Conceptual Structures for Discovering Knowledge

19th International Conference on Conceptual Structures, ICCS 2011
Derby, UK, July 25-29, 2011
Proceedings

Springer
This volume contains the proceedings of the 19th International Conference on Conceptual Structures (ICCS 2011), the latest in a series of annual conferences that have been held in Europe, Asia, Australia, and North America since 1993. Details of these events are available at www.conceptualstructures.org, and www.iccs.info points to the latest conference in this prestigious series. ICCS focuses on the useful representation and analysis of conceptual knowledge with research and business applications. It brings together some of the world’s best minds in information technology, arts, humanities, and social science to explore novel ways that information and communication technologies can leverage tangible business or social benefits. This is because conceptual structures (CS) harmonize the creativity of humans with the productivity of computers. CS recognizes that organizations work with concepts; machines like structures.

ICCS advances the theory and practice in connecting the user’s conceptual approach to problem solving with the formal structures that computer applications need to bring their productivity to bear. Arising originally out of the work of IBM in conceptual graphs, over the years ICCS has broadened its scope to include a wider range of theories and practices, among them formal concept analysis, description logics, the Semantic Web, the Pragmatic Web, ontologies, multi-agent systems, concept mapping, and more. Accordingly CS represent a family of approaches that builds on the successes of artificial intelligence, business intelligence, computational linguistics, conceptual modelling, information and Web technologies, user modelling, and knowledge management.

The theme for this year’s conference was “Conceptual Structures for Discovering Knowledge.” More and more data is being captured in electronic format (particularly through the Web and social media) and it is emerging that this data is reaching such a critical mass that it is becoming the most recorded form of the world around us. It now represents our business, economic, artistic, social, and scientific endeavors to such an extent that we require smart applications that can discover the hitherto hidden knowledge that this mass of data is busily capturing. By bringing together the way computers work with the way humans think, CS align the productivity of computer processing with the ingenuity of individuals and organizations in a meaningful digital future.

The ICCS papers that appear in this volume represent the rich variety of CS. Submitted papers were rigorously reviewed anonymously by members of the Program Committee and the Editorial Board who oversaw the process together with the organizers. About 60% of submitted papers deemed relevant to the conference were accepted, plus a few as short papers. There were also three invited papers. As this volume will evidence, it is pleasing that the number of accepted full papers reflects the high quality of submissions that ICCS continues to attract as the conference approaches its 20th anniversary.
In addition to ICCS, there were four workshops at the conference. Three of these workshops’ papers appear under their own sections in this volume. Two of these workshops cover CS and knowledge discovery in under-traversed domains and in task-specific information retrieval. The third addresses “CS in Learning, Teaching and Assessment;” a workshop that had its inauguration at last year’s ICCS (2010) in Kuching, Malaysia. The papers of the fourth workshop, “The First CUBIST Workshop”, appear in their own proceedings. ICCS 2011 represented a key dissemination event for the CUBIST project (www.cubist-project.eu), which is funded by the European Commission under the 7th Framework Programme of ICT, topic 4.3: Intelligent Information Management.

We wish to express our thanks to all the authors of the submitted papers, the speakers, workshop organizers, and the members of the ICCS Editorial Board and Program Committee. We would like to thank Uta Priss, who organized the anonymous reviewers of papers submitted by the ICCS Chairs. We also extend our thanks to the Local Organizing Chair Ashiq Anjum, and to our Sheffield Hallam and CUBIST colleague Constantinos Orphanides for managing the production of the proceedings, ready for the helpful people at Springer to whom we also owe our gratitude.

July 2011

Simon Andrews
Simon Polovina
Richard Hill
Babak Akhgar
Conference Organization

General Chair
Richard Hill University of Derby, UK

Program Chairs
Simon Andrews Sheffield Hallam University, UK
Simon Polovina Sheffield Hallam University, UK

Workshop Chair
Babak Akhgar Sheffield Hallam University, UK

Local Organizing Chair
Ashiq Anjum University of Derby, UK

Editorial Board
Galia Angelova Bulgarian Academy of Sciences, Bulgaria
Madalina Croitoru University Montpellier II, France
Frithjof Dau SAP Research Dresden, Germany
Aldo De Moor CommunitySense, The Netherlands
Harry Delugach University of Alabama in Huntsville, USA
Peter Eklund University of Wollongong, Australia
Sébastien Ferré University of Rennes, France
Bernhard Ganter Technische Universität Dresden, Germany
Ollivier Haemmerlé Université de Toulouse le Mirail, France
Pascal Hitzler Universität Karlsruhe, Germany
Mary Keeler VivoMind Intelligence, Inc., USA
Sergei Kuznetsov State University Higher School of Economics, Russia
Bernard Moulin Laval University, Canada
Marie-Laure Mugnier LIRMM, France
Peter Øhrstrøm Aalborg University, Denmark
VIII Conference Organization

Heather D. Pfeiffer  New Mexico State University, USA
Simon Polovina  Sheffield Hallam University, UK
Uta Priss  Edinburgh Napier University, UK
Sebastian Rudolph  University of Karlsruhe, Germany
Henrik Schärfe  Aalborg University, Denmark
John F. Sowa  VivoMind Intelligence, Inc., USA
Gerd Stumme  University of Kassel, Germany
Rudolf Wille  Technische Universität Darmstadt, Germany
Karl Erich Wolff  University of Applied Sciences Darmstadt, Germany

Program Committee

Jean-François Baget  LIRMM-RCR and INRIA Rhône-Alpes, France
Radim Bělohlávek  Palacký University of Olomouc, Czech Republic
Tru Cao  Ho Chi Minh City University of Technology, Vietnam
Peggy Cellier  INSA of Rennes, France
Dan Corbett  DARPA, Washington DC, USA
Juliette Dibie-Barthélemy  AgroParisTech, France
Pavlin Dobrev  ProSyst Labs EOOD, Bulgaria
Jerome Fortin  Iate, France
Udo Hebisch  Technische Universität Freiberg, Germany
Jan Hladik  SAP Research Dresden, Germany
John Howse  University of Brighton, UK
Adil Kabbaj  INSEA, Morocco
Markus Krötzsch  University of Oxford, UK
Leonard Kwuida  Zurich University of Applied Sciences, Switzerland
Ivan Launders  BT Global Services, UK
Michel Leclère  LIRMM, France
Robert Levinson  UC Santa Cruz, USA
Philippe Martin  Eurécom, France
Boris Motik  University of Oxford, UK
Daniel Oberle  SAP Research Karlsruhe, Germany
Sergei Obiedkov  State University Higher School of Economics, Russia
Jonas Poelmans  Katholieke Universiteit Leuven, Belgium
Anne-Marie Rassinoux  HCUGE, Switzerland
Eric Salvat  IMERIR, France
Ulrik Sandborg-Petersen  Aalborg University, Denmark
Jeffrey Schiffel  The Boeing Company, USA
Iain Stalker  University of Manchester, UK
Martin Watmough  CIBER, UK
Further Reviewers

Peter Chapman
Andrew Fish

Workshop Organizers - CFEUTD

Azita Bahrami IT Consultation, USA
Ray Hashemi Armstrong Atlantic State University, USA
Hamid Arabnia University of Georgia, USA
John Talburt University of Arkansas at Little Rock, USA

Workshop Organizers - TSIR

Rahat Iqbal Coventry University, UK
Adam Grzywaczewski Trinity Expert Systems Limited, UK

Workshop Organizers - CS-LTA

Meena Kharatmal Homi Bhabha Centre for Science Education, Mumbai, India
G. Nagarjuna Homi Bhabha Centre for Science Education, Mumbai, India

Sponsoring Institutions

School of Computing and Mathematics, University of Derby, UK
Communication and Computing Research Centre (CCRC) and the Department of Computing, Sheffield Hallam University, UK
# Table of Contents

## Invited Papers

Semantic Technologies for Enterprises ........................................... 1  
*Frithjof Dau*

Utility and Feasibility of Reasoning beyond Decidability in Semantic Technologies ................................................................. 19  
*Sebastian Rudolph and Michael Schneider*

Cognitive Architectures for Conceptual Structures .......................... 35  
*John F. Sowa*

## Accepted Papers

In-Close2, a High Performance Formal Concept Miner .......................... 50  
*Simon Andrews*

A Mapping from Conceptual Graphs to Formal Concept Analysis .......... 63  
*Simon Andrews and Simon Polovina*

Partial Orders and Logical Concept Analysis to Explore Patterns Extracted by Data Mining .............................................................. 77  
*Peggy Cellier, Sébastien Ferré, Mireille Ducassé, and Thierry Charnois*

A Buzz and E-Reputation Monitoring Tool for Twitter Based on Galois Lattices ................................................................. 91  
*Etienne Cuvelier and Marie-Aude Aufaure*

Using Generalization of Syntactic Parse Trees for Taxonomy Capture on the Web ................................................................. 104  
*Boris A. Galitsky, Gábor Dobrocsí, Josep Lluis de la Rosa, and Sergei O. Kuznetsov*

A.N. Prior’s Ideas on Tensed Ontology ............................................. 118  
*David Jakobsen, Peter Øhrstrøm, and Henrik Schärfe*

Crowdsourced Knowledge: Peril and Promise for Conceptual Structures Research ................................................................. 131  
*Mary Keeler*
Evaluating the Transaction Graph through a Financial Trading Case Study .......................................................... 145
Ivan Launders

Integration of the Controlled Language ACE to the Amine Platform .......................................................... 159
Mohammed Nasri, Adil Kabbaj, and Karim Bouzoubaa

Identifying Relations between Medical Concepts by Parsing UMLS® Definitions ...................................................... 173
Ivelina Nikolova and Galia Angelova

Topicality in Logic-Based Ontologies ...................................................... 187
Chiara Del Vescovo, Bijan Parsia, and Ulrike Sattler

A Concept Discovery Approach for Fighting Human Trafficking and Forced Prostitution ...................................................... 201
Jonas Poelmans, Paul Elzinga, Guido Dedene, Stijn Viaene, and Sergei O. Kuznetsov

A Modeling Method and Declarative Language for Temporal Reasoning Based on Fluid Qualities ...................................................... 215
Matei Popovici, Mihnea Muraru, Alexandru Agache, Cristian Giumale, Lorina Negreanu, and Ciprian Dobre

Expressing Conceptual Graph Queries from Patterns: How to Take into Account the Relations ...................................................... 229
Camille Pradel, Ollivier Haemmerlé, and Nathalie Hernandez

Unix Systems Monitoring with FCA ...................................................... 243
Uta Priss

Supporting Ontology Design through Large-Scale FCA-Based Ontology Restructuring ...................................................... 257
Mohamed Rouane-Hacene, Petko Valtchev, and Roger Nkambou

Towards a Formalization of Individual Work Execution at Computer Workplaces ...................................................... 270
Benedikt Schmidt, Heiko Paulheim, Todor Stoitsev, and Max Mühlhäuser

Semi-supervised Learning for Mixed-Type Data via Formal Concept Analysis ...................................................... 284
Mahito Sugiyama and Akihiro Yamamoto

Short Papers

Towards Structuring Episodes in Patient History ...................................................... 298
Galia Angelova, Svetla Boytcheva, and Dimitar Tcharaktchiev
Rigorous, and Informal? ........................................ 304
David Love

OpenSEA – Using Common Logic to Provide a Semantic Enterprise Architecture Framework ........................................ 309
Jeffrey A. Schiffel and Shaun Bridges

International Workshop on the Concept Formation and Extraction in Under-Traversed Domains

An Android Based Medication Reminder System: A Concept Analysis Approach ........................................ 315
Ray Hashemi, Les Sears, and Azita Bahrami

System Decomposition for Temporal Concept Analysis .................. 323
David Luper, Caner Kazanci, John Schramski, and Hamid R. Arabnia

Modeling UAS Swarm System Using Conceptual and Dynamic Architectural Modeling Concepts .......................... 331
Hassan Reza and Kirk Ogaard

Name Extraction and Formal Concept Analysis .............................. 339
Kazem Taghva, Russell Beckley, and Jeffrey Coombs

International Workshop on Task Specific Information Retrieval

Obada Alhabashneh, Rahat Iqbal, Nazaraf Shah, Saad Amin, and Anne James

Trace of Objects to Retrieve Prediction Patterns of Activities in Smart Homes .......................................................... 353
Farzad Amirjavid, Abdenour Bouzouane, and Bruno Bouchard

Distributed Context Aware Collaborative Filtering Approach for Service Selection in Wireless Mesh Networks ...................... 357
Neeraj Kumar and Kashif Iqbal

A Framework for the Evaluation of Adaptive IR Systems through Implicit Recommendation ........................................ 366
Catherine Mulwa, Seamus Lawless, M. Rami Ghorab, Eileen O’Donnell, Mary Sharp, and Vincent Wade

MedMatch – Towards Domain Specific Semantic Matching ............ 375
Jetendr Shamdasani, Peter Bloodsworth, Kamran Munir, Hanene Boussi Rahmouni, and Richard McClatchey
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application Identification of Semantic Web Techniques in KM Systems</td>
<td>383</td>
</tr>
<tr>
<td>Mohammad Reza Shahmoradi and Babak Akhgar</td>
<td></td>
</tr>
<tr>
<td>Conceptual Structures – Learning, Teaching and Assessment Workshop</td>
<td></td>
</tr>
<tr>
<td>Aligning the Teaching of FCA with Existing Module Learning Outcomes</td>
<td>394</td>
</tr>
<tr>
<td>Simon Andrews</td>
<td></td>
</tr>
<tr>
<td>A Proposal for Developing a Primer for Constructing and Analyzing Conceptual Structures</td>
<td>402</td>
</tr>
<tr>
<td>Nagarjuna G. and Meena Kharatmal</td>
<td></td>
</tr>
<tr>
<td>Internationalising the Computing Curricula: A Peircian Approach</td>
<td>406</td>
</tr>
<tr>
<td>Richard Hill and Dharmendra Shadija</td>
<td></td>
</tr>
<tr>
<td>Broadening the Ontological Perspectives in Science Learning: Implications for Research and Practice in Science Teaching</td>
<td>414</td>
</tr>
<tr>
<td>Nancy R. Romance and Michael R. Vitale</td>
<td></td>
</tr>
<tr>
<td>Author Index</td>
<td>423</td>
</tr>
</tbody>
</table>