

Lecture Notes in Artificial Intelligence 8272

Subseries of Lecture Notes in Computer Science

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# AI 2013: Advances in Artificial Intelligence

26th Australasian Joint Conference  
Dunedin, New Zealand, December 1-6, 2013  
Proceedings



Springer

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ISSN 0302-9743

e-ISSN 1611-3349

ISBN 978-3-319-03679-3

e-ISBN 978-3-319-03680-9

DOI 10.1007/978-3-319-03680-9

Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: Applied for

CR Subject Classification (1998): I.2, H.3-4, F.1, H.2.8, I.4-5, J.3

LNCS Sublibrary: SL 7 – Artificial Intelligence

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*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](http://www.springer.com))

# Preface

This volume contains the papers presented at the 26th Australasian Joint Conference on Artificial Intelligence (AI 2013). The conference was held from 3-6 December 2013 in Dunedin, home to the University of Otago in the South Island of New Zealand. This annual conference remains the premier event for artificial intelligence researchers in the Australasian region, and it is only the second time in its 26-year history that it was held outside Australia. It was co-located with the 16th International Conference on Principles and Practice of Multi-Agent Systems (PRIMA 2013).

AI 2013 received 120 submissions with authors from 34 countries. Each submission was reviewed by at least three Program Committee members or external referees. Subsequent to a thorough discussion and rigorous scrutiny by the reviewers and the dedicated members of the Senior Program Committee, 54 submissions were accepted for publication: 35 as full papers and 19 as short papers. The acceptance rate was 29% for full papers and 45% overall (including short papers).

AI 2013 featured keynote speeches by two eminent scientists. Fangzhen Lin (Hong Kong University of Science and Technology) talked about the connection between satisfiability and linear algebra. Pascal Van Hentenryck (NICTA), on the other hand, spoke of the role that optimisation has to play in effective disaster management.

Four workshops with their own proceedings were held on the first day of the conference:

- The Third Australasian Workshop on Artificial Intelligence in Health (AIH 2013)
- The Workshop on Machine Learning for Sensory Data Analysis (MLSDA'13)
- The 4th International Workshop on Collaborative Agents — Research and Development (CARE 2013)
- The 16th International Workshop on Coordination, Organisations, Institutions and Norms in Agent Systems (COIN@PRIMA2013)

These workshops were complemented by a tutorial on “Theory and Applications of State Space Models for Time Series Data”, presented by Peter Tino (University of Birmingham).

AI 2013 would not have been successful without the support of authors, reviewers, and organisers. We thank the many authors for submitting their research papers to the conference, and are grateful to the successful authors whose papers are published in this volume for their collaboration during the preparation of final submissions. We thank the members of the Program Committee and the external referees for their expertise and timeliness in assessing the papers. We also thank the organisers of the workshops and the tutorial for their commitment and dedication. We are very grateful to the members of the Organising

Committee for their efforts in the preparation, promotion, and organisation of the conference. We acknowledge the assistance provided by EasyChair for conference management, and we appreciate the professional service provided by the Springer LNCS editorial and publishing teams.

September 2013

Stephen Cranefield  
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## **Abstracts of Keynote Talks**

# From Satisfiability to Linear Algebra

Fangzhen Lin

Hong Kong University of Science and Technology

Satisfiability of boolean formulas (SAT) is an interesting problem for many reasons. It was the first problem proved to be NP-complete by Cook. Efficient SAT solvers have many applications. In fact, there is a huge literature on SAT, and its connections with other optimisation problems have been explored. In this talk, I discuss a way to map clauses to linear combinations, and sets of clauses to matrices. Through this mapping, satisfiability is related to linear programming, and resolution to matrix operations.

# Computational Disaster Management

Pascal Van Hentenryck

NICTA

The frequency and intensity of natural disasters have significantly increased over the past decades and this trend is predicted to continue. Natural disasters have dramatic impacts on human lives and on the socio-economic welfare of entire regions; they are identified as one of the major risks of the East Asia and Pacific region. Dramatic events such as Hurricane Katrina and the Tohoku tsunami have also highlighted the need for decision-support tools in preparing, mitigating, responding, and recovering from disasters.

In this talk, I will present an overview of some recent progress in using optimisation for disaster management and, in particular, in relief distribution, power system restoration, and evacuation planning and scheduling. I will argue that optimisation has a significant role to play in all aspects of disaster management, from policy formulation to mitigation, operational response, and recovery, using examples of systems deployed during hurricanes Irene and Sandy. Moreover, I will indicate that disaster management raises significant computational challenges for AI technologies, which must optimize over complex infrastructures in uncertain environments. Finally, I will conclude by identifying a number of fundamental research issues for AI in this space.

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