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Algorithms and Complexity

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Aris Pagourtzis

National Technical University of Athens
Zografou, Athens
Greece

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Preface

This volume contains the papers selected for presentation at CIAC 2017, the 10th International Conference on Algorithms and Complexity, held at the National Technical University of Athens, Greece, during May 24–26, 2017. This series of conferences presents original research contributions in the theory and applications of algorithms and computational complexity.

The volume begins with abstracts of the invited lectures, continues with contributed papers, arranged alphabetically by the last names of their authors, and concludes with an article devoted to the celebration of the 70th birthday of Stathis Zachos. The volume contains 36 accepted papers, selected by the Program Committee from 90 submissions received. Each submission was reviewed by at least three Program Committee members. Paper selection was based on originality, technical quality, and relevance.

We thank all the authors who submitted papers, the members of the Program Committee, and the external reviewers who assisted the Program Committee in the evaluation process. We are grateful to the three invited speakers, Giuseppe Italiano (Università di Roma “Tor Vergata”, Italy), Klaus Jansen (University of Kiel, Germany), and Christos Papadimitriou (University of California at Berkeley, USA), who kindly accepted our invitation to give plenary lectures at CIAC 2017.

Springer sponsored a CIAC 2017 best paper award, which was shared by two papers: one by Hans L. Bodlaender and Tom C. van der Zanden on “Improved Lower Bounds for Graph Embedding Problems” and the other by Robert Bredereck, Christian Komusiewicz, Stefan Kratsch, Hendrik Molter, Rolf Niedermeier, and Manuel Sorge on “Assessing the Computational Complexity of Multi-Layer Subgraph Detection.” Our warmest congratulations to all of them for these achievements! We also thank the members of the Best Paper Award Committee for selecting these papers.

We gratefully acknowledge the support from the National Technical University of Athens and its School of Electrical and Computer Engineering, the Institute of Communications and Computer Systems, Springer, and the European Association for Theoretical Computer Science (EATCS).

We would also like to thank Euripides Markou, Ioannis Milis, Dimitris Sakavalas, and Vassilis Zissimopoulos, who served in the Organizing Committee, as well as the local Arrangements Committee, and in particular, Alexandros Angelopoulos, Antonis Antonopoulos, Aggeliki Chalki, Eleni Iskou, Stratis Skoulakis, and Lydia Zakynthinou for their active participation in several organization tasks.

March 2017

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Invited Talks

TFNP: An Update

Paul W. Goldberg¹ and Christos H. Papadimitriou²

¹ University of Oxford, Oxford, UK

paul.goldberg@cs.ox.ac.uk

² University of California at Berkeley, Berkeley, USA

christos@cs.berkeley.edu

Abstract. The class TFNP was introduced a quarter of a century ago to capture problems in NP that have a witness for all inputs. A decade ago, this line of research culminated in the proof that the NASH equilibrium problem is complete for the subclass PPAD. Here we review some interesting developments since.

2-Edge and 2-Vertex Connectivity in Directed Graphs

Giuseppe F. Italiano

University of Rome Tor Vergata, Italy
giuseppe.italiano@uniroma2.it

Abstract. We survey some recent results on 2-edge and 2-vertex connectivity problems in directed graphs. Despite being complete analogs of the corresponding notions on undirected graphs, in digraphs 2-vertex and 2-edge connectivity have a much richer and more complicated structure. It is thus not surprising that 2-connectivity problems on directed graphs appear to be more difficult than on undirected graphs. For undirected graphs it has been known for over 40 years how to compute all bridges, articulation points, 2-edge- and 2-vertex-connected components in linear time, by simply using depth-first search. In the case of digraphs, however, the very same problems have been much more challenging and required the development of new tools and techniques.

New Algorithmic Results for Bin Packing and Scheduling

Klaus Jansen

Institut für Informatik, Christian-Albrechts-Universität zu Kiel,
24098 Kiel, Germany
kj@informatik.uni-kiel.de

Abstract. In this paper we present an overview about new results for bin packing and related scheduling problems. During the last years we have worked on the design of efficient exact and approximation algorithms for packing and scheduling problems. In order to obtain faster algorithms we studied integer linear programming (ILP) formulations for these problems and proved structural results for optimum solutions of the corresponding ILPs.

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