Editorial: Special Issue on “Theoretical Aspects of Computer Science” (STACS 2015)

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Published online: 23 June 2017

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This special issue of *Theory of Computing Systems* contains ten research articles which have grown out of talks presented at the 25th (= 32nd) Symposium on Theoretical Aspects of Computer Science (held March 4–7, 2015, in Garching near Munich, Germany). The STACS international conference series is dedicated to original research on theoretical aspects of computer science, with typical areas including algorithms and data structures, automata and formal languages, complexity theory, logic in computer science, and many new challenges from these directions. The contributions contained in this special issue have been selected based on their particular significance for the field, they have been extended and revised, and they have been again thoroughly reviewed by scientific peers (many thanks here to the anonymous referees, their expertise and also their endurance when going through several rounds of revision).

The ten articles in this issue are:

1. **Sayan Bhattacharya, Wolfgang Dvořák, Monika Henzinger, and Martin Starnberger:** Welfare Maximization with Friends-of-Friends Network Externalities
2. **Joan Boyar, Lene Favrholdt, Christian Kudahl, and Jesper W. Mikkelsen:** The Advice Complexity of a Class of Hard Online Problems
3. **Martin Delacourt and Benjamin Hellouin de Ménibus:** Characterisation of Limit Measures of Higher-dimensional Cellular Automata
4. **Andrew Goldberg, Sagi Hed, Haim Kaplan, and Robert Tarjan:** Minimum-Cost Flows in Unit-Capacity Networks
5. **Mathieu Hoyrup and Cristobal Rojas:** On the Information Carried by Programs about the Objects They Compute

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6. **Telikepalli Kavitha:** New Pairwise Spanners
7. **Neeraj Kayal and Chandan Saha:** Multi-k-ic Depth Three Circuit Lower Bound
8. **Jakub Łącki and Piotr Sankowski:** Optimal Decremental Connectivity in Planar Graphs
9. **Eva Rotenberg and Jacob Holm:** Dynamic Planar Embeddings of Dynamic Graphs
10. **Pascal Schweitzer:** Towards an Isomorphism Dichotomy for Hereditary Graph Classes

The articles 1, 4, 6, 8, 9, and 10 are, generally, from the Algorithmics area.

Bhattacharya et al. in their paper *Welfare Maximization with Friends-of-Friends Network Externalities*, the authors discuss online social networks, which allow the collection of large amounts of data about the influence between users connected by a friendship-like relationship. They consider Friends-of-Friends (2-hop) network externalities, and show, among other results, that welfare maximization is APX-hard.

The paper *Minimum-Cost Flows in Unit-Capacity Networks* by Goldberg et al. reports on an interesting unifying approach on a classical combinatorial optimization problem (soemwhat restricted).

Telikepalle Kavitha, in her paper *New Pairwise Spanners*, reports on new results on new efficient constructions of sparse pairwise spanners with small additive stretch.

The contribution *Optimal Decremental Connectivity in Planar Graphs* by Łącki and Sankowski presents (to constant resp. linear time) for queries regarding the dynamic connectivity information in undirected planar graphs, when edge deletions are allowed.

The paper *Dynamic Planar Embeddings of Dynamic Graphs* by Rotenberg and Holm addresses a similar problem area, concerning dynamic embeddings of (planar) graphs. where the authors present significant simplifications compared to earlier approaches.

In *Towards an Isomorphism Dichotomy for Hereditary Graph Classes*, by P. Schweitzer, the author develops some new techniques for the structural and algorithmic analysis of graphs, showing, in the end, that isomorphism of graphs of bounded generalized color valence can be solved in polynomial time.

In addition, and on the other hand, the articles 2, 3, 5, and 7 are more from the areas of Models of Computation and Verification.

In their paper *The Advice Complexity of a Class of Hard Online Problems*, the authors investigate the advice complexity of online problems. They define a new complexity class (AOC) and show first results on interesting members of this class.

The submission *Characterisation of Limit Measures of Higher-dimensional Cellular Automata* by Delacourt and Hellouin de Menibus significantly extends work reported on in STACS'2015. The authors show that the typical asymptotic behaviour of cellular automata of dimension ≥ 2 on random inputs is characterized in the same way as in the one-dimensional case (or for Turing machines).

In the paper *On the Information Carried by Programs about the Objects They Compute* by Hoyrup and Rojas, the authors show an exact relationship between Markov-computability and Type-2-computability. It concerns the question what

additional information a (finite) program provides as compared to the (in general infinite) object computed by the program.

Finally, in *Multi-k-ic depth three circuit lower bound* by Kayal and Saha, we return to a more combinatorial, though algebraic model of computation, viz. arithmetic circuits. The generalization introduced by the authors permits circuits of higher formal degree than before, and thus a larger class of polynomials. The main result is an exponential lower bound even for this larger class of circuits, truly asymptotic though (with the constant 2^{25} in the exponent)!

These ten contributions have been selected by the program committee of STACS'2015 to be included in this special issue of ToCS. I would like to thank very much all the members of the PC and the local organizing committee, in particular the co-chair of the conference Nicolas Ollinger from LIFO at Orléans, and also very much all the additional reviewers for this special issue. Finally, I would like to thank very much Alan Selman, for his guidance and his never-ending patience during the reviewing process for this special issue.

Garching, June 2017

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