

Lecture Notes in Artificial Intelligence 7519

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

Luis Fariñas del Cerro
Andreas Herzig Jérôme Mengin (Eds.)

Logics in Artificial Intelligence

13th European Conference, JELIA 2012
Toulouse, France, September 26-28, 2012
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

Luis Fariñas del Cerro
Université de Toulouse
Institut de Recherche en Informatique de Toulouse
118 route de Narbonne
31062 Toulouse Cedex 9, France
E-mail: luis.farinass@irit.fr

Andreas Herzig
Université de Toulouse
Institut de Recherche en Informatique de Toulouse
118 route de Narbonne
31062 Toulouse Cedex 9, France
E-mail: andreas.herzig@irit.fr

Jérôme Mengin
Université de Toulouse
Institut de Recherche en Informatique de Toulouse
118 route de Narbonne
31062 Toulouse Cedex 9, France
E-mail: jerome.mengin@irit.fr

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-33352-1 e-ISBN 978-3-642-33353-8
DOI 10.1007/978-3-642-33353-8
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2012946470

CR Subject Classification (1998): I.2.2-4, I.2.8-9, F.4.1, F.3.1, D.1.6, H.3.4

LNCS Sublibrary: SL 7 – Artificial Intelligence

© Springer-Verlag Berlin Heidelberg 2012

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.

The use of general descriptive names, registered names, trademarks, 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.

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

JELIA is the European Conference on Logics in Artificial Intelligence. The acronym actually stands for its French translation *Journées Européennes sur la Logique en Intelligence Artificielle*: the conference series started back in 1988 as a small workshop that was held in Roscoff, France. The theme of the workshop was the use of logic as a formal basis for theoretical and practical studies in artificial intelligence. Since then, the number of applications and their importance have grown significantly, and theory and methods of logic for artificial intelligence have evolved a lot. Many fields like theorem proving or belief revision have matured, while new domains such as description logic or answer set programming have emerged. As from the second meeting, JELIA has adopted English and has published its proceedings in Springer's LNAI series.

Over the last three decades, JELIA has been organized biennially in many European countries: three times in Germany, twice in the UK and Portugal, and once in the Netherlands, Italy, Spain, and Finland. This year JELIA finally returned to France, taking place in Toulouse, “*la ville rose*”, September 26–28, 2012.

This volume contains the papers selected for presentation at JELIA 2012. Competition was very high this year. We received 107 submissions from 31 countries (97 regular papers and 10 system descriptions). Only 36 regular papers and 5 system descriptions were selected for inclusion in the proceedings. The program included three invited talks whose abstracts can be found below:

- Leila Amgoud and Philippe Besnard “Logical Limits of Dung’s Abstract Argumentation Framework”
- Ulrich Furbach “Extensions of Hyper Tableaux”
- Wiebe van der Hoek “On Two Results in Contemporary Modal Logic: Local Definability and Succinctness”

Many people contributed to making JELIA 2012 a success. We would like to thank the authors of the 107 submitted papers, which were of high quality and covered a broad range of topics. We also would like to thank the PC members for their hard work, as well as all the additional experts who made it possible to achieve a thorough reviewing process within a rather short time frame. Thanks are also due to IRIT (Institut de Recherche en Informatique de Toulouse), CNRS (Centre National de la Recherche Scientifique), UPS (Université Paul Sabatier), and LEA IREP (French Spanish Laboratory for Advanced Studies in Information, Representation and Processing) for their financial support. A final word of thanks goes to the JELIA 2012 organizing committee, in particular to Véronique Debats and Sabyne Lartigue for their precious support.

September 2012

Luis Fariñas del Cerro
Andreas Herzig
Jérôme Mengin

Organization

Program Chairs

Luis Fariñas del Cerro

Andreas Herzig

Jérôme Mengin

Program Committee

Thomas Ågotnes

Natasha Alechina

José Júlio Alferes

Franz Baader

Philippe Balbiani

Peter Baumgartner

Salem Benferhat

Philippe Besnard

Richard Booth

Gerhard Brewka

Pedro Cabalar

James Delgrande

Marc Denecker

Hans van Ditmarsch

Barbara Dunin-Kępicz

Florence Dupin de Saint-Cyr

Ulle Endriss

Esra Erdem

Michael Fisher

Laura Giordano

Lluís Godo

Wiebe van der Hoek

Tomi Janhunen

Tommi Junttila

Jérôme Lang

Nicola Leone

Thomas Lukasiewicz

Carsten Lutz

Pierre Marquis

Luís Moniz Pereira

Angelo Montanari

David Pearce

Henri Prade

Jussi Rintanen

Francesca Rossi

Chiaki Sakama

Ulrike Sattler

Torsten Schaub

Renate A. Schmidt

Steven Schockaert

Leon van der Torre

Toby Walsh

Dirk Walther

Frank Wolter

Stefan Woltran

Additional Referees

Mario Alviano

Ringo Baumann

Jonathan Ben-Naim

Meghyn Bienvenu

Davide Bresolin

Andrea Cali

Martin Caminada

Broes De Cat

Pierangelo Dell'Acqua

Dario Della Monica

Agostino Dovier

Wolfgang Dvorak

Sjur Dyrkolbotn

Marcin Dziubinski

Patricia Everaere

Guillaume Feuillade

Martin Gebser

Adita Ghose

Valentina Gliozzi

Ricardo Gonçalves

Víctor Didier

Gutiérrez Basulto

The Anh Han

Ullrich Hustadt

Mark Kaminiski

George Katsirelos

Piotr Kaźmierczak

Mohammad Khodadadi

Matthias Knorr

Sébastien Konieczny

Thomas Krennwallner

Temur Kutsia

Frédéric Lardeux

Brian Logan

Marco Manna

Marco Maratea

Thomas Meyer

Manuel Ojeda-Aciego

Madalena Ortiz

Max Ostrowski

Erik Parmann

Stef De Pooter

Gian Luca Pozzato

Bryan Renne

Francesco Ricca

VIII Organization

Olivier Roussel
Pietro Sala
Frédéric Saubion
Marius Schneider
Thomas Schneider

Peter Schueller
Nicolas Schwind
Michael Thomazo
Dmitry Tishkovsky
Dmitry Tsarkov

Levan Uridia
Pierfrancesco Veltri
Hanne Vlaeminck
Yì Nicholas Wáng
Michal Zawidzki

Organizing Committee

Florence Dupin de Saint-Cyr
Damien Bigot
Pierre Bisquert
Claudette Cayrol
Véronique Debats

Sylvie Doutre
Luis Fariñas del Cerro
Andreas Herzig
Seif-eddine Kramdi
Marie-Christine Lagasquie

Sabyne Lartigue
Jérôme Mengin
Frédéric Moisan

Invited Talks

Leila Amgoud and Philippe Besnard (IRIT-CNRS, University of Toulouse, France), *Logical Limits of Dung's Abstract Argumentation Framework*

A Dung's abstract argumentation framework takes as input a set of arguments and a binary relation encoding attacks between these arguments, and returns arguments gathered in some so-called extensions. General indications lack on how to instantiate this setting from a logical formalism, i.e., how to build arguments from a given *logical* knowledge base and how to choose an appropriate attack relation. This leads in some cases to undesirable results like inconsistent extensions (i.e., the set of logical formulas underlying an extension is inconsistent). This is due to the gap between the abstract setting and the knowledge base from which it is specified.

We first propose to fill in this gap by extending Dung's framework. The idea is to consider all the ingredients involved in an argumentation problem. We start with the notion of an abstract monotonic logic which consists of a language (defining the formulas) and a consequence operator. We show how to build, in a systematic way, arguments from a knowledge base formalised in such a logic.

When starting from a logical knowledge base, this takes care of defining *the* arguments. As evidenced by the literature, it often happens that people take a *syntax-based* subset of the arguments and a specific attack relation to form an argumentation framework that they claim to capture the argumentative information represented in the logical knowledge base. We show that such need not be the case, in particular with the mostly overrated undercut relation.

Ulrich Furbach (Department of Computer Science, University of Koblenz-Landau, Germany), *Extensions of Hyper Tableaux*

At JELIA 1996 Hyper Tableaux were introduced as a first order calculus which combined ideas from hyper resolution and tableaux calculi. The first part of this talk reviews a number of extensions, which are implemented in the prover E-KRHyper. One of them incorporates efficient equality handling by the use of an adapted version of the well known superposition inference rule. Other extensions include a form of negation as failure, PROLOG-like data structures and arithmetic and a unique name assumption. By using a transformation from the description logic *SHIQ* to DL-clauses the prover E-KRHyper can also be used as a decision procedure for *SHIQ*. The second part of the talk depicts the embedding of E-KRHyper within the natural language question answering system loganswer.de. We discuss the requirements which stem from such a time critical and knowledge intensive application, and we discuss how such a system can be evaluated.

Wiebe van der Hoek (Department of Computer Science, University of Liverpool, UK) *On Two Results in Contemporary Modal Logic: Local Definability and Succinctness*

In this invited talk, I present two kinds of results and methods in modal logic. The first concerns *local definability*, and is joint work with Hans van Ditmarsch and Barteld Kooi. In modal logic, when adding a syntactic property to an axiomatisation, this property becomes true in all models, in all situations, under all circumstances. For instance, adding a property like $K_ap \rightarrow K_bp$ (agent b knows at least what agent a knows) to an axiomatisation of some epistemic logic has as an effect that such a property becomes *globally* true, i.e., it will hold in all states, at all time points (in a temporal setting), after every action (in a dynamic setting) and after any communication (in an update setting), and every agent will know that it holds, it will even be common knowledge. We propose a way to express that a property like the above only needs to hold *locally*: it may hold in the actual state, but not in all states. We achieve this by adding relational atoms to the language that represent (implicitly) quantification over all formulas, as in $\forall p(K_ap \rightarrow K_bp)$. We show how this can be done for a rich class of modal logics and a variety of syntactic properties.

The second theme concerns that of succinctness, and is joint work with Tim French, Petar Iliev and Barteld Kooi. One way of comparing knowledge representation formalisms is in terms of *representational succinctness*, i.e., we can ask whether one of the formalisms allows for a more ‘economical’ encoding of information than the other. Proving that one language is more succinct than another becomes harder when the underlying semantics is stronger. We propose to use *Formula Size Games* (as put forward by Adler and Immerman), games that are played on two *sets* of models, and that directly link the *length* of play with the *size* of the formula. Using Formula Size Games, we prove the following succinctness results for m -dimensional modal logic: (1) on general Kripke models, a notion of ‘everybody knows’ makes the resulting language exponentially more succinct for $m > 1$; (2) on epistemic models, the same language becomes more succinct for $m > 3$, (3) the results for the language with ‘everybody knows’ also hold of a language with ‘somebody knows’, and (4) on epistemic models, Public Announcement Logic is exponentially more succinct than epistemic logic, if $m > 3$. The latter settles an open problem raised by Lutz.

Table of Contents

Regular Papers

Preferential Semantics for the Logic of Comparative Similarity over Triangular and Metric Models	1
<i>Régis Alenda and Nicola Olivetti</i>	
Nested Sequent Calculi for Conditional Logics	14
<i>Régis Alenda, Nicola Olivetti, and Gian Luca Pozzato</i>	
Conflict-Tolerant Semantics for Argumentation Frameworks	28
<i>Ofer Arieli</i>	
Knowledge Means 'All', Belief Means 'Most'	41
<i>Dimitris Askounis, Costas D. Koutras, and Yorgos Zikos</i>	
Generalized DEL-Sequents	54
<i>Guillaume Aucher, Bastien Maubert, and François Schwarzentruher</i>	
Deciding the Bisimilarity Relation between Datalog Goals	67
<i>Philippe Balbiani and Antoun Yaacoub</i>	
Inconsistency Management for Traffic Regulations: Formalization and Complexity Results	80
<i>Harald Beck, Thomas Eiter, and Thomas Krennwallner</i>	
Conditional Epistemic Planning	94
<i>Mikkel Birkegaard Andersen, Thomas Bolander, and Martin Holm Jensen</i>	
PTL: A Propositional Typicality Logic	107
<i>Richard Booth, Thomas Meyer, and Ivan Varzinczak</i>	
The Complexity of One-Agent Refinement Modal Logic	120
<i>Laura Bozzelli, Hans van Ditmarsch, and Sophie Pinchinat</i>	
The View-Update Problem for Indefinite Databases	134
<i>Luciano Caroprese, Irina Trubitsyna, Mirosław Truszczyński, and Ester Zumpano</i>	
Three-Valued Logics for Incomplete Information and Epistemic Logic . . .	147
<i>Davide Ciucci and Didier Dubois</i>	
Exploiting Unfounded Sets for HEX-Program Evaluation	160
<i>Thomas Eiter, Michael Fink, Thomas Krennwallner, Christoph Redl, and Peter Schüller</i>	

Using Satisfiability for Non-optimal Temporal Planning	176
<i>Masood Feyzbakhsh Rankooh, Ali Mahjoob, and Gholamreza Ghassem-Sani</i>	
How to Exploit Parametric Uniformity for Maximum Entropy Reasoning in a Relational Probabilistic Logic	189
<i>Marc Finthammer and Christoph Beierle</i>	
Exact Query Reformulation with First-Order Ontologies and Databases	202
<i>Enrico Franconi, Volha Kerhet, and Nhung Ngo</i>	
A Selective Semantics for Logic Programs with Preferences	215
<i>Alfredo Gabaldon</i>	
A Minimal Model Semantics for Nonmonotonic Reasoning	228
<i>Laura Giordano, Valentina Gliozzi, Nicola Olivetti, and Gian Luca Pozzato</i>	
Extending a Temporal Defeasible Argumentation Framework with Possibilistic Weights	242
<i>Lluís Godo, Enrico Marchioni, and Pere Pardo</i>	
On Decidability of a Logic for Order of Magnitude Qualitative Reasoning with Bidirectional Negligibility	255
<i>Joanna Golińska-Pilarek</i>	
Fault Tolerance in Belief Formation Networks	267
<i>Sarah Holbrook and Pavel Naumov</i>	
Large-Scale Cost-Based Abduction in Full-Fledged First-Order Predicate Logic with Cutting Plane Inference	281
<i>Naoya Inoue and Kentaro Inui</i>	
Belief Base Change Operations for Answer Set Programming	294
<i>Patrick Krümpelmann and Gabriele Kern-Isberner</i>	
A Framework for Semantic-Based Similarity Measures for \mathcal{ELH} -Concepts	307
<i>Karsten Lehmann and Anni-Yasmin Turhan</i>	
Sequent Systems for Lewis' Conditional Logics	320
<i>Björn Lellmann and Dirk Pattinson</i>	
Relevant Minimal Change in Belief Update	333
<i>Laurent Perrussel, Jerusa Marchi, Jean-Marc Thévenin, and Dongmo Zhang</i>	
Minimal Proof Search for Modal Logic K Model Checking	346
<i>Abdallah Saffidine</i>	

Building an Epistemic Logic for Argumentation	359
<i>François Schwarzentruber, Srdjan Vesic, and Tjitze Rienstra</i>	
A Unifying Perspective on Knowledge Updates	372
<i>Martin Slota and João Leite</i>	
Verifying Brahms Human-Robot Teamwork Models	385
<i>Richard Stocker, Louise Dennis, Clare Dixon, and Michael Fisher</i>	
On Satisfiability in ATL with Strategy Contexts	398
<i>Nicolas Troquard and Dirk Walther</i>	
Jumping to Conclusions: A Logico-Probabilistic Foundation for Defeasible Rule-Based Arguments	411
<i>Bart Verheij</i>	
Beyond Maxi-Consistent Argumentation Operators	424
<i>Srdjan Vesic and Leendert van der Torre</i>	
Reasoning about Agent Programs Using ATL-Like Logics	437
<i>Nitin Yadav and Sebastian Sardina</i>	
Qualitative Approximate Behavior Composition	450
<i>Nitin Yadav and Sebastian Sardina</i>	
A Preferential Framework for Trivialization-Resistant Reasoning with Inconsistent Information	463
<i>Anna Zamansky</i>	

System Descriptions

DebateWEL: An Interface for Debating with Enthymemes and Logical Formulas	476
<i>Julien Balax, Florence Dupin de Saint-Cyr, and David Villard</i>	
OMiGA: An Open Minded Grounding On-The-Fly Answer Set Solver	480
<i>Minh Dao-Tran, Thomas Eiter, Michael Fink, Gerald Weidinger, and Antonius Weinzierl</i>	
The Multi-Engine ASP Solver ME-ASP	484
<i>Marco Maratea, Luca Pulina, and Francesco Ricca</i>	
A System for the Use of Answer Set Programming in Reinforcement Learning	488
<i>Matthias Nickles</i>	
The Tableau Prover Generator MetTeL2	492
<i>Dmitry Tishkovsky, Renate A. Schmidt, and Mohammad Khodadadi</i>	
Author Index	497