

Commenced Publication in 1973

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Editorial Board

David Hutchison

Lancaster University, Lancaster, UK

Takeo Kanade

Carnegie Mellon University, Pittsburgh, PA, USA

Josef Kittler

University of Surrey, Guildford, UK

Jon M. Kleinberg

Cornell University, Ithaca, NY, USA

Friedemann Mattern

ETH Zurich, Zürich, Switzerland

John C. Mitchell

Stanford University, Stanford, CA, USA

Moni Naor

Weizmann Institute of Science, Rehovot, Israel

C. Pandu Rangan

Indian Institute of Technology, Madras, India

Bernhard Steffen

TU Dortmund University, Dortmund, Germany

Demetri Terzopoulos

University of California, Los Angeles, CA, USA

Doug Tygar

University of California, Berkeley, CA, USA

Gerhard Weikum

Max Planck Institute for Informatics, Saarbrücken, Germany

More information about this series at <http://www.springer.com/series/7409>

Khalid Saeed · Władysław Homenda (Eds.)

Computer Information Systems and Industrial Management

14th IFIP TC 8 International Conference, CISIM 2015
Warsaw, Poland, September 24–26, 2015
Proceedings

Editors

Khalid Saeed
Faculty of Computer Science
Bialystok University of Technology
BIALYSTOK
Poland

Władysław Homenda
Warsaw University of Technology
Poland

ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-319-24368-9 ISBN 978-3-319-24369-6 (eBook)
DOI 10.1007/978-3-319-24369-6

Library of Congress Control Number: 2015949265

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

Springer Cham Heidelberg New York Dordrecht London

© IFIP International Federation for Information Processing 2015

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

Springer International Publishing AG Switzerland is part of Springer Science+Business Media
(www.springer.com)

Preface

CISIM 2015 was the 14th of a series of conferences dedicated to computer information systems and industrial management applications. The conference was supported by IFIP TC8 Information Systems. This year it was held during September 24–26, 2015, in Warsaw, Poland, at Warsaw University of Technology.

About 80 papers were submitted to CISIM by researchers and scientists from universities around the world. Each paper was assigned to three referees initially, and the decision was taken after receiving two positive or two negative reviews. In case of conflicting decisions, another expert's review was sought for a number of papers (over 35). In total, about 280 reviews were collected from the referees for the submitted papers. Because of the strict restrictions of Springer's Lecture Notes in Computer Science series, the number of accepted papers was limited. Furthermore, a number of electronic discussions were held between the Program Committee (PC) chairs and members to decide about papers with conflicting reviews and to reach a consensus. After the discussions, the PC chairs decided to accept for publication in the proceedings book about 65 % of the total submitted papers.

The main topics covered by the chapters in this book are biometrics, security systems, multimedia, classification and clustering with application, and industrial management. Besides these, the reader will find interesting papers on computer information systems as applied to wireless networks, computer graphics, and intelligent systems.

We are grateful to the four esteemed speakers for their keynote addresses. The authors of the keynote talks were Profs. Bożena Kostek (Gdańsk University of Technology, Poland), Jaroslav Pokorný (Charles University, Prague, Czech Republic), Agostino Cortesi (Università Ca' Foscari Venezia, Italy), and Radko Mesiar (Slovak University of Technology in Bratislava, Slovak Republic). Also Prof. Anna Bartkowiak from Wrocław University submitted a very interesting invited paper. All the keynote and invited papers are published in this proceedings volume.

We would like to thank all the members of the PC, and the external reviewers for their dedicated efforts in the paper selection process. We also thank the honorary chairs of the conference, Profs. Ryszard Tadeusiewicz and Witold Pedrycz. Special thanks are extended to the members of the Organizing Committee, both the International and the Local ones, and the Springer team for their great efforts to make the conference another success. We are also grateful to Andrei Voronkov, whose EasyChair system eased the submission and selection process and greatly supported the compilation of the proceedings. The proceedings editing was managed by Jiří Dvorský (VŠB-Technical University of Ostrava, Czech Republic), to whom we are indeed very grateful.

We hope that the reader's expectations will be met and that the participants enjoyed their stay in the beautiful city of Warsaw.

September 2015

Khalid Saeed
Władysław Homenda

Organization

Program Committee

Waleed Abdulla	University of Auckland, New Zealand
Raid Al-Tahir	The University of the West Indies, Trinidad and Tobago
Adrian Atanasiu	Bucharest University, Romania
Le Hoai Bac	Ho Chi Minh City University of Science, Vietnam
Anna Bartkowiak	Wrocław University, Poland
Aditya Bagchi	Indian Statistical Institute, India
Rahma Boucetta	National Engineering School of Gabes, Tunisia
Lam Thu Bui	Le Quy Don Technical University, Vietnam
Nabendu Chaki	Calcutta University, India
Rituparna Chaki	West Bengal University of Technology, India
Agostino Cortesi	Ca' Foscari University of Venice, Italy
Dipankar Dasgupta	University of Memphis, USA
Pierpaolo Degano	University of Pisa, Italy
Jan Devos	Ghent University, Belgium
Andrzej Dobrucki	Wrocław University of Technology, Poland
Jiří Dvorský	VŠB-Technical University of Ostrava, Czech Republic
David Dagan Feng	University of Sydney, Australia
Pietro Ferrara	IBM T.J. Watson Research Center, USA
Raju Halder	Ca' Foscari University of Venice, Italy
Christopher Harris	State University of New York, USA
Kauru Hirota	Tokyo Institute of Technology, Japan
Władysław Homenda	Warsaw University of Technology, Poland, Co-chair
Khalide Jbilou	Université du Littoral Côte d'Opale, France
Ryszard Kozera	The University of Western Australia, Australia
Flaminia Luccio	Ca' Foscari University of Venice, Italy
Romuald Mosdorf	Białystok University of Technology, Poland
Debajyoti Mukhopadhyay	Maharashtra Institute of Technology, India
Yuko Murayama	Iwate University, Japan
Hien Thanh Nguyen	Ton Duc Thang University, Vietnam
Nobuyuki Nishiuchi	Tokyo Metropolitan University, Japan
Andrzej Pacut	Warsaw University of Technology, Poland
Jerzy Pejaś	WPUT in Szczecin, Poland
Marco Pistoia	IBM T.J. Watson Research Center, USA
Igor Podolak	Jagiellonian University, Kraków, Poland
Jaroslav Pokorný	Charles University, Czech Republic
Piotr Porwik	University of Silesia, Poland

Jan Pries-Heje	The IT University of Copenhagen, Denmark
Tho Thanh Quan	Ho Chi Minh University of Technology, Vietnam
Isabel Ramos	University of Minho, Portugal
Khalid Saeed	Białystok University of Technology, Poland, Co-chair
Anirban Sarkar	National Institute of Technology, Durgapor, India
Ewa Skubalska-Rafajłowicz	Wrocław University of Technology, Poland
Václav Snášel	VŠB-Technical University of Ostrava, Czech Republic
Krzysztof Ślot	Lodz University of Technology, Poland
Marcin Szpyrka	AGH Kraków, Poland
Jacek Tabor	Jagiellonian University, Kraków, Poland
Andrea Torsello	Ca' Foscari University of Venice, Italy
Dao Trong Tran	Ton Duc Thang University, Vietnam
Nitin Upadhyay	BITS Pilani, India
Bay Dinh Vo	Ton Duc Thang University, Vietnam
Qiang Wei	Tsinghua University, Beijing, China
Sławomir Wierzchoń	Polish Academy of Sciences, Warsaw, Poland
Michał Woźniak	Wrocław University of Technology, Poland
Fusheng Yu	Beijing Normal University, China
Sławomir Zadrozny	Polish Academy of Sciences, Warsaw, Poland
Ivan Zelinka	VŠB-Technical University of Ostrava, Czech Republic

Additional Reviewers

Marcin Adamski	Białystok University of Technology, Poland
Tomáš Apeltauer	Brno University of Technology, Czech Republic
Alexander Barkalov	University of Zielona Góra, Poland
Stefano Bistarelli	University of Perugia, Italy
Chiara Bodei	University of Pisa, Italy
Mateusz Buczkowski	AGH Kraków, Poland
German Budnik	University of Białystok, Poland
Irena Bulatowa	Białystok University of Technology, Poland
Makoto Fukumoto	Fukuoka Institute of Technology, Japan
Hiroki Hasegawa	Mukogawa Women's University, Japan
Jun-Ichi Imai	Chiba Institute of Technology, Japan
Ondřej Jakl	VŠB-Technical University of Ostrava, Czech Republic
Jiří Jaroš	Brno University of Technology, Czech Republic
Bożena Kostek	Gdańsk University of Technology, Poland
Michal Krumnikl	VŠB-Technical University of Ostrava, Czech Republic
Miloš Kudelka	VŠB-Technical University of Ostrava, Czech Republic
Yasuo Kudo	Muroran Institute of Technology, Japan
Ewa Lukasiuk	Poznan University of Technology, Poland
Ladislav Maršík	Charles University, Czech Republic
Ilaria Matteucci	National Research Council, Italy
Hitomi Nakamura	Kinki University, Japan
Eliška Ochodková	VŠB-Technical University of Ostrava, Czech Republic
Akihiro Ogino	Kyoto Sangyo University, Japan

Yoshifumi Okada	Muroran Institute of Technology, Japan
Suhail Owais	Applied Science Private University, Jordan
Marinella Petrocchi	National Research Council, Italy
Mariusz Rybnik	University of Białystok, Poland
Bartłomiej Stasiak	Lodz University of Technology, Poland
Hidetsugu Suto	Muroran Institute of Technology, Japan
Ikuo Suzuki	Kitami Institute of Technology, Japan
Mariusz Szwoch	Gdańsk University of Technology, Poland
Marek Tabedzki	Białystok University of Technology, Poland
Muneyuki Unehara	Nagaoka University of Technology, Japan
Alicja Wieczorkowska	Polish-Japanese Institute of Information Technology Poland
Massimiliano Zanoni	Politecnico di Milano, Italy

Contents

Full Keynote and Invited papers

Privacy Analysis of Android Apps: Implicit Flows and Quantitative Analysis.	3
<i>Gianluca Barbon, Agostino Cortesi, Pietro Ferrara, Marco Pistoia, and Omer Tripp</i>	
Probabilistic Principal Components and Mixtures, How This Works	24
<i>Anna M. Bartkowiak and Radoslaw Zimroz</i>	
Music Information Retrieval – Soft Computing Versus Statistics.	36
<i>Bozena Kostek</i>	
Integrals Based on Monotone Measure: Optimization Tools and Special Functionals.	48
<i>Radko Mesiar</i>	
Graph Databases: Their Power and Limitations.	58
<i>Jaroslav Pokorný</i>	

Algorithms

Performance Analysis and Tuning for Parallelization of Ant Colony Optimization by Using OpenMP.	73
<i>Ahmed A. Abouelfarag, Walid Mohamed Aly, and Ashraf Gamal Elbially</i>	
Acceleration of Blender Cycles Path-Tracing Engine Using Intel Many Integrated Core Architecture.	86
<i>Milan Jaroš, Lubomír Říha, Petr Strakoš, Tomáš Karásek, Alena Vašatová, Marta Jarošová, and Tomáš Kozubek</i>	
A Modified Complete Spline Interpolation and Exponential Parameterization	98
<i>Ryszard Kozera, Lyle Noakes, and Magdalena Wilkołazka</i>	
Chaotic Properties of Gait Kinematic Data	111
<i>Michal Piorek</i>	
Comparison of ASIM Traffic Profile Detectors and Floating Car Data During Traffic Incidents.	120
<i>Lukáš Rapant, Kateřina Slaninová, Jan Martinovič, Marek Ščerba, and Martin Hájek</i>	

Verification of ArchiMate Behavioral Elements by Model Checking	132
<i>Piotr Szwed</i>	
Time-Dependent Route Planning for the Highways in the Czech Republic . . .	145
<i>Radek Tomis, Jan Martinovič, Kateřina Slaninová, Lukáš Rapant, and Ivo Vondrák</i>	
Self Organizing Maps with Delay Actualization	154
<i>Lukáš Vojáček, Pavla Dráždilová, and Jiří Dvorský</i>	
Biometrics and Biometrics Applications	
Person Identification Technique Using RGB Based Dental Images	169
<i>Soma Datta and Nabendu Chaki</i>	
A Novel Double Fault Diagnosis and Detection Technique in Digital Microfluidic Biochips	181
<i>Sagarika Chowdhury, Rajat Kumar Pal, and Goutam Saha</i>	
Biometric Swiping on Touchscreens	193
<i>Orcan Alpar and Ondrej Krejcar</i>	
Simple Displaying Method for Genealogy with Assisted Reproductive Technologies	204
<i>Seiji Sugiyama, Daisuke Yokozawa, Atsushi Ikuta, Satoshi Hiratsuka, Miyuki Shibata, and Tohru Matsuura</i>	
Data Analysis and Information Retrieval	
U-Stroke Pattern Modeling for End User Identity Verification Through Ubiquitous Input Device	219
<i>Tapalina Bhattasali, Nabendu Chaki, Khalid Saeed, and Rituparna Chaki</i>	
A Geometrical Approach to Rejecting Option in Pattern Recognition Problem	231
<i>Jakub Ciecierski, Bartomiej Dybisz, Agnieszka Jastrzebska, and Witold Pedrycz</i>	
Identification Effectiveness of the Shape Recognition Method Based on Sonar.	244
<i>Teodora Dimitrova-Grekow and Marcin Jarczewski</i>	

MRI Texture Analysis for Differentiation Between Healthy and Golden Retriever Muscular Dystrophy Dogs at Different Phases of Disease Evolution 255
Dorota Duda, Marek Kretowski, Noura Azzabou, and Jacques D. de Certaines

Policy-Based Slicing of Hibernate Query Language 267
Angshuman Jana, Raju Halder, Nabendu Chaki, and Agostino Cortesi

Uncovering Document Fraud in Maritime Freight Transport Based on Probabilistic Classification 282
Ron Triepels, Ad Feelders, and Hennie Daniels

Modelling and Optimization

Telerobotic Surgery: Fuzzy Path Planning Control for a Telerobotic Assistant Surgery 297
Rahma Boucetta

A Model for an Aggression Discovery Through Person Online Behavior 305
Germanas Budnikas

Modeling On-Demand Transit Transportation System Using an Agent-Based Approach 316
Olfa Chebbi and Joughaina Chaouachi

Optimal Fleet Sizing of Personal Rapid Transit System 327
Olfa Chebbi and Joughaina Chaouachi

Viability of Implementing Smart Mobility Tool in the Case of Tunis City 339
Ezzeddine Fatmassi, Olfa Chebbi, and Joughaina Chaouachi

Optimal Input Signal Design for a Second Order Dynamic System Identification Subject to D-Efficiency Constraints 351
Wiktor Jakowluk

Modelling Human Cognitive Processes: Unipolar vs Bipolar Uncertainty 363
Agnieszka Jastrzebska, Wojciech Lesinski, and Mariusz Rybnik

Experiments on Minimization Method of Incompletely Specified Finite State Machines for Low Power Design 375
Adam Klimowicz and Valery Solov'ev

Designing of Hierarchical Structures for Binary Comparators on FPGA/SoC 386
Valery Salaouyou and Marek Gruszewski

Pattern Recognition and Image Processing

Registration and Sequencing of Vessels Section Images at Macroscopic Levels 399
Aneta Górniak and Ewa Skubalska-Rafajłowicz

Comprehensive Performance Evaluation of Various Feature Extraction Methods for OCR Purposes 411
Dawid Sas and Khalid Saeed

Lagrange Piecewise-Quadratic Interpolation Based on Planar Unordered Reduced Data 423
Ryszard Kozera and Piotr Szmielew

A Novel Phase-Based Approach to Tear Film Surface Quality Assessment Using Lateral Shearing Interferometry 435
Piotr Szyperski and D. Robert Iskander

Various Aspects of Computer Security

The Impact of the TPM Weights Distribution on Network Synchronization Time 451
Michał Dolecki and Ryszard Kozera

Verification of Mutual Authentication Protocol for MobInfoSec System 461
Olga Siedlecka-Lamch, Imed El Fray, Mirosław Kurkowski, and Jerzy Pejaś

AQoPA: Automated Quality of Protection Analysis Framework for Complex Systems 475
Damian Rusinek, Bogdan Ksiezopolski, and Adam Wierzbicki

ICBAKE 2015 Workshop

Text Data Mining of English Interviews 489
Hiromi Ban, Haruhiko Kimura, Takashi Oyabu, and Jun Minagawa

Relationship of Terror Feelings and Physiological Response During Watching Horror Movie 500
Makoto Fukumoto and Yuuki Tsukino

Estimation of User’s Attention and Awareness in Occlusion-Rich Environments Using RGB-D Cameras 508
Jun-ichi Imai and Masanori Nemoto

Factors to Affect Descriptions on Intra-Concept Relation in Introductory Concept Mapping	519
<i>Jun Minagawa and Hiromi Ban</i>	
Investigation of Comfort of Uniform Shirt Made of Cellulose Considering Environmental Load	527
<i>Hideaki Mizuhashi, Masayoshi Kamijo, Hiroaki Yoshida, and Harumi Tamaki</i>	
Usability Evaluation for Continuous Error of Fingerprint Identification	539
<i>Nobuyuki Nishiuchi and Yuki Buniu</i>	
Study of Cancelable Biometrics in Security Improvement of Biometric Authentication System	547
<i>Sanggyu Shin and Yoichi Seto</i>	
Estimating a Shooting Angle in Ear Recognition	559
<i>Daishi Watabe, Takanari Minamidani, Hideyasu Sai, Taiyo Maeda, Takaharu Yamazaki, and Jianting Cao</i>	
Music Information Processing Workshop	
Mobile System for Optical Music Recognition and Music Sound Generation	571
<i>Julia Adamska, Mateusz Piecuch, Mateusz Podgórski, Piotr Walkiewicz, and Ewa Lukasik</i>	
Audio Features Dedicated to the Detection of Four Basic Emotions.	583
<i>Jacek Grekow</i>	
AutoPRK - Automatic Drum Player	592
<i>Filip Biedrzycki, Jakub Knast, Mariusz Nowak, and Jakub Paszkowski</i>	
Optical Music Recognition: Standard and Cost-Sensitive Learning with Imbalanced Data	601
<i>Wojciech Lesinski and Agnieszka Jastrzebska</i>	
Emotion-Based Music Information Retrieval Using Lyrics	613
<i>Akihiro Ogino and Yuko Yamashita</i>	
Author Index	623