

Lecture Notes in Artificial Intelligence 3571

Edited by J. G. Carbonell and J. Siekmann

Subseries of Lecture Notes in Computer Science

Lluís Godo (Ed.)

Symbolic and Quantitative Approaches to Reasoning with Uncertainty

8th European Conference, ECSQARU 2005
Barcelona, Spain, July 6-8, 2005
Proceedings

Series Editors

Jaime G. Carbonell, Carnegie Mellon University, Pittsburgh, PA, USA
Jörg Siekmann, University of Saarland, Saarbrücken, Germany

Volume Editor

Lluís Godo

Institut d'Investigació en Intel·ligència Artificial (IIIA)
Consejo Superior de Investigaciones Científicas (CSIC)
Campus UAB s/n, 08193 Bellaterra, Spain
E-mail: godo@iia.csic.es

Library of Congress Control Number: 2005928377

CR Subject Classification (1998): I.2, F.4.1

ISSN 0302-9743
ISBN-10 3-540-27326-3 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-27326-4 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 is a part of Springer Science+Business Media

springeronline.com

© Springer-Verlag Berlin Heidelberg 2005
Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 11518655 06/3142 5 4 3 2 1 0

Lluís Godo (Ed.)

Symbolic and Quantitative Approaches to Reasoning with Uncertainty

8th European Conference, ECSQARU 2005
Barcelona, Spain, July 6–8, 2005
Proceedings

Preface

These are the proceedings of the 8th European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, ECSQARU 2005, held in Barcelona (Spain), July 6–8, 2005. The ECSQARU conferences are biennial and have become a major forum for advances in the theory and practice of reasoning under uncertainty. The first ECSQARU conference was held in Marseille (1991), and after in Granada (1993), Fribourg (1995), Bonn (1997), London (1999), Toulouse (2001) and Aalborg (2003).

The papers gathered in this volume were selected out of 130 submissions, after a strict review process by the members of the Program Committee, to be presented at ECSQARU 2005. In addition, the conference included invited lectures by three outstanding researchers in the area, Serafin Moral (Imprecise Probabilities), Rudolf Kruse (Graphical Models in Planning) and Jérôme Lang (Social Choice). Moreover, the application of uncertainty models to real-world problems was addressed at ECSQARU 2005 by a special session devoted to successful industrial applications, organized by Rudolf Kruse. Both invited lectures and papers of the special session contribute to this volume. On the whole, the programme of the conference provided a broad, rich and up-to-date perspective of the current high-level research in the area which is reflected in the contents of this volume.

I would like to warmly thank the members of the Program Committee and the additional referees for their valuable work, the invited speakers and the invited session organizer. I also want to express my gratitude to all of my colleagues and friends of the Executive Committee for their excellent work and unconditional support, dedicating a lot of their precious time and energy to make this conference successful. Finally, the sponsoring institutions are also gratefully acknowledged for their support.

May 2005

Lluís Godo

Organization

ECSQARU 2005 was organized by the Artificial Intelligence Research Institute (IIIA), belonging to the Spanish Scientific Research Council (CSIC).

Executive Committee

Conference Chair	Lluís Godo (IIIA, Spain)
Organizing Committee	Teresa Alsinet (University of Lleida, Spain) Carlos Chesñevar (University of Lleida, Spain) Francesc Esteva (IIIA, Spain) Josep Puyol-Gruart (IIIA, Spain) Sandra Sandri (IIIA, Spain)
Technical Support	Francisco Cruz (IIIA, Spain)

Program Committee

Teresa Alsinet (Spain)	Hector Geffner (Spain)
John Bell (UK)	Angelo Gilio (Italy)
Isabelle Bloch (France)	Michel Grabisch (France)
Salem Benferhat (France)	Petr Hájek (Czech Republic)
Philippe Besnard (France)	Andreas Herzig (France)
Gerd Brewka (Germany)	Eyke Huellermeier (Germany)
Luis M. de Campos (Spain)	Anthony Hunter (UK)
Claudette Cayrol (France)	Manfred Jaeger (Denmark)
Carlos Chesñevar (Spain)	Gabriele Kern-Isberner (Germany)
Agata Ciabattoni (Austria)	Jürg Kohlas (Switzerland)
Giulianella Coletti (Italy)	Ivan Kramosil (Czech Republic)
Fabio Cozman (Brazil)	Rudolf Kruse (Germany)
Adnan Darwiche (USA)	Jérôme Lang (France)
James P. Delgrande (Canada)	Jonathan Lawry (UK)
Thierry Denœux (France)	Daniel Lehmann (Israel)
Javier Diez (Spain)	Pedro Larrañaga (Spain)
Marek Druzdzel (USA)	Churn-Jung Liao (Taiwan)
Didier Dubois (France)	Weiru Liu (UK)
Francesc Esteva (Spain)	Thomas Lukasiewicz (Italy)
Hélène Fargier (France)	Pierre Marquis (France)
Linda van der Gaag (Netherlands)	Khaled Mellouli (Tunisia)

VIII Organization

Serafín Moral (Spain)	Ken Satoh (Japan)
Thomas Nielsen (Denmark)	Torsten Schaub (Germany)
Kristian Olesen (Denmark)	Romano Scozzafava (Italy)
Ewa Orłowska (Poland)	Prakash P. Shenoy (USA)
Odile Papini (France)	Guillermo Simari (Argentina)
Simon Parsons (USA)	Philippe Smets (Belgium)
Luís Moniz Pereira (Portugal)	Claudio Sossai (Italy)
Ramon Pino-Pérez (Venezuela)	Milan Studený (Czech Republic)
David Poole (Canada)	Leon van der Torre (Netherlands)
Josep Puyol-Gruart (Spain)	Enric Trillas (Spain)
Henri Prade (France)	Emil Weydert (Luxembourg)
Maria Rifqi (France)	Mary-Anne Williams (Australia)
Alessandro Saffiotti (Sweden)	Nevin L. Zhang (Hong Kong, China)
Sandra Sandri (Spain)	

Additional Referees

David Allen	Christian Döring	Witold Pedrycz
Fabrizio Angiulli	Zied Elouedi	André Ponce de Leon
Cecilio Angulo	Enrique Herrera-Viedma	Guilin Qi
Nahla Ben Amor	Thanh Ha Dang	Jordi Recasens
Guido Boella	Jinbo Huang	Rita Rodrigues
Jesús Cerquides	Joris Hulstijn	Ikuo Tahara
Mark Chavira	Germano S. Kienbaum	Vicenç Torra
Gaetano Chemello	Beata Konikowska	Suzuki Yoshitaka
Petr Cintula	Vítor H. Nascimento	
Francisco A.F.T. da Silva	Giovanni Panti	

Sponsoring Institutions

Artificial Intelligence Research Institute (IIIA)
Spanish Scientific Research Council (CSIC)
Generalitat de Catalunya, AGAUR
Ministerio de Educación y Ciencia
MusicStrands, Inc.

Table of Contents

Invited Papers

Imprecise Probability in Graphical Models: Achievements and Challenges <i>Serafín Moral</i>	1
Knowledge-Based Operations for Graphical Models in Planning <i>Jörg Gebhardt, Rudolf Kruse</i>	3
Some Representation and Computational Issues in Social Choice <i>Jérôme Lang</i>	15

Bayesian Networks

Nonlinear Deterministic Relationships in Bayesian Networks <i>Barry R. Cobb, Prakash P. Shenoy</i>	27
Penniless Propagation with Mixtures of Truncated Exponentials <i>Rafael Rumí, Antonio Salmerón</i>	39
Approximate Factorisation of Probability Trees <i>Irene Martínez, Serafín Moral, Carmelo Rodríguez, Antonio Salmerón</i>	51
Abductive Inference in Bayesian Networks: Finding a Partition of the Explanation Space <i>M. Julia Flores, José A. Gámez, Serafín Moral</i>	63
Alert Systems for Production Plants: A Methodology Based on Conflict Analysis <i>Thomas D. Nielsen, Finn V. Jensen</i>	76
Hydrologic Models for Emergency Decision Support Using Bayesian Networks <i>Martin Molina, Raquel Fuentetaja, Luis Garrote</i>	88

Graphical Models

Probabilistic Graphical Models for the Diagnosis of Analog Electrical Circuits <i>Christian Borgelt, Rudolf Kruse</i>	100
Qualified Probabilistic Predictions Using Graphical Models <i>Zhiyuan Luo, Alex Gammerman</i>	111
A Decision-Based Approach for Recommending in Hierarchical Domains <i>Luis M. de Campos, Juan M. Fernández-Luna, Manuel Gómez, Juan F. Huete</i>	123

Learning Causal Networks

Scalable, Efficient and Correct Learning of Markov Boundaries Under the Faithfulness Assumption <i>Jose M. Peña, Johan Björkegren, Jesper Tegnér</i>	136
Discriminative Learning of Bayesian Network Classifiers via the TM Algorithm <i>Guzmán Santafé, Jose A. Lozano, Pedro Larrañaga</i>	148
Constrained Score+(Local)Search Methods for Learning Bayesian Networks <i>José A. Gámez, J. Miguel Puerta</i>	161
On the Use of Restrictions for Learning Bayesian Networks <i>Luis M. de Campos, Javier G. Castellano</i>	174
Foundation for the New Algorithm Learning Pseudo-Independent Models <i>Jae-Hyuck Lee</i>	186

Planning

Optimal Threshold Policies for Operation of a Dedicated-Platform with Imperfect State Information - A POMDP Framework <i>Arsalan Farrokh, Vikram Krishnamurthy</i>	198
APPSSAT: Approximate Probabilistic Planning Using Stochastic Satisfiability <i>Stephen M. Majercik</i>	209

Causality and Independence

Racing for Conditional Independence Inference <i>Remco R. Bouckaert, Milan Studený</i>	221
Causality, Simpson's Paradox, and Context-Specific Independence <i>Manon J. Sanscartier, Eric Neufeld</i>	233
A Qualitative Characterisation of Causal Independence Models Using Boolean Polynomials <i>Marcel van Gerven, Peter Lucas, Theo van der Weide</i>	244

Preference Modelling and Decision

On the Notion of Dominance of Fuzzy Choice Functions and Its Application in Multicriteria Decision Making <i>Irina Georgescu</i>	257
An Argumentation-Based Approach to Multiple Criteria Decision <i>Leila Amgoud, Jean-Francois Bonnefon, Henri Prade</i>	269
Algorithms for a Nonmonotonic Logic of Preferences <i>Souhila Kaci, Leendert van der Torre</i>	281
Expressing Preferences from Generic Rules and Examples – A Possibilistic Approach Without Aggregation Function <i>Didier Dubois, Souhila Kaci, Henri Prade</i>	293
On the Qualitative Comparison of Sets of Positive and Negative Affects <i>Didier Dubois, Hélène Fargier</i>	305

Argumentation Systems

Symmetric Argumentation Frameworks <i>Sylvie Coste-Marquis, Caroline Devred, Pierre Marquis</i>	317
Evaluating Argumentation Semantics with Respect to Skepticism Adequacy <i>Pietro Baroni, Massimiliano Giacomin</i>	329
Logic of Dementia Guidelines in a Probabilistic Argumentation Framework <i>Helena Lindgren, Patrik Eklund</i>	341

Argument-Based Expansion Operators in Possibilistic Defeasible Logic Programming: Characterization and Logical Properties
Carlos I. Chesñevar, Guillermo R. Simari, Lluís Godo, Teresa Alsinet 353

Gradual Valuation for Bipolar Argumentation Frameworks
Claudette Cayrol, Marie Christine Lagasque-Schieer 366

On the Acceptability of Arguments in Bipolar Argumentation Frameworks
Claudette Cayrol, Marie Christine Lagasque-Schieer 378

Inconsistency Handling

A Modal Logic for Reasoning with Contradictory Beliefs Which Takes into Account the Number and the Reliability of the Sources
Laurence Cholvy 390

A Possibilistic Inconsistency Handling in Answer Set Programming
Pascal Nicolas, Laurent Garcia, Igor Stéphan 402

Measuring the Quality of Uncertain Information Using Possibilistic Logic
Anthony Hunter, Weiru Liu 415

Remedying Inconsistent Sets of Premises
Philippe Besnard 427

Measuring Inconsistency in Requirements Specifications
Kedian Mu, Zhi Jin, Ruqian Lu, Weiru Liu 440

Belief Revision and Merging

Belief Revision of GIS Systems: The Results of REV!GIS
Salem Benferhat, Jonathan Bennaïm, Robert Jeansoulin, Mahat Khelifallah, Sylvain Lagrue, Odile Papini, Nic Wilson, Eric Würbel 452

Multiple Semi-revision in Possibilistic Logic
Guilin Qi, Weiru Liu, David A. Bell 465

A Local Fusion Method of Temporal Information
Mahat Khelifallah, Belaïd Benhamou 477

Mediation Using m -States <i>Thomas Meyer, Pilar Pozos Parra, Laurent Perrussel</i>	489
Combining Multiple Knowledge Bases by Negotiation: A Possibilistic Approach <i>Guilin Qi, Weiru Liu, David A. Bell</i>	501
Conciliation and Consensus in Iterated Belief Merging <i>Olivier Gauwin, Sébastien Konieczny, Pierre Marquis</i>	514
An Argumentation Framework for Merging Conflicting Knowledge Bases: The Prioritized Case <i>Leila Amgoud, Souhila Kaci</i>	527

Belief Functions

Probabilistic Transformations of Belief Functions <i>Milan Daniel</i>	539
Contextual Discounting of Belief Functions <i>David Mercier, Benjamin Quost, Thierry Denœux</i>	552

Fuzzy Models

Bilattice-Based Squares and Triangles <i>Ofer Arieli, Chris Cornelis, Glad Deschrijver, Etienne Kerre</i>	563
A New Algorithm to Compute Low T-Transitive Approximation of a Fuzzy Relation Preserving Symmetry. Comparisons with the T-Transitive Closure <i>Luis Garmendia, Adela Salvador</i>	576
Computing a Transitive Opening of a Reflexive and Symmetric Fuzzy Relation <i>Luis Garmendia, Adela Salvador</i>	587
Generating Fuzzy Models from Deep Knowledge: Robustness and Interpretability Issues <i>Raffaella Guglielmann, Liliana Ironi</i>	600
Analysis of the TaSe-II TSK-Type Fuzzy System for Function Approximation <i>Luis Javier Herrera, Héctor Pomares, Ignacio Rojas, Alberto Guillén, Mohammed Awad, Olga Valenzuela</i>	613

Many-Valued Logical Systems

Non-deterministic Semantics for Paraconsistent C-Systems <i>Arnon Avron</i>	625
Multi-valued Model Checking in Dense-Time <i>Ana Fernández Vilas, José J. Pazos Arias, A. Belén Barragáns Martínez, Martín López Nores, Rebeca P. Díaz Redondo, Alberto Gil Solla, Jorge García Duque, Manuel Ramos Cabrer</i>	638
Brun Normal Forms for Co-atomic Lukasiewicz Logics <i>Stefano Aguzzoli, Ottavio M. D'Antona, Vincenzo Marra</i>	650
Poset Representation for Gödel and Nilpotent Minimum Logics <i>Stefano Aguzzoli, Brunella Gerla, Corrado Manara</i>	662

Uncertainty Logics

Possibilistic Inductive Logic Programming <i>Mathieu Serrurier, Henri Prade</i>	675
Query Answering in Normal Logic Programs Under Uncertainty <i>Umberto Straccia</i>	687
A Logical Treatment of Possibilistic Conditioning <i>Enrico Marchioni</i>	701
A Zero-Layer Based Fuzzy Probabilistic Logic for Conditional Probability <i>Tommaso Flaminio</i>	714
A Logic with Coherent Conditional Probabilities <i>Nebojša Iškodić, Zoran Ognjanović</i>	726
Probabilistic Description Logic Programs <i>Thomas Lukasiewicz</i>	737

Probabilistic Reasoning

Coherent Restrictions of Vague Conditional Lower-Upper Probability Extensions <i>Andrea Capotorti, Maroussa Zagoraiou</i>	750
--	-----

Type Uncertainty in Ontologically-Grounded Qualitative Probabilistic Matching <i>David Poole, Clinton Smyth</i>	763
Some Theoretical Properties of Conditional Probability Assessments <i>Veronica Biazzo, Angelo Gilio</i>	775
Unifying Logical and Probabilistic Reasoning <i>Rolf Haenni</i>	788

Reasoning Models Under Uncertainty

Possibility Theory for Reasoning About Uncertain Soft Constraints <i>Maria Silvia Pini, Francesca Rossi, Brent Venable</i>	800
About the Processing of Possibilistic and Probabilistic Queries <i>Patrick Bosc, Olivier Pivert</i>	812
Conditional Deduction Under Uncertainty <i>Audun Jøsang, Simon Pope, Milan Daniel</i>	824
Heterogeneous Spatial Reasoning <i>Haibin Sun, Wenhui Li</i>	836

Uncertainty Measures

A Notion of Comparative Probabilistic Entropy Based on the Possibilistic Specificity Ordering <i>Didier Dubois, Eyke Hüllermeier</i>	848
Consonant Random Sets: Structure and Properties <i>Enrique Miranda</i>	860
Comparative Conditional Possibilities <i>Giulianella Coletti, Barbara Vantaggi</i>	872
Second-Level Possibilistic Measures Induced by Random Variables <i>Ivan Kramosil</i>	884

Probabilistic Classifiers

Hybrid Bayesian Estimation Trees Based on Label Semantics <i>Zengchang Qin, Jonathan Lawry</i>	896
---	-----

Selective Gaussian Naïve Bayes Model for Diffuse Large-B-Cell Lymphoma Classification: Some Improvements in Preprocessing and Variable Elimination
Andrés Cano, Javier G. Castellano, Andrés R. Masegosa, Serafín Moral 908

Towards a Definition of Evaluation Criteria for Probabilistic Classifiers
Nahla Ben Amor, Salem Benferhat, Zied Elouedi 921

Methods to Determine the Branching Attribute in Bayesian Multinets Classifiers
Andrés Cano, Javier G. Castellano, Andrés R. Masegosa, Serafín Moral 932

Classification and Clustering

Qualitative Inference in Possibilistic Option Decision Trees
Ilyes Jenhani, Zied Elouedi, Nahla Ben Amor, Khaled Mellouli 944

Partially Supervised Learning by a Credal EM Approach
Patrick Vannoorenberghe, Philippe Smets 956

Default Clustering from Sparse Data Sets
Julien Velcin, Jean-Gabriel Ganascia 968

New Technique for Initialization of Centres in TSK Clustering-Based Fuzzy Systems
Luis Javier Herrera, Héctor Pomares, Ignacio Rojas, Alberto Guillén, Jesús González 980

Industrial Applications

Learning Methods for Air Traffic Management
Frank Rehm, Frank Klawonn 992

Molecular Fragment Mining for Drug Discovery
Christian Borgelt, Michael R. Berthold, David E. Patterson 1002

Automatic Selection of Data Analysis Methods
Detlef D. Nauck, Martin Spott, Ben Azvine 1014

Author Index 1027