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# Preface

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This special issue of Theory of Computing Systems consists of extended journal papers originally presented at the 9th International Computer Science Symposium in Russia (CSR 2014) held on June 7–11, 2014 in Moscow, Russia. The event was hosted by the Moscow Center for Continuous Mathematical Education and co-chaired by Nikolai K. Vereshchagin, Edward A. Hirsch, and Sergei O. Kuznetsov. Preliminary versions of these papers presented at the conference appear in LNCS 8476. The Program Committee, chaired by Jean-Éric Pin, invited several authors to submit extended journal versions of their papers to this special issue. All submissions were reviewed in accordance with customary high standards.

The CSR conference series is devoted to a broad scope of computer science topics. A short description of the contributions in this issue follows.

The paper *The Connectivity of Boolean Satisfiability: Dichotomies for Formulas and Circuits* by Konrad Schwerdtfeger (this paper received the *Best Student Paper* award at the conference) addresses the connectivity of the solution space of of Boolean circuits and formulas, in which gates are selected from a fixed set of Boolean functions. In particular, the paper establishes a connection between the diameter of the solution graph and the complexity of the connectivity problems.

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The paper *Space Saving by Dynamic Algebraization Based on Tree-Depth* by Martin Fürer and Huiwen Yu studies space efficient dynamic programming algorithms based on treewidth of graphs. They show how to use a tree decomposition and extend the algebraic techniques introduced earlier by Lokshtanov and Nederlof.

The paper *The Query Complexity of Witness Finding* by Akinori Kawachi, Benjamin Rossman, and Osamu Watanabe (this paper received the *Best Paper* award at the conference) concerns the number of queries to an unknown language required to produce a sample in this language with high probability. The authors prove upper and lower bounds for this problem in various settings.

The paper *Processing Succinct Matrices and Vectors* by Markus Lohrey and Manfred Schmidt-Schauß studies the complexity of matrix problems when the input is represented succinctly. Two ways of representing matrices are studied: multi-terminal decision diagrams and an extension of this model. Some of the problems happen to be polynomial-time solvable, some are complete for NP or #P.

The paper *The half-levels of the FO2 alternation hierarchy* by Lukas Fleischer, Manfred Kufleitner, and Alexander Lauser analyses the power of various fragments of first order logic to define regular languages. In particular, the authors consider the quantifier alternation hierarchy within the two-variable fragment of first-order logic and establish its decidability. Among other techniques, the proof relies on an extension of block products to ordered monoids.

The paper *Separation Logic with One Quantified Variable* by Stéphane Demri, Didier Galmiche, Dominique Larchey-Wendling, and Daniel Méry investigates first-order separation logic with one record field restricted to a unique quantified variable (1SL1). The authors show that the satisfiability problem for 1SL1 is PSPACE-complete and characterize its expressive power by showing that every formula is equivalent to a Boolean combination of atomic properties.

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