Lecture Notes in Artificial Intelligence 6989

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

Cesare Tinelli Viorica Sofronie-Stokkermans (Eds.)

Frontiers of Combining Systems

8th International Symposium, FroCoS 2011
Saarbrücken, Germany, October 5-7, 2011
Proceedings

Springer

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

Cesare Tinelli
The University of Iowa
Iowa City, IA 52242, USA
E-mail: cesare-tinelli@uiowa.edu

Viorica Sofronie-Stokkermans
Max-Planck-Institut für Informatik
66123 Saarbrücken, Germany
E-mail: sofronie@mpi-inf.mpg.de

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-642-24363-9 e-ISBN 978-3-642-24364-6
DOI 10.1007/978-3-642-24364-6
Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2011936707

CR Subject Classification (1998): I.2, I.2.3, D.3.1, F.4, I.1, F.2

LNCS Sublibrary: SL 7 – Artificial Intelligence

© Springer-Verlag Berlin Heidelberg 2011
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

This volume collects papers presented at the 8th International Symposium on Frontiers of Combining Systems (FroCoS 2011), held October 5–7, 2011 in Saarbrücken, Germany. Previous FroCoS meetings were organized in Munich (1996), Amsterdam (1998), Nancy (2000), Santa Margherita Ligure (2002), Vienna (2005), Liverpool (2007) and Trento (2009). In 2004, 2006, 2008 and 2010 FroCoS joined IJCAR, the International Joint Conference on Automated Reasoning. Like its predecessors, FroCoS 2011 offered a common forum for the presentation and discussion of research in the general area of combination, modularization and integration of systems, with emphasis on logic-based systems and their applications. This research touches on many areas of computer science such as computational logic, program development and verification, artificial intelligence, automated reasoning, constraint solving, declarative programming, and symbolic computation.

The Program Committee accepted 15 papers out of a total of 22 submissions. Each submission was reviewed by at least three Program Committee members or external reviewers. We thank all the reviewers for their work and all the members of the Program Committee for their careful and thoughtful deliberations.

In addition to the contributed papers, the program included three invited lectures, by Alessandro Artale (Free University of Bozen-Bolzano), Martin Lange (University of Kassel) and Tobias Nipkow (Technical University Munich), and an invited tutorial by André Platzer (Carnegie-Mellon University). We are grateful to the invited speakers not only for their interesting presentations, but also for contributing extended abstracts or full papers to the proceedings.

Many people and institutions contributed to the success of FroCoS 2011. We are indebted to the members of the Program Committee and to the additional referees for the thorough reviewing work, to the members of the FroCoS Steering Committee for their support, and to Andrei Voronkov for his indispensable EasyChair conference management system. We would also like to thank the Max Planck Institute for financial support and for providing the infrastructure. We are very grateful to Uwe Brahm, Manuel Lamotte, Jennifer Müller, Roxane Wetzel and Anja Zimmer for their help with the organization of the conference, and to Christoph Weidenbach for his support. Last, but not least, we thank all authors who submitted papers to FroCoS 2011 and all the symposium participants.

July 2011

Viorica Sofronie-Stokkermans
Cesare Tinelli

Organization

Program Committee

Franz Baader	TU Dresden, Germany
Clark Barrett	New York University, USA
Peter Baumgartner	NICTA, Australia
Torben Braüner	Roskilde University, Denmark
Thom Fruehwirth	University of Ulm, Germany
Silvio Ghilardi	University of Milan, Italy
Jürgen Giesl	RWTH Aachen, Germany
Valentin Goranko	Technical University of Denmark
Bernhard Gramlich	TU Wien, Austria
Sava Krstić	Intel Corporation, USA
Carsten Lutz	University of Bremen, Germany
Till Mossakowski	DFKI GmbH Bremen, Germany
Silvio Ranise	FBK-IRST, Italy
Christophe Ringeissen	LORIA-INRIA, France
Philipp Rümmer	Uppsala University, Sweden
Renate A. Schmidt	The University of Manchester, UK
Roberto Sebastiani	DISI, University of Trento, Italy
Viorica Sofronie-Stokkermans	MPI Informatik and University of Koblenz-Landau, Germany
Volker Sorge	University of Birmingham, UK
Cesare Tinelli	The University of Iowa, USA
Wolfgang Windsteiger	RISC, Johannes Kepler University, Austria
Frank Wolter	University of Liverpool, UK

Additional Reviewers

Blanchette, Jasmin Christian	Frigeri, Achille	Küsters, Ralf
Blanqui, Frederic	Genet, Thomas	Lohrey, Markus
Bruttomesso, Roberto	Goel, Amit	Maratea, Marco
Bursuc, Sergiu	Göller, Stefan	Marx, Maarten
Cortier, Veronique	Hadarean, Liana	Nipkow, Tobias
Deters, Morgan	Kahrs, Stefan	Papacchini, Fabio
Eggersglüß, Stephan	King, Tim	Saubion, Frédéric
	Kutsia, Temur	Tonetta, Stefano

Table of Contents

Invited Papers

Tailoring Temporal Description Logics for Reasoning over Temporal Conceptual Models 1
Alessandro Artale, Roman Kontchakov, Vladislav Ryzhikov, and Michael Zakharyaschev

Automatic Proof and Disproof in Isabelle/HOL 12
Jasmin Christian Blanchette, Lukas Bulwahn, and Tobias Nipkow

Size-Change Termination and Satisfiability for Linear-Time Temporal Logics 28
Martin Lange

Contributed Papers

Combining Theories: The Ackerman and Guarded Fragments 40
Carlos Areces and Pascal Fontaine

On the Undecidability of Fuzzy Description Logics with GCIs and Product T-norm 55
Franz Baader and Rafael Peñaloza

The Complexity of Reversal-Bounded Model-Checking 71
Marcello M. Bersani and Stéphane Demri

Expressing Polymorphic Types in a Many-Sorted Language 87
François Bobot and Andrei Paskevich

A Combination of Rewriting and Constraint Solving for the Quantifier-Free Interpolation of Arrays with Integer Difference Constraints 103
Roberto Bruttomesso, Silvio Ghilardi, and Silvio Ranise

Superposition Modulo Non-linear Arithmetic 119
Andreas Eggers, Evgeny Kruglov, Stefan Kupferschmid, Karsten Scheibler, Tino Teige, and Christoph Weidenbach

The Modal Logic of Equilibrium Models 135
Luis Fariñas del Cerro and Andreas Herzig

Harnessing First Order Termination Provers Using Higher Order Dependency Pairs 147
Carsten Fuhs and Cynthia Kop

Stochastic Local Search for SMT: Combining Theory Solvers with WalkSAT 163
Alberto Griggio, Quoc-Sang Phan, Roberto Sebastiani, and Silvia Tomasi

Controlled Term Rewriting 179
Florent Jacquemard, Yoshiharu Kojima, and Masahiko Sakai

Sharing Is Caring: Combination of Theories 195
Dejan Jovanović and Clark Barrett

Modular Termination and Combinability for Superposition Modulo Counter Arithmetic 211
Christophe Ringeissen and Valerio Senni

Congruence Closure of Compressed Terms in Polynomial Time 227
Manfred Schmidt-Schauss, David Sabel, and Altug Anis

Generalized and Formalized Uncurrying 243
Christian Sternagel and René Thiemann

A Semantic Account for Modularity in Multi-language Modelling of Search Problems 259
Shahab Tasharrofi and Eugenia Ternovska

Author Index 275