, Nagoya 466-8555, Japan
ito.takayuki@nitech.ac.jp

Abstract. Much attention has been focused on the collective intelligence of people worldwide. Interest continues to increase in online democratic discussions, which might become one of the next generation methods for open and public forums. To harness collective intelligence, incentives for participants are one critical factor. If we can incentivize participants to engage in stimulating and active discussions, the entire discussion will head in fruitful ways and avoid negative behaviors that encourage “flaming.” “Flaming” means a hostile and insulting interaction by Wikipedia. In our work, we developed an open web-based forum system called COLLAGREE that has facilitator support functions and deployed it for an internet-based town meeting in Nagoya as a city project for an actual town meeting of the Nagoya Next Generation Total City Planning for 2014–2018. Our experiment ran on the COLLAGREE system during a two-week period with nine expert facilitators from the Facilitators Association of Japan. The participants discussed four categories about their views of an ideal city. COLLAGREE registered 266 participants from whom it gathered 1,151 opinions, 3,072 visits, and 18,466 views. The total of 1,151 opinions greatly exceeded the 463 opinions obtained by previous real-world town meetings. We clarified the importance of a COLLAGREE-type internet based town meeting and a facilitator role, which is one mechanism that can manage inflammatory language and encourage positive discussions. While facilitators, who are one element of a hierarchical management, can be seen as a top-down approach to produce collective discussions, incentive can be seen as a bottom-up approach. In this talk, we also focus on incentives for participants and employ both incentives and facilitators to harness collective intelligence. I propose an incentive mechanism for large-scale collective discussions, where the discussion activities of each participant are rewarded based on their effectiveness. With these incentives, we encourage both the active and passive actions of participants. In this talk, I will present current results about this project.

Semiotic Analysis of Behavioral Knowledge and Skills for Cyber-Physical Co-Coaching

Tetsuo Sawaragi

Department of Mechanical Engineering and Science,
Graduate School of Engineering, Kyoto University's, Kyoto, Japan

Abstract. Recently robotic techniques are applied not only to the manufacturing fields but also to everyday life domain (i.e., ambient intelligence). Wherein, human beings are observed by a variety of sensors existing in the environment, and their invisible internal states like intentional and emotional states are inferred based on the observed sensor data so that the system can understand their activities. In this talk, we regard understanding human bodily motions and/or gestures are “semiotic processes to structuralize the infinite into some coherent internal constructs within the observer.” Like a verbal language, human bodily motions are organized along the two different sorts of contexts; syntagmatic and paradigmatic contexts. Moreover, performing bodily motions is exactly an activity of communication between the actor and the cognizer (i.e., observer), where the two separate semiotic processes within the actor and the observer are interchanging with each other, and thus the meanings come out and become shared between them. As for the semiosis of human bodily motions, we approach to the constructive semiosis from two different but interconnected perspectives; from an observer’s view and from an actor’s view. The former deals with how a cognizer understands an actor’s bodily motion emitting a plenty of “signs”, while the latter is how to design actions to be understood by an observer. Our research group in the project is developing techniques for exploring the systematic structures implied in the human bodily motions. In order to extract the semiotic structures organized via syntagmatic and paradigmatic contexts, we developed two methodologies by extending the conventional methods of singular spectrum transformation (SST) and singular value decomposition (SVD), respectively. Based on the results of the above analysis, we show a testbed of cyber-physical co-coaching system, where a novice sport player is coached by being provided with semiotically analyzed behaviors and constructed ‘pantomimed’ motions in display as well as with other verbal instructions by an expert. It is shown how the skills of the players evolve as they accumulate such interactions, and the interface design issues for cyber-physical co-coaching system is discussed. Then, we introduce a schema theory to explain how we learn and perform discrete perceptual motor skills. Discrete motor skills are skills that take a short time to perform and involve using our senses to understand what is happening and then using our bodies to take action. The computational model of how the schema is learned, acquired and reconstructed through the iteration of assimilation and accommodation from the trials is presented for a simple target-tracking task. Finally, general issues for human-system collaborative system design and how the novel knowledge is expected to emerge out of their interactions.

Production as a Service

Alfred Taudes

Institute of Production Management, Vienna University of Economics,
Vienna, Austria

Abstract. The Internet of People has transformed the world. On the horizon is a new Internet of Things, where things start to sense their environment, communicate via the Internet and behave autonomously as cyber-physical systems. In Industry 4.0 machines can sense their condition and communicate with parts, and consumer products offer new functions and generate Big Data as the basis of novel information-based services. 3D printing and blockchain technology offer totally new ways of production and coordination. This new wave of innovation poses significant opportunities and threats to traditional manufacturing companies. They not only have to acquire new technical skills related to software and data analytics but also have to adapt their business model to make full use of the new possibilities. Analyzing the various technological options it turns out that they have to learn and adopt business practices that were hitherto only used by service companies and information businesses. They also have to define their role in a novel organization of manufacturing. Real-world cases are used to illustrate the new concept of Production as a Service.

Contents

Team Knowledge Formation and Evolution Based on Computational Experiment.	1
<i>Yutong Li and Yanzhong Dang</i>	
Towards a Service Value Co-creation Model for Older Adult Education	15
<i>Jinfang Cai and Michitaka Kosaka</i>	
Knowledge Sharing via Informal Communities in a Globally Distributed Organization	30
<i>Penny Chen, Yen Cheung, Vincent C.S. Lee, and Adam Hart</i>	
Effects of Different Trust on Team Creativity: Taking Knowledge Sharing as a Mediator	44
<i>Jiangning Wu, Hang Zhao, and Donghua Pan</i>	
Identifying Lead User in Mass Collaborative Innovation Community: Based on Knowledge Supernetwork	57
<i>Zhihong Li and Hongting Tang</i>	
A Conceptual Model of Optimizing Service System for the 3 rd Generation Service Innovation	68
<i>Michitaka Kosaka and Jing Wang</i>	
A Methodology for Problem-Driven Knowledge Acquisition and Its Application	82
<i>Yin Gai, Yanzhong Dang, and Zhaoguang Xu</i>	
A Framework for Analyzing Vulnerability of Critical Infrastructures Under Localized Attacks	94
<i>KeSheng Yan, LiLi Rong, Tao Lu, and ZiJian Ni</i>	
The Network Topology of the Chinese Creditees	104
<i>Yingli Wang, Mingmin Yang, Xiangyin Chen, Changli Zhou, and Xiaoguang Yang</i>	
Product Diffusion Research Based on Symbolic Regression	115
<i>Weihua Cui, Xianneng Li, and Guangfei Yang</i>	
Public Policy Simulation Based on Online Social Network: Case Study of Chinese Circuit Breaker Mechanism	130
<i>Yuan Huang, Yijun Liu, and Qianqian Li</i>	

The Online Debate Networks Analysis: A Case Study of Debates
at Tianya Forum 140
Can Wang and Xijin Tang

Entropy Measures for Extended Hesitant Fuzzy Linguistic Term Sets
and Their Applications. 151
Xia Liang, Cuiping Wei, and Xiaoyan Cheng

Group Decision Making Based on Acceptably Consistent Interval
Multiplicative Preference Relations 165
Zhen Zhang, Wenyu Yu, and Chonghui Guo

Implementation of the Distributed Fixed-Point Algorithm
and Its Application 175
Zhengtian Wu, Qinfen Shi, Yu Yu, Haili Xia, and Hongyan Yang

Optimization of Supplier Selection and Order Allocation Under Fuzzy
Demand in Fuzzy Lead Time 182
Sirin Suprasongsin, Van Nam Huynh, and Pisal Yenradee

A Dynamic Spectrum Allocation Strategy in CRNs
and Its Performance Evaluation. 196
Shunfu Jin and Wuyi Yue

Ensembled Support Vector Machines for Meta-Modeling 203
Yeboon Yun and Hirotaka Nakayama

Deep Context Identification of Deceptive Reviews Using Word Vectors 213
Wen Zhang, Yipan Jiang, and Taketoshi Yoshida

Performance Comparison of TF*IDF, LDA and Paragraph Vector
for Document Classification 225
Jindong Chen, Pengjia Yuan, Xiaoji Zhou, and Xijin Tang

A New Recommendation Framework for Accommodations Sharing
Based on User Preference 236
Qiuyan Zhong, Yangguang Wang, and Yueyang Li

Author Index 253