

Lecture Notes in Artificial Intelligence

6208

Edited by R. Goebel, J. Siekmann, and W. Wahlster

Subseries of Lecture Notes in Computer Science

Madalina Croitoru
Sébastien Ferré
Dickson Lukose (Eds.)

Conceptual Structures: From Information to Intelligence

18th International Conference
on Conceptual Structures, ICCS 2010
Kuching, Sarawak, Malaysia, July 26-30, 2010
Proceedings

Series Editors

Randy Goebel, University of Alberta, Edmonton, Canada

Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Wolfgang Wahlster, DFKI and University of Saarland, Saarbrücken, Germany

Volume Editors

Madalina Croitoru

LIRMM

Université Montpellier II and CNRS

34392 Montpellier, France

E-mail: madalina.croitoru@lirmm.fr

Sébastien Ferré

IRISA

Université de Rennes 1

35042 Rennes, France

E-mail: sebastien.ferre@irisa.fr

Dickson Lukose

MIMOS BERHAD

Technology Park Malaysia

57000 Kuala Lumpur, Malaysia

E-mail: Dickson.Lukose@mimos.my

Library of Congress Control Number: 2010929654

CR Subject Classification (1998): I.2, H.2, I.5, I.2.7, I.2.4, F.4.3

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN 0302-9743

ISBN-10 3-642-14196-X Springer Berlin Heidelberg New York

ISBN-13 978-3-642-14196-6 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

springer.com

© Springer-Verlag Berlin Heidelberg 2010

Printed in Germany

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

Printed on acid-free paper 06/3180

Preface

The 18th International Conference on Conceptual Structures (ICCS 2010) was the latest in a series of annual conferences that have been held in Europe, Australia, and North America since 1993. The focus of the conference has been the representation and analysis of conceptual knowledge for research and practical application. ICCS brings together researchers and practitioners in information and computer sciences as well as social science to explore novel ways that conceptual structures can be deployed.

Arising from the research on knowledge representation and reasoning with conceptual graphs, over the years ICCS has broadened its scope to include innovations from a wider range of theories and related practices, among them other forms of graph-based reasoning systems like RDF or existential graphs, formal concept analysis, Semantic Web technologies, ontologies, concept mapping and more. Accordingly, ICCS represents a family of approaches related to conceptual structures that build on the successes with techniques derived from artificial intelligence, knowledge representation and reasoning, applied mathematics and lattice theory, computational linguistics, conceptual modeling and design, diagrammatic reasoning and logic, intelligent systems and knowledge management.

The ICCS 2010 theme “From Information to Intelligence” hints at unveiling the reasoning capabilities of conceptual structures. Indeed, improvements in storage capacity and performance of computing infrastructure have also affected the nature of knowledge representation and reasoning (KRR) systems, shifting their focus toward representational power and execution performance. Therefore, KRR research is now faced with a challenge of developing knowledge representation and reasoning structures optimized for such reasonings.

There were 36 papers submitted to ICCS 2010 for peer review. All submissions were assessed by at least three referees, and most of them, by four referees. The top-ranked 12 submissions were accepted as full papers, amounting to an acceptance rate of 33%, and 6 other submissions were accepted as posters, amounting to a total acceptance rate of 50%. The programme also included five invited talks by leading researchers, two from the ICCS community itself and three from related communities. The thorough selection process would not have been possible without the help of the numerous reviewers to whom we express our acknowledgement.

We take this opportunity to thank the Ministry of Science, Technology and Innovation, Malaysia (MOSTI), MIMOS BERHAD, the National ICT Association of Malaysia (PICOM), Multimedia Development Corporation (MDeC), Center of Excellence in Semantic Technology and Augmented Reality, the Faculty of Cognitive Sciences and Human Development, as well as the Faculty of

Computer Science and Information Technology of University Malaysia Sarawak, for providing support in funding, promotion and local arrangements, making this event a success.

July 2010

Madalina Croitoru
Sébastien Ferré
Dickson Lukose

Conference Organization

Executive Committee

General Chair

Dickson Lukose

MIMOS BERHAD, Malaysia

Program Chairs

Madalina Croitoru

LIRMM, Université Montpellier II and CNRS,
France

Sébastien Ferré

IRISA, Université de Rennes 1, France

Workshops Chair

Tan Yew Seng

MIMOS BERHAD, Malaysia

Tutorials Chair

Daniel Bahls

MIMOS BERHAD, Malaysia

Editorial Board

Galia Angelova

Bulgarian Academy of Sciences, Bulgaria

Frithjof Dau

SAP Dresden, Germany

Aldo de Moor

CommunitySense, The Netherlands

Harry Delugach

University of Alabama in Huntsville, USA

Peter Eklund

University of Wollongong, Australia

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

Higher School of Economics, Moscow, Russia

Bernard Moulin

Université Laval, Canada

Marie-Laure Mugnier

LIRMM, France

Peter Øhrstrøm

Aalborg University, Denmark

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
Rudolf Wille
Karl Erich Wolff

University of Kassel, Germany
Technische Universität Darmstadt, Germany
University of Applied Sciences Darmstadt,
Germany

Program Committee

Jean-François Baget
Radim Belohlavek
Tru H. Cao

LIRMM-RCR and INRIA Rhône-Alpes, France
Palacky University of Olomouc, Czech Republic
Ho Chi Minh City University of Technology,
Vietnam

Dan Corbett
Olivier Corby
Juliette Dibie-Barthélemy
Pavlin Dobrev
Udo Hebisch
Joachim Hereth
Nathalie Hernandez
Wolfgang Hesse
Richard Hill
Jan Hladik
Adil Kabbaj
Rob Kremer
Markus Krötzsch
Leonard Kwuida

DARPA, Washington, DC, USA
INRIA Sophia-Antipolis, France
AgroParisTech, France
ProSyst Labs EOOD, Bulgaria
Technische Universität Freiberg, Germany
DMC GmbH, Germany
Université Toulouse le Mirail, France
Philipps-Universität Marburg, Germany
Sheffield Hallam University, UK
SAP Research Dresden, Germany
INSEA, Rabat, Morocco
University of Calgary, Canada
Universität Karlsruhe (TH), Germany
Zurich University of Applied Sciences,
Switzerland

Michel Leclère
Robert Levinson
Philippe Martin
Claudio Masolo
Daniel Oberle
Sergei Obiedkov
John Old
Anne-Marie Rassinoux
Gary Richmond
Olivier Ridoux
Eric Salvat
Ulrik Sandborg-Petersen
Jeffrey Schiffel
Denny Vrandecic
Guo-Qiang Zhang

LIRMM, France
UC Santa Cruz, USA
Eurécom, France
ISTC, Trento, Italy
SAP Research Karlsruhe, Germany
Higher School of Economics, Moscow, Russia
Edinburgh Napier University, UK
University Hospital of Geneva, Switzerland
City University of New York, USA
Université de Rennes 1, France
IMERIR, Perpignan, France
University of Aalborg, Denmark
The Boeing Company, USA
AIFB, Universität Karlsruhe, Germany
Case Western Reserve University, Cleveland,
USA

External Reviewers

Jason Heard
Melanie Kellar

Sponsoring Institutions

Ministry of Science, Technology and Innovation, Malaysia (MOSTI)
MIMOS BERHAD, Kuala Lumpur, Malaysia
The National ICT Association of Malaysia (PICOM)
Multimedia Development Corporation (MDeC)
Faculty of Cognitive Sciences and Human Development,
University Malaysia Sarawak, Malaysia
Faculty of Computer Science and Information Technology,
University Malaysia Sarawak, Malaysia
Center of Excellence in Semantic Technology and Augmented Reality,
University Malaysia Sarawak, Malaysia

Table of Contents

Invited Papers

Entities and Surrogates in Knowledge Representation	1
<i>Michel Chein</i>	
Exploring Conceptual Possibilities	2
<i>Bernhard Ganter</i>	
Graphical Representation of Ordinal Preferences: Languages and Applications	3
<i>Jérôme Lang</i>	
Combining Description Logics, Description Graphs, and Rules	10
<i>Boris Motik</i>	
Practical Graph Mining	13
<i>Mohammed J. Zaki</i>	

Accepted Papers

Use of Domain Knowledge in the Automatic Extraction of Structured Representations from Patient-Related Texts	14
<i>Galina Angelova</i>	
Translations between RDF(S) and Conceptual Graphs	28
<i>Jean-François Baget, Madalina Croitoru, Alain Gutierrez, Michel Leclère, and Marie-Laure Mugnier</i>	
Default Conceptual Graph Rules, Atomic Negation and Tic-Tac-Toe	42
<i>Jean-François Baget and Jérôme Fortin</i>	
On the Stimulation of Patterns: Definitions, Calculation Method and First Usages	56
<i>Ryan Bissell-Siders, Bertrand Cuissart, and Bruno Crémilleux</i>	
Ontology-Based Understanding of Natural Language Queries Using Nested Conceptual Graphs	70
<i>Tru H. Cao and Anh H. Mai</i>	
An Easy Way of Expressing Conceptual Graph Queries from Keywords and Query Patterns	84
<i>Catherine Comparot, Ollivier Haemmerlé, and Nathalie Hernandez</i>	

Natural Intelligence – Commonsense Question Answering with Conceptual Graphs	97
<i>Fatih Mehmet Güler and Aysenur Birturk</i>	
Learning to Map the Virtual Evolution of Knowledge	108
<i>Mary Keeler</i>	
Branching Time as a Conceptual Structure	125
<i>Peter Øhrstrøm, Henrik Schärfe, and Thomas Ploug</i>	
Formal Concept Analysis in Knowledge Discovery: A Survey	139
<i>Jonas Poelmans, Paul Elzinga, Stijn Viaene, and Guido Dedene</i>	
Granular Reduction of Property-Oriented Concept Lattices	154
<i>Ling Wei, Xiao-Hua Zhang, and Jian-Jun Qi</i>	
Temporal Relational Semantic Systems	165
<i>Karl Erich Wolff</i>	

Accepted Posters

FcaBedrock, a Formal Context Creator	181
<i>Simon Andrews and Constantinos Orphanides</i>	
From Generalization of Syntactic Parse Trees to Conceptual Graphs	185
<i>Boris A. Galitsky, Gábor Dobrocsi, Josep Lluís de la Rosa, and Sergey O. Kuznetsov</i>	
Conceptual Structures for Reasoning Enterprise Agents	191
<i>Richard Hill</i>	
Conceptual Graphs for Semantic Email Addressing	195
<i>Dat T. Huynh and Tru H. Cao</i>	
Introducing Rigor in Concept Maps	199
<i>Meena Kharatmal and G. Nagarjuna</i>	
Conceptual Knowledge Acquisition Using Automatically Generated Large-Scale Semantic Networks	203
<i>Pia-Ramona Wojtinnik, Brian Harrington, Sebastian Rudolph, and Stephen Pulman</i>	
Author Index	207