

Lecture Notes in Artificial Intelligence 8502

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

Troels Andreassen Henning Christiansen
Juan-Carlos Cubero Zbigniew W. Raś (Eds.)

Foundations of Intelligent Systems

21st International Symposium, ISMIS 2014
Roskilde, Denmark, June 25-27, 2014
Proceedings

Volume Editors

Troels Andreasen
Roskilde University, Denmark
E-mail: troels@ruc.dk

Henning Christiansen
Roskilde University, Denmark
E-mail: henning@ruc.dk

Juan-Carlos Cubero
University of Granada, Spain
E-mail: jc.cubero@decsai.ugr.es

Zbigniew W. Raś
University of North Carolina, Charlotte, NC, USA
and Warsaw University of Technology, Poland
E-mail: ras@uncc.edu

ISSN 0302-9743

e-ISSN 1611-3349

ISBN 978-3-319-08325-4

e-ISBN 978-3-319-08326-1

DOI 10.1007/978-3-319-08326-1

Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014941587

LNCS Sublibrary: SL 7 – Artificial Intelligence

© Springer International Publishing Switzerland 2014

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. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

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.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume contains the papers presented at ISMIS 2014: 21st International Symposium on Methodologies for Intelligent Systems held during June 25–27, 2014, in Roskilde, Denmark. The symposium was organized by members of the PLIS research group: Programming, Logic and Intelligent Systems, of the Department of Communication, Business and Information Technologies at Roskilde University.

ISMIS is a conference series that started in 1986 and has developed into an established and prestigious conference for exchanging the latest research results in building intelligent systems. The scope of ISMIS represents a wide range of topics on applying artificial intelligence techniques to areas as diverse as decision support, automated deduction, reasoning, knowledge-based systems, machine learning, computer vision, robotics, planning, databases, information retrieval, and so on. ISMIS provides a forum and a means for exchanging information for those interested purely in theory, those interested primarily in implementation, and those interested in specific research and industrial applications.

We want to express our special thanks to the Program Committee members and everyone who contributed at any level to the organization of ISMIS 2014. Also, special thanks to our invited speakers, Matthias Jarke, Xavier Serra and Steffen Staab. We would like to thank every author who submitted a paper to ISMIS 2014 and finally the team of EasyChair, without whose free software the handling of submissions and editing of the proceedings could not have been managed so smoothly by a small group of people. Last but not the least, we thank Alfred Hofmann of Springer for his continuous support.

April 2014

Troels Andreasen
Henning Christiansen
Juan-Carlos Cubero
Zbigniew W. Raś

Organization

The symposium was organized by members of the PLIS research group: Programming, Logic and Intelligent Systems, of the Department of Communication, Business and Information Technologies at Roskilde University.

General Chair

Zbigniew W. Raś	University of North Carolina, Charlotte, USA and Warsaw University of Technology, Poland
-----------------	--

Symposium Chair

Troels Andreassen	Roskilde University, Denmark
-------------------	------------------------------

Program Co-chairs

Henning Christiansen	Roskilde University, Denmark
Juan Carlos Cubero	University of Granada, Spain

Steering Committee

Aijun An	York University, Canada
Alexander Felfernig	Graz University of Technology, Austria
Andrzej Skowron	University of Warsaw, Poland
Dominik Ślęzak	Infobright Inc., Canada; and University of Warsaw, Poland
Henryk Rybinski	Warsaw University of Technology, Poland
Jaime Carbonell	CMU, USA
Jan Rauch	University of Economics, Prague, Czech Republic
Jiming Liu	Hong Kong Baptist University, Hong Kong, SAR China
Li Chen	Hong Kong Baptist University, Hong Kong, SAR China
Lorenza Saitta	University of Piemonte Orientale, Italy
Maria Zemankova	NSF, USA
Marzena Kryszkiewicz	Warsaw University of Technology, Poland
Nick Cercone	York University, Canada

Petr Berka	University of Economics, Prague, Czech Republic
Stan Matwin	University of Ottawa, Canada
Tapio Elomaa	Tampere University of Technology, Finland
Zbigniew W. Raś	UNC-Charlotte, USA; and Warsaw University of Technology, Poland

Program Committees

ISMIS Regular Papers and Posters

Luigia Carlucci Aiello	Sapienza Università di Roma, Italy
Aijun An	York University, Canada
Troels Andreasen	Roskilde University, Denmark
Annalisa Appice	University of Bari, Italy
Salima Benbernou	University of Paris V, France
Marenglen Biba	University of New York Tirana, Albania
Maria Bielikova	Slovak University of Technology, Slovakia
Ivan Bratko	University of Ljubljana, Slovenia
Francois Bry	University of Munich, Germany
Henrik Bulskov	Roskilde University, Denmark
Sandra Carberry	University of Delaware, USA
Michelangelo Ceci	University of Bari, Italy
Jianhua Chen	Louisiana State University, USA
Henning Christiansen	Roskilde University (Co-chair), Denmark
William J. Clancey	Florida Institute for Human and Machine Cognition, USA
Luca Console	Università di Torino, Italy
Bruno Cremilleux	Université de Caen Basse-Normandie, France
Juan Carlos Cubero	University of Granada (Co-chair), Spain
Alfredo Cuzzocrea	ICAR-CNR, University of Calabria, Italy
Ramon Lopez de Mantaras	Spanish National Research Council, Spain
Nicola Di Mauro	Università degli Studi di Bari “Aldo Moro”, Italy
Jørgen Fischer Nilsson	Technical University of Denmark
Vladimir A. Fomichov	National Research University, France
Laura Giordano	University of Piemonte Orientale, Italy
Jacek Grekow	Bialystok University of Technology, Poland
Jerzy Grzymala-Busse	University of Kansas, USA
Hakim Hacid	Alcatel-Lucent Bell Labs
Allel Hadjali	Université de Rennes 1, France
Shoji Hirano	Shimane Medical University, Japan
Lothar Hotz	University of Hamburg, Germany
Manfred Jaeger	Aalborg University, Denmark
Nathalie Japkowicz	University of Ottawa, Canada
Mieczyslaw Klopotek	Polish Academy of Sciences, Poland

Bozena Kostek	Gdansk University of Technology, Poland
Patrick Lambrix	Linkoping University, Sweden
Rory Lewis	University of Colorado at Colorado Springs, USA
Michael Lowry	NASA Ames, USA
Donato Malerba	University of Bari, Italy
Giuseppe Manco	Università della Calabria, Italy
Krzysztof Marasek	Polish-Japanese Institute of Information Technology, Poland
Maria José Martín Bautista	University of Granada, Spain
Nicolas Marín Ruiz	University of Granada, Spain
Elio Masciari	Università della Calabria, Italy
Paola Mello	University of Bologna, Italy
Ernestina Menasalvas Ruiz	Universidad Politécnica de Madrid, Spain
Neil Murray	University at Albany, State University of New York, USA
Agnieszka Mykowiecka	Polish Academy of Sciences, Poland
John Mylopoulos	University of Toronto, Canada
Thomas D. Nielsen	Aalborg University, Denmark
Jean-Marc Petit	Université de Lyon, France
Olivier Pivert	University of Rennes 1, France
Henri Prade	National Center for Scientific Research, France
Vijay Raghavan	University of Louisiana at Lafayette, USA
Hiroshi Sakai	Kyushu Institute of Technology, Japan
Daniel Sanchez Fernandez	University of Granada, Spain
Dominik Slezak	University of Warsaw, Poland
Jerzy Stefanowski	Poznan Technical University, Poland
Jaroslav Stepaniuk	Bialystok University of Technology, Poland
Marcin Sydow	Polish-Japanese Institute of Information Technology, Poland
Erich Teppan	University of Klagenfurt, Germany
K. Thirunarayan	Wright State University, USA
Christel Vrain	Orleans University, France
Alicja Wiczorkowska	Polish-Japanese Institute of Information Technology, Poland
Franz Wotawa	Graz University of Technology, Poland
Yiyu Yao	University of Regina, Canada
Slawomir Zadrozny	University of North Carolina at Charlotte, USA
Wlodek Zadrozny	University of North Carolina at Charlotte, USA
Ning Zhong	Maebashi Institute of Technology, Japan
Djamel Zighed	University of Lyon 2, France

Special Session: Challenges in Text Mining and Semantic Information Retrieval

Piotr Andruszkiewicz	Warsaw University of Technology, Poland
Robert Bembenik	Warsaw University of Technology, Poland

Philipp Cimiano
Tomasz Gambin
Piotr Gawrysiak
Marzena Kryszkiewicz

Bielefeld University, Germany
Warsaw University of Technology, Poland
Warsaw University of Technology, Poland
Warsaw University of Technology
(Co-chair), Poland)

Evangelos Milios
Mikołaj Morzy
Robert Nowak
Grzegorz Protaziuk
Henryk Rybinski
Łukasz Skonieczny

Dalhousie University, Canada
Poznań University of Technology, Poland
University of Technology
Warsaw University of Technology, Poland
University of Technology (Co-chair), Poland
Warsaw University of Technology (Co-chair),
Poland

Jerzy Stefanowski
Julian Szymanski
Krzysztof Walczak
Wlodek Zadrozny

Poznań Technical University, Poland
Gdansk University of Technology, Poland
Warsaw University of Technology, Poland
University of North Carolina at Charlotte, USA

Special Session: Warehousing and OLAPing Complex, Spatial and Spatio-Temporal Data

Michelangelo Ceci
Alfredo Cuzzocrea

University of Bari, Italy
ICAR-CNR & University of Calabria (Chair),
Italy

Sergio Flesca
Filippo Furfaro
Carson Leung

University of Calabria, Italy
University of Calabria, Italy
University of Manitoba, Canada

Additional Reviewers

Agrawal, Ameeta
Aiello, Marco
Boulkrinat, Samia
Béchet, Nicolas
Cancelliere, Rossella
Chesani, Federico
Choiref, Zahira
Corby, Olivier
Dragisic, Zlatan
Fumarola, Fabio
Grisetti, Giorgio
Guarascio, Massimo
Hose, Katja
Ivanova, Valentina

Kapanipathi, Pavan
Klec, Mariusz
Lanotte, Pasqua Fabiana
Liberatore, Paolo
Lyu, Siwei
Pio, Gianvito
Protaziuk, Grzegorz
Pusala, Murali
Serafino, Francesco
Sharif, Mohammad
Spillane, Sean
Thion, Virginie
Wang, Wenbo
Zihayat, Morteza

Invited Talks

Exploiting Cultural Specificity in Music Information Research

Xavier Serra

Music Technology Group
Universitat Pompeu Fabra, Barcelona
`xavier.serra@upf.edu`

Music Information Research (MIR) is a discipline that aims to understand and model music from an information processing perspective and one of its major challenges relates to the automatic generation of musically meaningful information with which to better describe and exploit audio music recordings. The goal is to integrate and process a variety of data sources, like the actual audio recordings, plus editorial metadata and contextual information, to obtain structured information that is semantically and musically meaningful and that is of use in search, retrieval and discovery tasks [1].

A piece of music is an information entity that makes sense specially within a particular social and cultural context. Its analysis and description has to take that into account and thus the data-driven approaches have to incorporate domain knowledge from that particular context in order to make sense of the available information on that piece of music.

In this presentation I will introduce the research currently being done in CompMusic (<http://compmusic.upf.edu>), a project funded by the European Research Council that focuses on a number of MIR problems through the study of five music cultures: Hindustani (North India), Carnatic (South India), Turkish-makam (Turkey), Arab-Andalusian (Maghreb), and Beijing Opera (China). We work on the extraction of musically relevant features from audio music recordings related to melody and rhythm, and on the semantic analysis of the contextual information of those recordings [2].

Given that most of the research in MIR has been based on studying the western commercial music of the last few decades, our claim is that the technologies developed have a strong bias towards that music, thus not being appropriate for other music repertoires. We want to identify the current limitations and propose information processing approaches that can go beyond those boundaries. For that we selected a few music cultures that had personalities contrasting with the popular western music, that had alive performance practices and strong social and cultural relevance, for which there were musicological and cultural studies, and for which it was feasible to collect sufficient and coherent machine-readable

music data. At the same time we wanted to have a diverse set of music repertoires with which to study a variety of new and diverse MIR problems.

A major effort in CompMusic has been the creation of research corpora. The types of data that we have gathered are mainly audio recordings and editorial metadata, which are then complemented with descriptive information about the items we have, and in some cases with music scores and/or lyrics. In order to evaluate our research results we have defined a user scenario and have developed a complete system-level application with which users can interact and with which we can evaluate most of the research results from a user perspective. The system, Dunya (<http://dunya.compmusic.upf.edu>), is a web-based application to explore music collections aimed at music connoisseurs of the particular music traditions. It uses the technologies developed for melodic and rhythmic description and semantic analysis to navigate through the audio recordings and the information items available. This navigation promotes the discovery of relationships between the different information items.

References

1. Serra, X., Magas, M., Benetos, E., Chudy, M., Dixon, S., Flexer, A., Gómez, E., Gouyon, F., Herrera, P., Jordà, S., Paytuvi, O., Peeters, G., Schlüter, J., Vinet, H., Widmer, G.: Roadmap for Music Information ReSearch (2013) ISBN: 978-2-9540351-1-6
2. Serra, X.: A Multicultural Approach in Music Information Research. In: Int. Soc. for Music Information Retrieval Conf. (ISMIR), pp. 151–156 (2011)

Big Data Workflows: Issues and Challenges

Matthias Jarke

RWTH Aachen University, Informatik 5 & Fraunhofer FIT
Ahornstr. 55m 52074 Aachen, Germany
`jarke@cs.rwth-aachen.de`

Abstract. Big Data is often seen as a rather uniform, if not well understood conglomerate of research and practice issues related to massively increased Volume, Velocity, and Variety of data. In reality, there is an enormous diversity of requirements, architectural and algorithmic settings, in which key success factors can range from efficient sensor fusion to rapid query processing and stream mining, to careful semantic-preserving data integration, to aspect such as data protection, provenance maintenance, novel business models, and digital rights management. In the Fraunhofer Big Data [1], twenty-four research institutes from different disciplines in science and engineering have joined forces to explore big data in the six domains of production, logistics, life sciences/healthcare, energy management, security, business and finance.

This presentation will illustrate this variety from the perspective of intelligent, automated workflow assistance in different big data settings. We start with an overview of attempts for automating the integration of heterogeneous structured and semi-structured data, e.g. in corporate as well as cross-organizational multi-database settings [2]. One set of application projects we are currently engaged in comprises different aspects of research data management, focusing on prevention of scientific fraud and traceability, while ensuring correct data ownership and shared understanding. Another important aspect in this context is the evolution analysis of contributions to scientific communities [3], be it open source communities or simply publication and citation networks. As another extreme, we look at highly scalable digital rights policies and management workflows within very large-scale video databases, contrasting automated techniques and “wisdom of the crowd” [4].

References

1. <http://www.bigdata.fraunhofer.de>
2. Jarke, M., Jeusfeld, M.A., Quix, C.: Data-centric intelligent information integration – from concepts to automation. *Journal of Intelligent Information Systems* (to appear, 2014)
3. Pham, M.C., Klamma, R., Jarke, M.: Development of computer science disciplines - a social network analysis approach. *Social Network Analysis and Mining (SNAM)* 1(4), 321–340 (2011)

4. Rashed, K., Renzel, D., Klamma, R., Jarke, M.: Community and trust-aware fake media detection. *Multimedia Tools and Applications* (2012), doi:10.1007/s11042-012-1103-3; Special issue on Multimedia on the Web 2012

Table of Contents

Complex Networks and Data Stream Mining

Community Detection by an Efficient Ant Colony Approach	1
<i>Lúcio Pereira de Andrade, Rogério Pinto Espíndola, and Nelson Francisco Favilla Ebecken</i>	
Adaptive XML Stream Classification Using Partial Tree-Edit Distance	10
<i>Dariusz Brzezinski and Maciej Piernik</i>	
RILL: Algorithm for Learning Rules from Streaming Data with Concept Drift	20
<i>Magdalena Deckert and Jerzy Stefanowski</i>	
Community Detection for Multiplex Social Networks Based on Relational Bayesian Networks	30
<i>Jiuchuan Jiang and Manfred Jaeger</i>	
Mining Dense Regions from Vehicular Mobility in Streaming Setting	40
<i>Corrado Loglisci and Donato Malerba</i>	
Mining Temporal Evolution of Entities in a Stream of Textual Documents	50
<i>Gianvito Pio, Pasqua Fabiana Lanotte, Michelangelo Ceci, and Donato Malerba</i>	
An Efficient Method for Community Detection Based on Formal Concept Analysis	61
<i>Selmane Sid Ali, Fadila Bentayeb, Rokia Missaoui, and Omar Boussaid</i>	

Data Mining Methods

On Interpreting Three-Way Decisions through Two-Way Decisions	73
<i>Xiaofei Deng, Yiyu Yao, and JingTao Yao</i>	
FHM: Faster High-Utility Itemset Mining Using Estimated Utility Co-occurrence Pruning	83
<i>Philippe Fournier-Viger, Cheng-Wei Wu, Souleymane Zida, and Vincent S. Tseng</i>	
Automatic Subclasses Estimation for a Better Classification with HNNP	93
<i>Ruth Janning, Carlotta Schatten, and Lars Schmidt-Thieme</i>	

A Large-Scale, Hybrid Approach for Recommending Pages Based on Previous User Click Pattern and Content	103
<i>Mohammad Amir Sharif and Vijay V. Raghavan</i>	
EverMiner Prototype Using LISP-Miner Control Language	113
<i>Milan Šimůnek and Jan Rauch</i>	
Local Characteristics of Minority Examples in Pre-processing of Imbalanced Data.....	123
<i>Jerzy Stefanowski, Krystyna Napierała, and Małgorzata Trzcielińska</i>	
Visual-Based Detection of Properties of Confirmation Measures	133
<i>Robert Susmaga and Izabela Szczęch</i>	

Intelligent Systems Applications

A Recursive Algorithm for Building Renovation in Smart Cities	144
<i>Andrés Felipe Barco, Elise Vareilles, Michel Aldanondo, and Paul Gaborit</i>	
Spike Sorting Based upon PCA over DWT Frequency Band Selection...	154
<i>Konrad Ciecierski, Zbigniew W. Raś, and Andrzej W. Przybyszewski</i>	
Neural Network Implementation of a Mesoscale Meteorological Model	164
<i>Robert Firth and Jianhua Chen</i>	
Spectral Machine Learning for Predicting Power Wheelchair Exercise Compliance	174
<i>Robert Fisher, Reid Simmons, Cheng-Shiu Chung, Rory Cooper, Garrett Grindle, Annmarie Kelleher, Hsinyi Liu, and Yu Kuang Wu</i>	
Mood Tracking of Radio Station Broadcasts	184
<i>Jacek Grekow</i>	
Evidential Combination Operators for Entrapment Prediction in Advanced Driver Assistance Systems	194
<i>Alexander Karlsson, Anders Dahlbom, and Hui Zhong</i>	
Influence of Feature Sets on Precision, Recall, and Accuracy of Identification of Musical Instruments in Audio Recordings.....	204
<i>Elżbieta Kubera, Alicja A. Wieczorkowska, and Magdalena Skrzypiec</i>	
Multi-label Ferns for Efficient Recognition of Musical Instruments in Recordings	214
<i>Miron B. Kursa and Alicja A. Wieczorkowska</i>	

Computer-Supported Polysensory Integration Technology for Educationally Handicapped Pupils	224
<i>Michał Lech, Andrzej Czyżewski, Waldemar Kucharski, and Bożena Kostek</i>	
Integrating Cluster Analysis to the ARIMA Model for Forecasting Geosensor Data	234
<i>Sonja Pravilovic, Annalisa Appice, and Donato Malerba</i>	
Unsupervised and Hybrid Approaches for On-line RFID Localization with Mixed Context Knowledge	244
<i>Christoph Scholz, Martin Atzmueller, and Gerd Stumme</i>	
Mining Surgical Meta-actions Effects with Variable Diagnoses’ Number	254
<i>Hakim Touati, Zbigniew W. Raś, James Studnicki, and Alicja A. Wieczorkowska</i>	

Knowledge Representation in Databases and Systems

A System for Computing Conceptual Pathways in Bio-medical Text Models	264
<i>Troels Andreassen, Henrik Bulskov, Jørgen Fischer Nilsson, and Per Anker Jensen</i>	
Putting Instance Matching to the Test: Is Instance Matching Ready for Reliable Data Linking?	274
<i>Silviu Homoceanu, Jan-Christoph Kalo, and Wolf-Tilo Balke</i>	
Improving Personalization and Contextualization of Queries to Knowledge Bases Using Spreading Activation and Users’ Feedback	285
<i>Ana Belen Pelegrina, Maria J. Martin-Bautista, and Pamela Faber</i>	
Plethoric Answers to Fuzzy Queries: A Reduction Method Based on Query Mining	295
<i>Olivier Pivert and Grégory Smits</i>	
Generating Description Logic ALC from Text in Natural Language	305
<i>Ryan Ribeiro de Azevedo, Fred Freitas, Rodrigo Rocha, José Antônio Alves de Menezes, and Luis F. Alves Pereira</i>	
DBaaS-Expert: A Recommender for the Selection of the Right Cloud Database	315
<i>Soror Sahri, Rim Moussa, Darrell D.E. Long, and Salima Benbernou</i>	
Context-Aware Decision Support in Dynamic Environments: Methodology and Case Study	325
<i>Alexander Smirnov, Tatiana Levashova, Alexey Kashevnik, and Nikolay Shilov</i>	

Textual Data Analysis and Mining

Unsupervised Aggregation of Categories for Document Labelling	335
<i>Piotr Borkowski, Krzysztof Ciesielski, and Mieczysław A. Kłopotek</i>	
Classification of Small Datasets: Why Using Class-Based Weighting Measures?	345
<i>Flavien Bouillot, Pascal Poncelet, and Mathieu Roche</i>	
Improved Factorization of a Connectionist Language Model for Single-Pass Real-Time Speech Recognition	355
<i>Lukasz Brocki, Danijel Koržinek, and Krzysztof Marasek</i>	
Automatic Extraction of Logical Web Lists	365
<i>Pasqua Fabiana Lanotte, Fabio Fumarola, Michelangelo Ceci, Andrea Scarpino, Michele Damiano Torelli, and Donato Malerba</i>	
Combining Formal Logic and Machine Learning for Sentiment Analysis	375
<i>Niklas Christoffer Petersen and Jørgen Villadsen</i>	
Clustering View-Segmented Documents via Tensor Modeling	385
<i>Salvatore Romeo, Andrea Tagarelli, and Dino Ienco</i>	
Searching XML Element Using Terms Propagation Method	395
<i>Samia Berchiche-Fellag and Mohamed Mezghiche</i>	

Special Session: Challenges in Text Mining and Semantic Information Retrieval

AI Platform for Building University Research Knowledge Base	405
<i>Jakub Koperwas, Lukasz Skonieczny, Marek Kozłowski, Piotr Andruszkiewicz, Henryk Rybiński, and Wacław Struk</i>	
A Seed Based Method for Dictionary Translation	415
<i>Robert Krajewski, Henryk Rybiński, and Marek Kozłowski</i>	
SAUText — A System for Analysis of Unstructured Textual Data	425
<i>Grzegorz Protaziuk, Jacek Lewandowski, and Robert Bembenik</i>	
Evaluation of Path Based Methods for Conceptual Representation of the Text	435
<i>Lukasz Kucharczyk and Julian Szymański</i>	

Special Session: Warehousing and OLAPing Complex, Spatial and Spatio-Temporal Data

Restructuring Dynamically Analytical Dashboards Based on Usage Profiles	445
<i>Orlando Belo, Paulo Rodrigues, Rui Barros, and Helena Correia</i>	
Enhancing Traditional Data Warehousing Architectures with Real-Time Capabilities	456
<i>Alfredo Cuzzocrea, Nickerson Ferreira, and Pedro Furtado</i>	
Inference on Semantic Trajectory Data Warehouse Using an Ontological Approach	466
<i>Thouraya Sakouhi, Jalel Akaichi, Jamal Malki, Alain Bouju, and Rouaa Wannous</i>	
Combining Stream Processing Engines and Big Data Storages for Data Analysis	476
<i>Thomas Steinmaurer, Patrick Traxler, Michael Zwick, Reinhard Stumptner, and Christian Lettner</i>	

ISMIS Posters

Representation and Evolution of User Profile in Information Retrieval Based on Bayesian Approach	486
<i>Farida Achemoukh and Rachid Ahmed-Ouamer</i>	
Creating Polygon Models for Spatial Clusters	493
<i>Fatih Akdag, Christoph F. Eick, and Guoning Chen</i>	
Skeleton Clustering by Autonomous Mobile Robots for Subtle Fall Risk Discovery	500
<i>Yutaka Deguchi and Einoshin Suzuki</i>	
Sonar Method of Distinguishing Objects Based on Reflected Signal Specifics	506
<i>Teodora Dimitrova-Grekow and Marcin Jarczewski</i>	
Endowing Semantic Query Languages with Advanced Relaxation Capabilities	512
<i>Géraud Fokou, Stéphane Jean, and Allel Hadjali</i>	
A Business Intelligence Solution for Monitoring Efficiency of Photovoltaic Power Plants	518
<i>Fabio Fumarola, Annalisa Appice, and Donato Malerba</i>	

WBPL: An Open-Source Library for Predicting Web Surfing Behaviors 524
 Ted Gueniche, Philippe Fournier-Viger, Roger Nkambou, and Vincent S. Tseng

Data-Quality-Aware Skyline Queries 530
 Hélène Jaudoin, Olivier Pivert, Grégory Smits, and Virginie Thion

Neuroscience Rough Set Approach for Credit Analysis of Branchless Banking 536
 Rory Lewis

Collective Inference for Handling Autocorrelation in Network Regression 542
 Corrado Loglisci, Annalisa Appice, and Donato Malerba

On Predicting a Call Center’s Workload: A Discretization-Based Approach 548
 Luis Moreira-Matias, Rafael Nunes, Michel Ferreira, João Mendes-Moreira, and João Gama

Improved Approximation Guarantee for Max Sum Diversification with Parameterised Triangle Inequality 554
 Marcin Sydow

Learning Diagnostic Diagrams in Transport-Based Data-Collection Systems 560
 Vu The Tran, Peter Eklund, and Chris Cook

Author Index 567