

Special Issue on the 11th International Workshop on Reachability Problems (RP 2017)

Preface

The present special issue of *Fundamenta Informaticae* journal is devoted to the 11th International Workshop on Reachability Problems (RP 2017) held on September 7–9, 2017, at Royal Holloway, University of London, UK. The RP event aims to bring together researchers from a variety of disciplines who are interested in computational aspects of reachability problems, as they appear in algebraic structures, computational models, automata and formal languages, concurrent systems, computational games, hybrid systems, automated verification, etc. One of the goals of the conference is to promote exploration of new approaches to analysing the behaviour of computational processes by combining mathematical, algorithmic, and computational techniques. The first workshop on Reachability Problems was organized in Turku, Finland in 2007. In 2018 RP has been transformed into the annual International Conference on Reachability Problems and so far RP has been organized 14 times and located at: IRIF, University of Paris - virtually - (2020), Université libre de Bruxelles (2019), Aix-Marseille University (2018), Royal Holloway, University of London (2017), Aalborg University (2016), the University of Warsaw (2015), the University of Oxford (2014), Uppsala University (2013), the University of Bordeaux (2012), the University of Genoa (2011), Masaryk University Brno (2010), École Polytechnique (2009), the University of Liverpool (2008), and Turku University (2007).

Reachability is a fundamental problem in the context of computational models and physical processes. In general, the reachability problem can be formulated as follows – given a state space and a collection of transition functions, decide whether a certain set of target states is reachable from a given set of initial states. Often one considers reachability problems over infinite state spaces. Transition rules are specified in numerous ways, including via rewrite rules, affine maps, and differential equations.

Algorithmic solutions to reachability problems are typically based on combinations of exploration strategies, symbolic manipulations of sets of states, decomposition properties, reduction to optimisation problems and logical decision procedures. Such algorithms also benefit from approximations, abstractions, accelerations, and extrapolation heuristics. Ad hoc solutions, as well as solutions based on general-purpose constraint solvers and deduction engines, are often combined in order to balance efficiency and flexibility.

This volume contains six papers that were selected because of their overall quality and significance among 16 papers presented at the 11th International Workshop on Reachability Problems (RP 2017).

The papers of this special issue cover foundational and pragmatic aspects of reachability problems for probabilistic time automata and Büchi automata, complexity of the model-checking in higher-order modal fixpoint logic, safety verification and synthesis problems for real-time systems, partial order reduction methods for safety checking, analysis of copyful streaming string transducers in the context of their expressive power and decision problems.

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