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Model Checking and Artificial Intelligence

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Preface

Model checking is a branch of software and hardware verification that involves developing algorithms for the automatic verification of systems. Originating from mathematical logic, “model checking” stands for the process of determining whether or not a formula of some logic is satisfied by a model for the logic. Initiated two and a half decades ago, with papers that have gained their authors the 2007 Turing award, this active research area has resulted in rich theory, and the development of a number of widely used model-checking tools. These include Carnegie-Mellon’s SMV, Cadence-SMV, and Bell Laboratories’ SPIN. Some of the main activities in model checking involve development of expressive specification formalisms, in particular, temporal logics, the modeling of systems, and finding efficient algorithms for automatically checking that a model of a system satisfies its temporal specification.

The success of model checking in the computer-aided verification community has led to a growth of interest in the use of model checking in AI. One common interest between these two fields is verification of autonomous systems. Logics for autonomous systems can express properties that are not commonly used for reactive systems, expressing properties related to the knowledge and belief of components (agents) of the system about other components. New model-checking algorithms, for such specification properties, are challenging and useful for various applications, including online auction mechanisms, which are embedded in various Internet services, and autonomous robots.

Conversely, results in AI are applicable for model checking. The main challenge in model checking is to address the time and space complexity of analyzing realistic systems. Thus, some AI heuristic search techniques can be used as a basis for model checking. SAT-solving is another interface between these two research areas; while being the focus of AI research for many years, a new model-checking technique called “Bounded Model Checking” makes use of it as a basis for faster analysis and for analyzing bigger systems.

The MOCHART workshop brings together both researchers in AI with an interest in model checking and researchers in model checking who are interested in AI techniques.

Previous editions of the workshop were held in Riva del Garda, Italy in 2006 (as a satellite workshop of ECAI), San Francisco in 2005 (as a satellite workshop of Concur), Acapulco in 2003 (as a satellite workshop of IJCAI03), and Lyon in 2002 (as a satellite workshop of ECAI02).

MOCHART 2008 was held as a satellite workshop of the ECAI 2008 conference.

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Table of Contents

Verifying Time and Communication Costs of Rule-Based Reasoners	1
<i>Natasha Alechina, Brian Logan, Nguyen Hoang Nga, and Abdur Rakib</i>	
Solving μ -Calculus Parity Games by Symbolic Planning	15
<i>Marco Bakera, Stefan Edelkamp, Peter Kissmann, and Clemens D. Renner</i>	
Verifying Robocup Teams	34
<i>Clara Benac Earle, Lars-Åke Fredlund, José Antonio Iglesias, and Agapito Ledezma</i>	
Scaling Search with Pattern Databases	49
<i>Stefan Edelkamp, Shahid Jabbar, and Peter Kissmann</i>	
Survey on Directed Model Checking (Invited Talk)	65
<i>Stefan Edelkamp, Viktor Schuppan, Dragan Bošnački, Anton Wijs, Ansgar Fehnker, and Husain Aljazzar</i>	
Automated Testing of Planning Models	90
<i>Klaus Havelund, Alex Groce, Gerard Holzmann, Rajeev Joshi, and Margaret Smith</i>	
Towards Partial Order Reduction for Model Checking Temporal Epistemic Logic	106
<i>Alessio Lomuscio, Wojciech Penczek, and Hongyang Qu</i>	
Model Checking Driven Heuristic Search for Correct Programs (Invited Talk)	122
<i>Gal Katz and Doron Peled</i>	
Experimental Evaluation of a Planning Language Suitable for Formal Verification	132
<i>Radu I. Siminiceanu, Rick W. Butler, and César A. Muñoz</i>	
Relaxation Refinement: A New Method to Generate Heuristic Functions (Invited Talk)	147
<i>Jan-Georg Smaus and Jörg Hoffmann</i>	
Model Checking Strategic Equilibria (Invited Talk)	166
<i>Nicolas Troquard, Wiebe van der Hoek, and Michael Wooldridge</i>	
Author Index	189