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Preface

Exploration of very large search spaces is at the heart of many disciplines of computer science and engineering, and formal verification and artificial intelligence in particular. On one hand, model checking (MC) is used to automatically verify logical properties over a model of a system, and MC procedures for many classes of models and logics of interest have been efficiently automated and successfully applied to a broad range of real-size applications in the last decade. These recent advances have led to a growth of interest in the use of MC principles and tools in Artificial Intelligence (AI). In the meantime, the AI community has had a long and impressive line of research in developing and improving search algorithms over very large state spaces under a broad range of assumptions. MC researchers are interested in leveraging this vast body of knowledge, as a way to mitigate the state-space explosion problem. Under a slightly different perspective, there is also a demand for innovative verification approaches, such as model checking, for AI applications. This is becoming a critical need, as AI technologies are increasingly considered for safety-critical applications such as space missions. AI software typically features unconventional architectures and requirements that ask for specific verification solutions. All these trends call for an increased dialogue between the AI and MC communities.

The purpose of the MoChArt workshop series is therefore to bring together researchers with an interest in both MC and AI. The goals are to tease out common themes and differences, identify common problems and their solutions, share experiences with the applicability of techniques from one field to problems from the other, and to identify the key issues to be addressed in increasing the convergence between MC and AI. The workshop welcomes submissions on all ideas, research, experiments and tools that relate to both MC and AI fields.

MoChArt '05 follows on two very lively and productive editions: MoChArt

'02 in Lyon (associated to ECAI) and MoChArt '03 in Acapulco (associated to IJCAI), both coupled to artificial intelligence conferences. This time, MoChArt '05 is co-located with two major international events in the field of formal verification: the 16th International Conference on Concurrency Theory (CONCUR 2005) and the 12th International SPIN Workshop on Model Checking of Software (SPIN 2005).

The nine papers selected for this third edition of MoChArt cater to different facets of the workshop's theme. The first four contributions propose different ways to improve the efficiency of exploring large state spaces, respectively using planning (Edelkamp and Jabbar), sequential partition of the state space (Kwon), symbolic encoding of and/or graphs (Qian and Nymeyer), and incremental state hashing (Mehler and Edelkamp). The next two contributions propose verification technology for generating controllers, using conversion of LTL to Büchi automata (Kerjean et al.) and using incremental real-time verification (Musliner et al.). The next two contributions have to do with game-theoretic and epistemic verification: the first one is a comparative study of epistemic temporal model checkers (van Ditmarsch et al.), the other proposes a probabilistic analysis for games (Ballarini et al.). The last paper discusses verification techniques used for diagnosability analysis (Lawesson et al.).

The workshop also features an invited presentation by Richard Korf on his recent work on searching very large spaces, based on his recent paper, *Large-Scale Parallel Breadth-First Search* (R. E. Korf and P. Schultze, AAAI Conference, 2005).

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