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EDITORIAL

Preface for the special issue for ATVA 2015

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This volume contains extended versions of selected papers presented at ATVA 2015, the 13th International Symposium on Automated Technology for Verification and Analysis, held during October 12–15, 2015, in Shanghai, China. ATVA is an international recognized conference, focusing on theoretical and practical aspects of automated analysis, verification, and synthesis by providing an international forum for interaction among researchers in academia and industry. ATVA 2015 had 95 regular and 13 tool submissions, with 33 papers accepted (six of them are tool papers). The program also included three invited talks and three invited tutorials given by Dino Distefano (Facebook and Queen Mary University of London), Martin Fränzle (Carl von Ossietzky University), Joost-Pieter Katoen (RWTH Aachen University), and J Strother Moore (University of Texas at Austin). After the conference, we invited the authors of a selection of the conference papers to submit extended versions for this special issue. The extended versions went through a separate reviewing process.

Below we give a short summary for each of the papers of this special issue.

- Looking at mean-payoff through foggy window by Paul Hunter, Guillermo Alberto Perez, Jean-François Raskin.

Mean-payoff games (MPGs) are two-player zero-sum games played with infinite duration on weighted graphs. It is well known that MPG admits memoryless optimal strategies for both players under full observation. However, for the partial-observation case, the problem is undecidable, namely deciding whether one player has an observation-based winning strategy that enforces a given threshold on the mean payoff. In this paper, the authors investigate the window mean-payoff objectives introduced recently as an alternative to the classical mean payoff objectives. They have proven that some of the window mean-payoff objectives are decidable in games with partial observation.

- TSO to TSO linearizability is undecidable by Chao Wang, Yi Lv, Peng Wu.

TSO-to-TSO linearizability is a variant of linearizability for concurrent libraries on the mainstream x86/TSO memory model. In this paper, the authors show that TSO-to-TSO linearizability for a bounded number of processes is undecidable. Additionally, they prove

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that all variants of history inclusion problems are undecidable on TSO for a bounded number of processes. Other relaxed memory models, such as the memory models of POWER and ARM, are much weaker than the TSO memory model. They conjecture that variants of linearizability on these relaxed memory models are also undecidable.

- Hierarchical information and the synthesis of distributed strategies by Dietmar Berwander, Anup Basil Mathew, and Marie van den Bogaard.

Infinite games with imperfect information are undecidable. One fundamental decidable case occurs when there is a total ordering among players in the game, such that each player has access to all the information that the following ones receive. In this paper the authors consider variations of this hierarchy principle for synchronous games with perfect recall, and identify new decidable classes for which the distributed synthesis problem is solvable with finite-state strategies. In particular, they show that decidability is maintained when the information hierarchy may change along the play, or when transient phases without hierarchical information are allowed. Finally, they interpret the result in terms of distributed system architectures.

- Spanning the spectrum from safety to Liveness by Orna Kupferman and Rachel Minkov.

In formal verification, safety specifications assert that the system stays within some allowed region, in which nothing "bad" happens. Classical investigated safety specification is binary: a specification is either safety or not safety. In this paper, the authors introduce a quantitative measure for safety. Intuitively, the safety level of a language L measures the fraction of words not in L that have a bad prefix–a prefix all whose extensions violate the specification. The authors formalize the notion of safety level and study the problem of finding the safety level of languages given by means of automata (deterministic and nondeterministic) as well as linear temporal logic formulas. They also study the problem of deciding their membership in specific classes (including safety, almost-safety, fraction-safety, etc.). Finally, the authors investigate properties of the different classes and the structure of deterministic automata for them.

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