Ian Miguel Wheeler Ruml (Eds.)

Abstraction, Reformulation, and Approximation

7th International Symposium, SARA 2007
Whistler, Canada, July 18-21, 2007
Proceedings

Springer

Series Editors

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

Volume Editors

Ian Miguel
University of St.Andrews
School of Computer Science
North Haugh, KY16 9SX, St.Andrews, UK
E-mail: ianm@cs.st-and.ac.uk

Wheeler Ruml
Palo Alto Research Center
3333 Coyote Hill Road, Palo Alto, CA 94304, USA
E-mail: ruml@acm.org

Library of Congress Control Number: 2007930461

CR Subject Classification (1998): I.2, F.4.1, F.3

LNCS Sublibrary: SL 7 – Artificial Intelligence

ISSN 0302-9743
ISBN-10 3-540-73579-8 Springer Berlin Heidelberg New York
ISBN-13 978-3-540-73579-3 Springer Berlin Heidelberg New York

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India
Printed on acid-free paper SPIN: 12089598 06/3180 5 4 3 2 1 0

Preface

It has been recognized since the inception of artificial intelligence that abstractions, problem reformulations and approximations (AR&A) are central to human common-sense reasoning and problem solving and to the ability of systems to reason effectively in complex domains. AR&A techniques have been used in a variety of problem-solving settings, including automated reasoning, cognitive modelling, constraint programming, design, diagnosis, machine learning, model-based reasoning, planning, reasoning, scheduling, search, theorem proving, and intelligent tutoring. The primary use of AR&A techniques in such settings has been to overcome computational intractability by decreasing the combinatorial costs associated with searching large spaces. In addition, AR&A techniques are useful for knowledge acquisition and explanation generation in complex domains.

The considerable interest in AR&A techniques has led to a series of successful symposia over the last decade, the Symposium on Abstraction, Reformulation, and Approximation (SARA). Its aim is to provide a forum for intensive interaction among researchers in all areas of artificial intelligence and computer science interested in the different aspects of AR&A. AAAI workshops in 1990 and 1992 focused on selecting, constructing, and using abstractions and approximations, while a series of workshops in 1988, 1990, and 1992 focused on problem reformulations. The two series were then combined since there was considerable overlap in their attendees and topics. The present symposium is the seventh in this new series, following successful symposia in 1994, 1995, 1998, 2000, 2002, and 2005. The diverse backgrounds of participants of the symposia lead to a rich and lively exchange of ideas, allow the comparison of goals, techniques, and paradigms between resesarchers who might not otherwise be aware of each others' work, and help identify important research issues and engineering hurdles.

This volume contains the proceedings of SARA 2007, the seventh symposium, held at Whistler Village, British Columbia, Canada, July 18-21. Three distinguished speakers were invited to give keynote presentations, and their abstracts are included herein: Vadim Bulitko of the University of Alberta, Canada; Alan Frisch of the University of York, UK; and John Hooker of Carnegie Mellon University, USA. We thank all the authors of submitted papers for their efforts in preparing an impressive corpus of work, the Programme Committee and auxiliary reviewers for their thorough evaluation and considered selection of presentations for SARA, and the SARA Steering Committee for its advice and guidance. We are also very grateful to Google, the Pacific Institute for the Mathematical Sciences, and the Palo Alto Research Center for their generous support of the symposium, and to the Association for the Advancement of Artificial Intelligence (AAAI), with which SARA 2007 is affiliated.

July 2007

Ian Miguel
Wheeler Ruml

Organization

Steering Committee

Berthe Choueiry (University of Nebraska-Lincoln, USA)
Fausto Giunchighlia (University of Trento, Italy)
Michael Genesereth (Stanford University, USA)
Robert Holte (University of Alberta, Canada)
Ian Miguel (University of St. Andrews, UK)
Michael Lowry (NASA, USA)
Wheeler Ruml (Palo Alto Research Center, USA)
Lorenza Saitta (Università del Piemonte Orientale, Italy)
Sven Koenig (University of Southern California, USA)
Toby Walsh (University of New South Wales, Australia)

Organizing Committee

Conference Chairs	Ian Miguel (University of St. Andrews, UK) Wheeler Ruml (Palo Alto Research Center, USA)
Publicity Chair	Karen Petrie (University of Oxford, UK)
Sponsorship Chair	Peter Nightingale (University of St. Andrews, UK)

Programme Committee

J. Christopher Beck (University of Toronto, Canada)
Berthe Choueiry (University of Nebraska-Lincoln, USA)
Johan de Kleer (Palo Alto Research Center, USA)
Marie desJardins (University of Maryland, Baltimore County, USA)
Stefan Edelkamp (Universität Dortmund, Germany)
Boi Faltings (Ecole Polytechnique Federale de Lausanne, Switzerland)
Ariel Felner (Ben-Gurion University, Israel)
Alan Frisch (University of York, UK)
Hector Geffner (Universitat Pompeu Fabra, Spain)
Michael Genesereth (Stanford University, USA)
Fausto Giunchiglia (University of Trento, Italy)
Brahim Hnich (Izmir University, Turkey)
Daniel Kayser (Université Paris-Nord, France)
Sven Koenig (University of Southern California, USA)
Derek Long (University of Strathclyde, UK)
Michael Lowry (NASA, USA)

Peter Revesz (University of Nebraska-Lincoln, USA)
Marie-Christine (Rousset University of Grenoble, France)
Lorenza Saitta (Università del Piemonte Orientale, Italy)
Bart Selman (Cornell University, USA)
Barbara Smith (Cork Constraint Computation Centre, Ireland)
Miroslav Velev (Carnegie Mellon University, USA)
Toby Walsh (University of New South Wales, Australia)
Weixiong Zhang (Washington University, USA)
Rong Zhou (Palo Alto Research Center, USA)
Robert Zimmer (Goldsmiths College, University of London, UK)
Jean-Daniel Zucker (Université Paris 13/UR 079 GEODES, France)

Additional Referees

Sebastian Brand
Kenneth Daniel
George Katsirelos
Zeynep Kiziltan
Peter Nightingale
Claude-Guy Quimper
Pietro Torasso
Gianluca Torta
Xiaoming Zheng

Sponsoring Institutions

The Association for the Advancement of Artificial Intelligence
Google, Inc.
The Pacific Institute for the Mathematical Sciences
The Palo Alto Research Center

Table of Contents

Invited Talks (Abstracts)

Research Papers

Research Summaries