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Special Issue
Developments in Language Theory (DLT 2015)
Preface
Guest Editors

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This special issue of the International Journal of Foundations of Computer Science contains nine papers, which are revised and extended versions of the papers selected from the 19th International Conference on Developments in Language Theory (DLT 2015) that was organized by the University of Liverpool, UK, during July 27-30, 2015.

The DLT conference series is one of the major international conference series in language theory and related areas. The Developments in Language Theory (DLT) conference was established by G. Rozenberg and A. Salomaa in 1993. Since then, the DLT conferences were held in every odd year: Magdeburg, Germany (1995), Thessaloniki, Greece (1997), Aachen, Germany (1999) and Vienna, Austria (2001). Since 2001, a DLT conference takes place in Europe in every odd year and outside Europe in every even year. The locations of DLT conferences since 2002 were: Kyoto, Japan (2002), Szeged, Hungary (2003), Auckland, New Zealand (2004), Palermo, Italy (2005), Santa Barbara, California, USA (2006), Turku, Finland (2007), Kyoto, Japan (2008), Stuttgart, Germany (2009), London, Ontario, Canada (2010), Milano, Italy (2011), Taipei, Taiwan (2012). Marne-la-Vallée, France (2013), Ekaterinburg, Russia (2014).

The series of International Conferences Developments in Language Theory provides a forum for presenting current developments in formal languages and automata. Its scope is very general and includes, among others, the following topics and areas: combinatorial and algebraic properties of words and languages; grammars, acceptors and transducers for strings, trees, graphs, arrays; algebraic theories for automata and languages; codes; efficient text algorithms; symbolic dynamics; decision problems; relationships to complexity theory and logic; picture description and analysis; polyominoes and bidimensional patterns; cryptography; concurrency; cellular automata; bio-inspired computing; quantum computing.

This special issue contains selection of nine contributions selected from 31 papers originally presented at DLT 2015. The first one "Diverse Palindromic Factorization is NP-Complete" by Hideo Bannai, Travis Gagie, Shunsuke Inenaga, Juha Kärkkäinen, Dominik Kempa, Marcin Piątkowski and Shiho Sugimoto proves that it is NP-complete to decide whether a given string can be factored into palindromes that are each unique in the factorization.

In the next paper, "Consensus Game Acceptors" by Dietmar Berwanger and Marie Van Den Bogaard, the authors reveal a correspondence between iterated transductions and coordination games with imperfect information. They show that for the basic class of consensus acceptor games the set of winning strategies can be described as the transitive closure of the synchronous transduction that relates the observation histories of the players. The correspondence gives raise to a classification of consensus games in terms of context-sensitive and context-free languages.

In the third paper, titled "On The Size of Two-way Reasonable Automata for the Liveness Problem," Maria Paola Bianchi, Juraj Hromkovič and Ivan Kováč consider reasonable automata as a subclass of deterministic two-way automata, where each state is associated with a logical formula expressing some properties of the input word. They solve the liveness problem and show several lower and upper bounds with respect to the logic used for describing the meaning of the individual states.

The forth paper is "Finite Automata Over Infinite Alphabets: Two Models with Transitions for Local Change" by Christopher Czyba, Christopher Spinrath and Wolfgang Thomas. In it the authors consider two models of automata over infinite alphabets. They prove closure (and non-closure) properties, show the decidability of the respective non-emptiness problems, prove limits on decidability results for extended models, and discuss open issues in the development of a generalized theory.

This paper is followed by "On the Density of Context-Free and Counter Languages" by Joey Eremondi, Oscar Ibarra and Ian McQuillan, which studies dense languages. Here a language is called dense if every word in the universe is an infix of some word in the language. The authors determine decidability properties for whether or not a language is dense, depending on the machine model used to accept the language. In particular, this property is surprisingly decidable for one-way nondeterministic reversal-bounded pushdown automata.

Then Markus Holzer, Sebastian Jakobi and Martin Kutrib in "Minimal Reversible Deterministic Finite Automata" give a structural characterization of regular languages that can be accepted by reversible deterministic finite automata. Their characterization is based on the absence of a forbidden pattern in the minimal deterministic state graph. This forbidden pattern characterization gives rise to NL-complete decision algorithms.

In the next paper, "Multi-Sequential Word Relations" by Ismaël Jecker and Emmanuel Filiot, the authors consider relations, defined by finite state transducers, that are equal to a finite union of functions realised by sequential (input-deterministic) transducers. Such relations are called multi-sequential. They prove that given a transducer, deciding whether the relation defined by it is multi-

sequential can be done in polynomial time.

After that, Ines Klimann, Matthieu Picantin and Dmytro Savchuk prove in their paper that connected 3-state reversible Mealy automata cannot generate infinite Burnside groups (i.e. infinite finitely generated torsion groups). Their result relies on a fine analysis of associated orbit trees and a new characterization of the existence of elements of infinite order in automaton groups.

This issue concludes the paper "State Complexity of Neighbourhoods and Approximate Pattern Matching" by Timothy Ng, David Rappaport and Kai Salomaa, in which they show that the worst case state complexity of a radius r neighbourhood of a language recognized by an n-state deterministic finite automaton is $(r+2)^n - 1$. They also prove that the worst case state complexity for the set of strings that contain a substring within distance r from a string recognized by a given n-state deterministic finite automaton is $(r+2)^{n-2} + 1$.

We would like to thank all the reviewers of the papers submitted to this special issue for their precious comments. We also thank Oscar H. Ibarra, Chief Editor of IJFCS, for his help with the preparation of this special issue.