Lecture Notes in Computer Science

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, Zurich, 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
Database and Expert Systems Applications

28th International Conference, DEXA 2017
Lyon, France, August 28–31, 2017
Proceedings, Part II
Preface

The well-established International Conference on Database and Expert Systems Applications – DEXA — provides a forum to bring together researchers and practitioners who are actively engaged both in theoretical and practical aspects of database, information, and knowledge systems. It allows participants to exchange ideas, up-to-date information, and experiences in database and knowledge systems and to debate issues and directions for further research and development.

This volume contains papers selected for presentation at the 28th International Conference on Database and Expert Systems Applications (DEXA 2017), which took place in Lyon, France, during August 28–31, 2017.

DEXA 2017 attracted 166 submissions from all over the world. Decision on acceptance or rejection was based on at least three reviews for each submitted paper. After a thorough review process by the Program Committee members, to whom we owe our acknowledgment and special thanks for the time and effort they invested in reviewing papers, the DEXA 2017 chairs accepted 37 full research papers and 40 short research papers yielding an acceptance rate of 22% and 24%, respectively. Full papers were given a maximum of 15 pages in this volume and short papers were given an eight-page limit. Authors of selected papers presented at the conference will be invited to submit extended versions of their papers for publication in the Springer journal *Transactions on Large-Scale Data- and Knowledge-Centered Systems* (TLDKS). The submitted extended versions will undergo a further review process.

Two high-quality keynote presentations on “Structural and Semantic Summarization of RDF Graphs” given by Ioana Manolescu, Senior Researcher, Inria Saclay and Ecole Polytechnique, France, and “Omnipresent Multimedia – Pain and Gain of the Always Connected Paradigm” given by Gabriele Anderst-Kotsis, Johannes Kepler University Linz, Austria, were also featured in the scientific program of DEXA 2017.

This edition of DEXA also featured five international workshops covering a variety of specialized topics:

- AICTSS 2017: First International Workshop on Advanced ICT Technologies for Secure Societies
- BDMICS 2017: Second International Workshop on Big Data Management in Cloud Systems
- BIOKDD 2017: 8th International Workshop on Biological Knowledge Discovery from Data
- TIR 2017: 14th International Workshop on Technologies for Information Retrieval
- UCC 2017: First International Workshop on Uncertainty in Cloud Computing

The success of DEXA 2017 would not have been possible without the hard work and dedication of many people including Gabriela Wagner as manager of the DEXA organization for her highly skillful management and efficient assistance, Chirine Ghedira and Mahmoud Barhamgi as local Organizing Committee chairs for tackling
different aspects of the local organization and their dedication and commitment to this event, Karim Benouaret, Caroline Wintergerst, Christophe Gravier, Omar Boussaid, Fadila Bentayeb, Nadia Kabachi, Nabila Benharkat, Nadia Bennani, Faty Berkaï, and Claire Petrel as local Organizing Committee members for supporting us all the way through, and Vladimir Marik as publication chair for the preparation of the proceedings volumes. Our special thanks and gratitude also go to the general chairs for their continuous encouragement and great support: Abdelkader Hameurlain (IRIT, Paul Sabatier University, Toulouse, France), Amit Sheth (Kno.e.sis - Wright State University, USA), and Roland R. Wagner (Johannes Kepler University, Linz, Austria).

DEXA 2017 received support from the following institutions: Lyon 1 University, Lyon 2 University, Lyon 3 University, University of Lyon, INSA of Lyon, LIRIS Lab, ERIC Lab, CNRS, FIL (Fédération Informatique Lyonnaise), AMIES Labex, and FAW in Austria. We gratefully thank them for their commitment to supporting this scientific event.

Last but not least, we want to thank the international community, including all the authors, the Program Committee members, and the external reviewers, for making and keeping DEXA a nice avenue and a well-established conference in its domain.

For readers of this volume, we hope you will find it both interesting and informative. We also hope it will inspire and embolden you to greater achievement and to look further into the challenges that are still ahead in our digital society.

June 2017

Djamal Benslimane
Ernesto Damiani
William I. Grosky
Organization

General Chair
Abdelkader Hameurlain  IRIT, Paul Sabatier University Toulouse, France
Amit Sheth  Kno.e.sis - Wright State University, USA
Roland R. Wagner  Johannes Kepler University Linz, Austria

Program Committee Co-chairs
Djamal Benslimane  University of Lyon 1, France
Ernesto Damiani  University of Milan, Italy
William I. Grosky  University of Michigan, USA

Publication Chair
Vladimir Marik  Czech Technical University, Czech Republic

Program Committee
Slim Abdennadher  German University, Cairo, Egypt
Witold Abramowicz  The Poznan University of Economics, Poland
Hamideh Afsarmanesh  University of Amsterdam, The Netherlands
Riccardo Albertoni  Institute of Applied Mathematics and Information Technologies - Italian National Council of Research, Italy
Idir Amine Amarouche  University Houari Boumediene, Algiers, Algeria
Rachid Anane  Coventry University, UK
Annalisa Appice  Università degli Studi di Bari, Italy
Mustafa Atay  Winston-Salem State University, USA
Faten Atigui  CNAM, France
Spiridon Bakiras  Hamad bin Khalifa University, Qatar
Zhifeng Bao  National University of Singapore, Singapore
Ladjel Bellatreche  ENSMA, France
Nadia Bennani  INSA Lyon, France
Karim Benouaref  Université Claude Bernard Lyon 1, France
Morad Benyousef  University of Ottawa, Canada
Catherine Berrut  Grenoble University, France
Athman Bouguettaya  University of Sydney, Australia
Omar Boussaid  University of Lyon, France
Stephane Bressan  National University of Singapore, Singapore
David Camacho  Autonomous University of Madrid, Spain
<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luis M. Camarinha-Matos</td>
<td>Universidade Nova de Lisboa + Uninova, Portugal</td>
</tr>
<tr>
<td>Barbara Catania</td>
<td>DISI, University of Genoa, Italy</td>
</tr>
<tr>
<td>Michelangelo Ceci</td>
<td>University of Bari, Italy</td>
</tr>
<tr>
<td>Richard Chbeir</td>
<td>UPPA University, France</td>
</tr>
<tr>
<td>Cindy Chen</td>
<td>University of Massachusetts Lowell, USA</td>
</tr>
<tr>
<td>Phoebie Chen</td>
<td>La Trobe University, Australia</td>
</tr>
<tr>
<td>Shu-Ching Chen</td>
<td>Florida International University, USA</td>
</tr>
<tr>
<td>Max Chevalier</td>
<td>IRIT, SIG, Université de Toulouse, France</td>
</tr>
<tr>
<td>Byron Choi</td>
<td>Hong Kong Baptist University, Hong Kong, SAR China</td>
</tr>
<tr>
<td>Henning Christiansen</td>
<td>Roskilde University, Denmark</td>
</tr>
<tr>
<td>Soon Ae Chun</td>
<td>City University of New York, USA</td>
</tr>
<tr>
<td>Alfredo Cuzzocrea</td>
<td>University of Trieste, Italy</td>
</tr>
<tr>
<td>Deborah Dahl</td>
<td>Conversational Technologies, USA</td>
</tr>
<tr>
<td>Jérôme Darmont</td>
<td>Université de Lyon, ERIC Lyon 2, France</td>
</tr>
<tr>
<td>Andre de Carvalho</td>
<td>University of Sao Paulo, Brazil</td>
</tr>
<tr>
<td>Roberto De Virgilio</td>
<td>Università Roma Tre, Italy</td>
</tr>
<tr>
<td>Zhi-Hong Deng</td>
<td>Peking University, China</td>
</tr>
<tr>
<td>Vincenzo Deufemia</td>
<td>Università degli Studi di Salerno, Italy</td>
</tr>
<tr>
<td>Gayo Diallo</td>
<td>Bordeaux University, France</td>
</tr>
<tr>
<td>Juliette Dibie-Barthélémy</td>
<td>AgroParisTech, France</td>
</tr>
<tr>
<td>Ying Ding</td>
<td>Indiana University, USA</td>
</tr>
<tr>
<td>Gill Dobbie</td>
<td>University of Auckland, New Zealand</td>
</tr>
<tr>
<td>Dejing Dou</td>
<td>University of Oregon, USA</td>
</tr>
<tr>
<td>Cedric du Mouza</td>
<td>CNAM, France</td>
</tr>
<tr>
<td>Johann Eder</td>
<td>University of Klagenfurt, Austria</td>
</tr>
<tr>
<td>Samhaa El-Beltagy</td>
<td>Nile University, Cairo, Egypt</td>
</tr>
<tr>
<td>Suzanne Embury</td>
<td>The University of Manchester, UK</td>
</tr>
<tr>
<td>Markus Endres</td>
<td>University of Augsburg, Germany</td>
</tr>
<tr>
<td>Damiani Ernesto</td>
<td>Università degli Studi di Milano, Italy</td>
</tr>
<tr>
<td>Noura Faci</td>
<td>Lyon 1 University, France</td>
</tr>
<tr>
<td>Bettina Fazzinga</td>
<td>ICAR-CNR, Italy</td>
</tr>
<tr>
<td>Leonidas Fegaras</td>
<td>The University of Texas at Arlington, USA</td>
</tr>
<tr>
<td>Stefano Ferilli</td>
<td>University of Bari, Italy</td>
</tr>
<tr>
<td>Flavio Ferrarotti</td>
<td>Software Competence Center Hagenberg, Austria</td>
</tr>
<tr>
<td>Vladimir Fomichev</td>
<td>National Research University, Higher School of Economics, Russian Federation</td>
</tr>
<tr>
<td>Flavius Frasincar</td>
<td>Erasmus University Rotterdam, The Netherlands</td>
</tr>
<tr>
<td>Bernhard Freudenthaler</td>
<td>Software Competence Center Hagenberg GmbH, Austria</td>
</tr>
<tr>
<td>Hiroaki Fukuda</td>
<td>Shibaura Institute of Technology, Japan</td>
</tr>
<tr>
<td>Steven Furnell</td>
<td>Plymouth University, UK</td>
</tr>
<tr>
<td>Aryya Gangopadhyay</td>
<td>University of Maryland Baltimore County, USA</td>
</tr>
<tr>
<td>Yunjun Gao</td>
<td>Zhejiang University, China</td>
</tr>
<tr>
<td>Joy Garfield</td>
<td>University of Worcester, UK</td>
</tr>
<tr>
<td>Claudio Gennaro</td>
<td>ISTI-CNR, Italy</td>
</tr>
</tbody>
</table>
Chuan-Ming Liu  National Taipei University of Technology, Taiwan
Hong-Cheu Liu  University of South Australia, Australia
Jorge Lloret Gazo  University of Zaragoza, Spain
Jianguo Lu  University of Windsor, Canada
Alessandra Lumini  University of Bologna, Italy
Hui Ma  Victoria University of Wellington, New Zealand
Qiang Ma  Kyoto University, Japan
Stephane Maag  TELECOM SudParis, France
Zakaria Maamar  Zayed University, United Arab Emirates
Elio Masciari  ICAR-CNR, Università della Calabria, Italy
Brahim Medjahed  University of Michigan - Dearborn, USA
Faouzi Mhamdi  ESSTT, University of Tunis, Tunisia
Alok Mishra  Atılım University, Ankara, Turkey
Harekrishna Mishra  Institute of Rural Management Anand, India
Sanjay Misra  University of Technology, Minna, Nigeria
Jose Mocito  Brisa Innovation, Portugal
Lars Moench  University of Hagen, Germany
Riad Mokadem  IRIT, Paul Sabatier University, France
Yang-Sae Moon  Kangwon National University, South Korea
Franck Morvan  IRIT, Paul Sabatier University, France
Dariusz Mrozek  Silesian University of Technology, Poland
Francesc Munoz-Escoi  Universitat Politecnica de Valencia, Spain
Ismael Navas-Delgado  University of Málaga, Spain
Wilfred Ng  Hong Kong University of Science and Technology, Hong Kong, SAR China
Javier Nieves Acedo  University of Deusto, Spain
Mourad Oussalah  University of Nantes, France
Gultekin Ozsoyoglu  Case Western Reserve University, USA
George Pallis  University of Cyprus, Cyprus
Ingrid Pappel  Tallinn University of Technology, Estonia
Marcin Paprzycki  Polish Academy of Sciences, Warsaw Management Academy, Poland
Oscar Pastor Lopez  Universidad Politecnica de Valencia, Spain
Clara Pizzuti  Institute for High Performance Computing and Networking, ICAR, National Research Council, CNR, Italy
Pascal Poncelet  LIRMM, France
Elaheh Pourabbas  National Research Council, Italy
Jianbin Qin  University of New South Wales, Australia
Claudia Raibulet  Università degli Studi di Milano-Bicocca, Italy
Isidro Ramos  Technical University of Valencia, Spain
Praveen Rao  University of Missouri-Kansas City, USA
Manjeet Rege  University of St. Thomas, USA
Rodolfo F. Resende  Federal University of Minas Gerais, Brazil
Claudia Roncancio  Grenoble University/LIG, France
Massimo Ruffolo  ICAR-CNR, Italy
## Additional Reviewers

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mira Abboud</td>
<td>University of Nantes, France</td>
</tr>
<tr>
<td>Amine Abdaoui</td>
<td>LIRMM, France</td>
</tr>
<tr>
<td>Addi Ait-Mlouk</td>
<td>Cadi Ayyad University, Morocco</td>
</tr>
<tr>
<td>Ahmed Bahey</td>
<td>Nile University, Egypt</td>
</tr>
<tr>
<td>Cristóbal Barba-González</td>
<td>Universidad de Málaga, Spain</td>
</tr>
<tr>
<td>Nagwa M. Baz</td>
<td>Nile University, Egypt</td>
</tr>
<tr>
<td>Gema Bello</td>
<td>Autonomous University of Madrid, Spain</td>
</tr>
<tr>
<td>Kirill Borodulin</td>
<td>South Ural State University, Russian Federation</td>
</tr>
<tr>
<td>Yi Bu</td>
<td>Indiana University, USA</td>
</tr>
<tr>
<td>Stephen Carden</td>
<td>Georgia Southern University, USA</td>
</tr>
<tr>
<td>Loredana Caruccio</td>
<td>University of Salerno, Italy</td>
</tr>
<tr>
<td>Brice Chardin</td>
<td>LIAS/ENSMA, Poitiers, France</td>
</tr>
<tr>
<td>Arpita Chatterjee</td>
<td>Georgia Southern University, USA</td>
</tr>
<tr>
<td>Hongxu Chen</td>
<td>The University of Queensland, Australia</td>
</tr>
<tr>
<td>Weitong Chen</td>
<td>The University of Queensland, Australia</td>
</tr>
<tr>
<td>Van-Dat Cung</td>
<td>Grenoble INP, France</td>
</tr>
<tr>
<td>Sarah Dahab</td>
<td>Telecom SudParis, France</td>
</tr>
<tr>
<td>Matthew Damigos</td>
<td>NTUA, Greece</td>
</tr>
<tr>
<td>María del Carmen</td>
<td>University of Zaragoza, Spain</td>
</tr>
<tr>
<td>Yassine Djoudi</td>
<td>USTHB University, Algiers, Algeria</td>
</tr>
<tr>
<td>Hai Dong</td>
<td>RMIT University, Australia</td>
</tr>
<tr>
<td>Xingzhong Du</td>
<td>The University of Queensland, Australia</td>
</tr>
<tr>
<td>Daniel Ernesto Lopez</td>
<td>University of Missouri-Kansas City, USA</td>
</tr>
<tr>
<td>Gian Rodríguez Hernández</td>
<td>USTHB University, Algiers, Algeria</td>
</tr>
<tr>
<td>William Ferrg</td>
<td>Boeing Research and Technology, USA</td>
</tr>
<tr>
<td>Marco Franceschetti</td>
<td>Alpen Adria University Klagenfurt, Austria</td>
</tr>
<tr>
<td>Feng George Yu</td>
<td>Youngstown State University, USA</td>
</tr>
<tr>
<td>Azadeh Ghari-Neiat</td>
<td>University of Sydney, Australia</td>
</tr>
<tr>
<td>Paola Gomez</td>
<td>Université Grenoble-Alpes, France</td>
</tr>
<tr>
<td>Antonio Gonzalez</td>
<td>Autonomous University of Madrid, Spain</td>
</tr>
<tr>
<td>Senen Gonzalez</td>
<td>Software Competence Center Hagenberg, Austria</td>
</tr>
<tr>
<td>Wentian Guo</td>
<td>NUS, Singapore</td>
</tr>
<tr>
<td>Rajan Gupta</td>
<td>University of Delhi, India</td>
</tr>
<tr>
<td>Hsin-Yu Ha</td>
<td>Florida International University, USA</td>
</tr>
<tr>
<td>Ramón Hermoso</td>
<td>University of Zaragoza, Spain</td>
</tr>
<tr>
<td>Juan Jose Hernandez Porras</td>
<td>Telecom SudParis, France</td>
</tr>
<tr>
<td>Bing Huang</td>
<td>University of Sydney, Australia</td>
</tr>
<tr>
<td>Xin Huang</td>
<td>Hong Kong Baptist University, SAR China</td>
</tr>
<tr>
<td>Liliana Ibanescu</td>
<td>AgroParisTech and Inria, France</td>
</tr>
<tr>
<td>Angelo Impedovo</td>
<td>University of Bari Aldo Moro, Italy</td>
</tr>
<tr>
<td>Daniel Kadenbach</td>
<td>University of Applied Sciences and Arts Hannover, Germany</td>
</tr>
<tr>
<td>Name</td>
<td>Institution</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>Pavel Verman</td>
<td>South Ural State University, Russian Federation</td>
</tr>
<tr>
<td>Qing Wang</td>
<td>The Australian National University, Australia</td>
</tr>
<tr>
<td>Rong Wang</td>
<td>Southwest Jiaotong University, China</td>
</tr>
<tr>
<td>Weiqing Wang</td>
<td>The University of Queensland, Australia</td>
</tr>
<tr>
<td>Yanhao Wang</td>
<td>NUS, Singapore</td>
</tr>
<tr>
<td>Alok Watve</td>
<td>Broadway Technology, USA</td>
</tr>
<tr>
<td>Tharanga Wickramarachchi</td>
<td>Georgia Southern University, USA</td>
</tr>
<tr>
<td>Jason Wu</td>
<td>Boeing, Boeing Research and Technology, USA</td>
</tr>
<tr>
<td>Yi-Hung Wu</td>
<td>Chung Yuan Christian University, Taiwan</td>
</tr>
<tr>
<td>Peipei Yi</td>
<td>Hong Kong Baptist University, SAR China</td>
</tr>
<tr>
<td>Wei Emma Zhang</td>
<td>Macquarie University, Australia</td>
</tr>
<tr>
<td>Zhiwei Zhang</td>
<td>Hong Kong Baptist University, SAR China</td>
</tr>
<tr>
<td>Xu Zhuang</td>
<td>Southwest Jiaotong University, China</td>
</tr>
<tr>
<td>Mikhail Zymbler</td>
<td>South Ural State University, Russian Federation</td>
</tr>
</tbody>
</table>
## Sponsors of DEXA 2017

<table>
<thead>
<tr>
<th>Organism</th>
<th>Logo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Université de Lyon</td>
<td><img src="image1.png" alt="Université de Lyon Logo" /></td>
</tr>
<tr>
<td>Claude Bernard University Lyon 1</td>
<td><img src="image2.png" alt="Lyon1 Logo" /></td>
</tr>
<tr>
<td>Université Lumière Lyon 2</td>
<td><img src="image3.png" alt="Université Lumière Lyon 2 Logo" /></td>
</tr>
<tr>
<td>Jean Moulin Lyon 3 University</td>
<td><img src="image4.png" alt="Jean Moulin Lyon 3 University Logo" /></td>
</tr>
<tr>
<td>INSA Lyon (National Institute of Applied Science)</td>
<td><img src="image5.png" alt="INSA Lyon Logo" /></td>
</tr>
<tr>
<td>FIL (Fédération Informatique de Lyon)</td>
<td><img src="image6.png" alt="Fédération Informatique de Lyon Logo" /></td>
</tr>
<tr>
<td>CNRS (National Center for Scientific Research)</td>
<td><img src="image7.png" alt="CNRS Logo" /></td>
</tr>
<tr>
<td>AMIES (Agence pour les mathématiques en interaction avec l’entreprise et la société)</td>
<td><img src="image8.png" alt="AMIES Logo" /></td>
</tr>
<tr>
<td>LIRIS Lab</td>
<td><img src="image9.png" alt="LIRIS Lab Logo" /></td>
</tr>
<tr>
<td>ERIC Lab</td>
<td><img src="image10.png" alt="ERIC Lab Logo" /></td>
</tr>
<tr>
<td>FAW Company</td>
<td><img src="image11.png" alt="FAW Company Logo" /></td>
</tr>
</tbody>
</table>
Contents – Part II

Security and Privacy (II)

Generating $k$-Anonymous Microdata by Fuzzy Possibilistic Clustering . . . . . . . . . . 3
   Balkis Abidi and Sadok Ben Yahia

Lightweight Privacy-Preserving Task Assignment
in Skill-Aware Crowdsourcing . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 18
   Louis Béziaud, Tristan Allard, and David Gross-Amblard

Clustering Heuristics for Efficient $t$-closeness Anonymisation . . . . . . . . . . . . . . . . 27
   Anne V.D.M. Kayem and Christoph Meinel

Service Computing

A QoS-Aware Web Service Composition Approach Based on Genetic
Programming and Graph Databases . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 37
   Alexandre Sawczuk da Silva, Ewan Moshi, Hui Ma, and Sven Hartmann

Combining Web-Service and Rule-Based Systems to Implement
a Reliable DRG-Solution . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 45
   Idir Amine Amarouche, Lydia Rabia, and Tayeb Kenaza

Usage-Aware Service Identification for Architecture Migration
of Object-Oriented Systems to SoA . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 54
   Dionysis Athanasopoulos

Continuous and Temporal Data, and Continuous Query Language

On Computing Temporal Aggregates over Null Time Intervals . . . . . . . . . . . . . . . . . 67
   Kai Cheng

A Continuous Query Language for Stream-Based Artifacts . . . . . . . . . . . . . . . . . . . 80
   Maroun Abi Assaf, Youakim Badr, and Youssef Amghar

Past Indeterminacy in Data Warehouse Design . . . . . . . . . . . . . . . . . . . . . . . . . . . . . 90
   Christina Khnaisser, Luc Lavoie, Anita Burgun,
   and Jean-François Ethier

Text Processing and Semantic Search

A Case for Term Weighting Using a Dictionary on GPUs . . . . . . . . . . . . . . . . . . . . . 103
   Toshiaki Wakatsuki, Atsushi Keyaki, and Jun Miyazaki
Process and Tool-Support to Collaboratively Formalize Statutory Texts
by Executable Models ......................................................... 118
   Bernhard Waltl, Thomas Reschenhofer, and Florian Matthes

A Bayesian Approach for Semantic Search Based
on DAG-Shaped Ontologies .................................................... 126
   Anna Formica, Michele Missikoff, Elaheh Pourabbas,
   and Francesco Taglino

**Indexing and Concurrency Control Methods**

Indexing Multiple-Instance Objects ......................................... 143
   Linfei Zhou, Wei Ye, Zhen Wang, Claudia Plant, and Christian Böhm

Novel Indexing Strategy and Similarity Measures for Gaussian
Mixture Models ................................................................. 158
   Linfei Zhou, Wei Ye, Bianca Wackersreuther, Claudia Plant,
   and Christian Böhm

A Concurrency Control Protocol that Selects Accessible Replicated Pages
to Avoid Latch Collisions for B-Trees in Manycore Environments ....... 172
   Tomohiro Yoshihara and Haruo Yokota

Non-order-preserving Index for Encrypted Database Management System . . 190
   Wai-Kit Wong, Kwok-Wai Wong, Ho-Yin Yue, and David W. Cheung

**Data Warehouse and Data Stream Warehouse**

A Variety-Sensitive ETL Processes ........................................... 201
   Nabila Berkani and Ladjel Bellatreche

Integrating the R Language Runtime System with a Data
Stream Warehouse ............................................................ 217
   Carlos Ordonez, Theodore Johnson, Simon Urbanek,
   Vladislav Shkapenyuk, and Divesh Srivastava

Cleaning Out Web Spam by Entropy-Based Cascade Outlier Detection ....... 232
   Sha Wei and Yan Zhu

Logical Schema for Data Warehouse on Column-Oriented
NoSQL Databases ............................................................. 247
   Mohamed Boussahoua, Omar Boussaid, and Fadila Bentayeb
Data Mining and Machine Learning

PALM: A Parallel Mining Algorithm for Extracting Maximal Frequent Conceptual Links from Social Networks ................................. 259
Erick Stattner, Reynald Eugenie, and Martine Collard

Learning Interactions from Web Service Logs. ................................. 275
Hamza Labbaci, Brahim Medjahed, and Youcef Aklouf

Data Driven Generation of Synthetic Data with Support Vector Data Description .......................................................... 290
Fajrian Yunus, Ashish Dandekar, and Stéphane Bressan

Conversion Rate Estimation in Online Advertising via Exploring Potential Impact of Creative. .................................................. 299
Junxiang Jiang and Huiqiang Jiang

Recommender Systems and Query Recommendation

A NoSQL Data-Based Personalized Recommendation System for C2C e-Commerce .............................................................. 313
Tran Khanh Dang, An Khuong Vo, and Josef Küng

Recommending Diverse and Personalized Travel Packages .................. 325
Idir Benouaret and Dominique Lenne

Association Rule Based Approach to Improve Diversity of Query Recommendations .......................................................... 340
M. Kumara Swamy, P. Krishna Reddy, and Subhash Bhalla

How to Find the Best Rated Items on a Likert Scale and How Many Ratings Are Enough .................................................. 351
Qing Liu, Debabrata Basu, Shruti Goel, Talel Abdessalem, and Stéphane Bressan

Graph Algorithms

Itinerary Planning with Category Constraints Using a Probabilistic Approach .............................................................. 363
Paolo Bolzoni, Fabio Persia, and Sven Helmer

Minimizing Negative Influence in Social Networks: A Graph OLAP Based Approach .............................................................. 378
Zakia Challal, Omar Boussaid, and Kamel Boukhalfa

Hypergraph Drawing by Force-Directed Placement ........................................ 387
Naheed Anjum Arafat and Stéphane Bressan
A Fast Heuristic for Finding Near-Optimal Groups for Vehicle Platooning in Road Networks  ......................................................... 395

Dietrich Steinmetz, Gerrit Burmester, and Sven Hartmann

Semantic Clustering and Data Classification

F-SED: Feature-Centric Social Event Detection.  ................................. 409

Elio Mansour, Gilbert Tekli, Philippe Arnould, Richard Chbeir,
and Yudith Cardinale

Generating Fake but Realistic Headlines Using Deep Neural Networks  .... 427

Ashish Dandekar, Remmy A.M. Zen, and Stéphane Bressan

Qualitative AHP Method Based on Multiple Criteria Levels

Under Group of Experts.  .............................................................. 441

Amel Ennaceur, Zied Elouedi, and Eric Lefevre

Exploit Label Embeddings for Enhancing Network Classification  ........... 450

Yiqi Chen, Tieyun Qian, Ming Zhong, and Xuhui Li

Author Index  .................................................................................. 459
Contents – Part I

Semantic Web and Semantics

MULDER: Querying the Linked Data Web by Bridging RDF
Molecule Templates ......................................................... 3
Kemele M. Endris, Mikhail Galkin, Ioanna Lytra,
Mohamed Nadjib Mami, Maria-Esther Vidal, and Sören Auer

QAESTRO – Semantic-Based Composition of Question Answering Pipelines . . . 19
Kuldeep Singh, Ioanna Lytra, Maria-Esther Vidal, Dharmen Punjani,
Harsh Thakkar, Christoph Lange, and Sören Auer

Nested Forms with Dynamic Suggestions for Quality RDF Authoring . . . . . 35
Pierre Maillot, Sébastien Ferré, Peggy Cellier, Mireille Ducassé,
and Franck Partouche

Graph Matching

A Graph Matching Based Method for Dynamic
Passenger-Centered Ridesharing ........................................ 49
Jia Shi, Yifeng Luo, Shuigeng Zhou, and Jihong Guan

Answering Graph Pattern Matching Using Views: A Revisit. ............... 65
Xin Wang

Towards an Integrated Graph Algebra for Graph Pattern Matching
with Gremlin ............................................................... 81
Harsh Thakkar, Dharmen Punjani, Sören Auer, and Maria-Esther Vidal

Data Modeling, Data Abstraction, and Uncertainty

Online Lattice-Based Abstraction of User Groups ....................... 95
Behrooz Omidvar-Tehrani and Sihem Amer-Yahia

Probabilistic MaxRS Queries on Uncertain Data ....................... 111
Yuki Nakayama, Daichi Amagata, and Takahiro Hara

On Addressing the Empty Answer Problem in Uncertain Knowledge Bases . . 120
Ibrahim Dellal, Stéphane Jean, Allel Hadjali, Brice Chardin,
and Mickaël Baron

Language Constructs for a Datalog Compiler ................................ 130
Stefan Brass
Preferences and Query Optimization

Temporal Conditional Preference Queries on Streams .................................................. 143
Marcos Roberto Ribeiro, Maria Camila N. Barioni, Sandra de Amo, Claudia Roncancio, and Cyril Labbé

Efficient Processing of Aggregate Reverse Rank Queries ........................... 159
Yuyang Dong, Hanxiong Chen, Kazutaka Furuse, and Hiroyuki Kitagawa

Storing Join Relationships for Fast Join Query Processing .......................... 167
Mohammed Hamdi, Feng Yu, Sarah Alswedani, and Wen-Chi Hou

Access Patterns Optimization in Distributed Databases
Using Data Reallocation. .......................................................... 178
Adrian Sergiu Darabant, Leon Tambulea, and Viorica Varga

Data Integration and RDF Matching

Semantic Web Datatype Similarity: Towards Better RDF .......................... 189
Irvin Dongo, Firas Al Khalil, Richard Chbeir, and Yudith Cardinale

SJoin: A Semantic Join Operator to Integrate Heterogeneous RDF Graphs . 206
Mikhail Galkin, Diego Collarana, Ignacio Traverso-Ribón, Maria-Esther Vidal, and Sören Auer

Choosing Data Integration Approaches Based on Data
Source Characterization .......................................................... 222
Julio Cesar Cardoso Tesolin and Maria Cláudia Cavalcanti

Security and Privacy (I)

Towards Privacy-Preserving Record Linkage with Record-Wise
Linkage Policy .......................................................... 233
Takahito Kaiho, Wen-jie Lu, Toshiyuki Amagasa, and Jun Sakuma

Two-Phase Preference Disclosure in Attributed Social Networks ........ 249
Younes Abid, Abdessamad Imine, Amedeo Napoli, Chedy Raïssi, and Michaël Rusinowitch

Access Control Policies for Relational Databases in Data Exchange Process . 264
Adel Jbali and Salma Sassi

Web Search

Orion: A Cypher-Based Web Data Extractor. .................................................. 275
Edimar Manica, Carina F. Dorneles, and Renata Galante
Search and Aggregation in XML Documents .......................... 290
Abdelmalek Habi, Brice Effantin, and Hamamache Kheddouci

Representing and Learning Human Behavior Patterns with Contextual Variability .................. 305
Paula Lago, Claudia Roncancio, Claudia Jiménez-Guarín, and Cyril Labbé

Truthfulness of Candidates in Set of t-uples Expansion ...................... 314
Ngurah Agus Sanjaya Er, Mouhamadou Lamine Ba, Talel Abdessalem, and Stéphane Bressan

Data Clustering

Interactive Exploration of Subspace Clusters for High Dimensional Data .... 327
Jesper Kristensen, Son T. Mai, Ira Assent, Jon Jacobsen, Bay Vo, and Anh Le

Co-clustering for Microdata Anonymization ............................... 343
Tarek Benkhelif, Françoise Fessant, Fabrice Clérot, and Guillaume Raschia

STATS - A Point Access Method for Multidimensional Clusters .......... 352
Giannis Evagorou and Thomas Heinis

LinkedMDR: A Collective Knowledge Representation of a Heterogeneous Document Corpus ......................... 362
Nathalie Charbel, Christian Sallaberry, Sebastien Laborie, Gilbert Tekli, and Richard Chbeir

Top-K and Skyline Queries

Skyline-Based Feature Selection for Polarity Classification in Social Networks .................. 381
Fayçal Réda Saidani, Allel Hadjali, Idir Rassoul, and Djamal Belkasmi

Group Top-k Spatial Keyword Query Processing in Road Networks .......... 395
Hermann B. Ekomie, Kai Yao, Jianjun Li, Guohui Li, and Yanhong Li

Geo-Social Keyword Top-k Data Monitoring over Sliding Window ........... 409
Shunya Nishio, Daichi Amagata, and Takahiro Hara

Geo-Social Keyword Skyline Queries .................................... 425
Naoya Taguchi, Daichi Amagata, and Takahiro Hara
FTGWS: Forming Optimal Tutor Group for Weak Students Discovered in Educational Settings ................................................................. 436
  Yonghao Song, Hengyi Cai, Xiaohui Zheng, Qiang Qiu, Yan Jin, and Xiaofang Zhao

Data Mining and Big Data

Mining Cardinalities from Knowledge Bases ........................................ 447
  Emir Muñoz and Matthias Nickles

Incremental Frequent Itemsets Mining with IPPC Tree .......................... 463
  Van Quoc Phuong Huynh, Josef Küng, and Tran Khanh Dang

MapFIM: Memory Aware Parallelized Frequent Itemset Mining in Very Large Datasets ................................................................. 478
  Khanh-Chuong Duong, Mostafa Bamha, Arnaud Giacometti,
  Dominique Li, Arnaud Soulet, and Christel Vrain

Utilizing Bat Algorithm to Optimize Membership Functions for Fuzzy Association Rules Mining .......................................................... 496
  Anping Song, Jiaxin Song, Xuehai Ding, Guoliang Xu,
  and Jianjiao Chen

A Formal Approach for Failure Detection in Large-Scale Distributed Systems Using Abstract State Machines ........................................ 505
  Andreea Buga and Sorana Tania Nemes

Author Index ...................................................................................... 515