Theory of Computing Systems (2021) 65:901–902
https://doi.org/10.1007/s00224-021-10052-x

Preface

Evripidis Bampis[1] **· Nicole Megow**[2]

Accepted: 24 June 2021 / Published online: 14 July 2021

The Special Issue *Approximation and Online Algorithms* focuses on the design and analysis of algorithms for online and computationally hard problems. Approximation algorithms deal with computationally hard problems in a context where complete information is available. Online algorithms deal with problems where the information arrives over time, or more generally, when the algorithm operates under some state of uncertainty. Both types of algorithms have been extensively studied in the literature and have provided many new exciting theoretical and practical contributions.

This special issue of *Theory of Computing Systems* is devoted to selected extended abstracts that were presented at the 17th Workshop on Approximation and Online Algorithms (WAOA 2019), which took place in Munich, Germany, from September 12th to September 13th, 2019. Out of 38 submitted papers, 16 were accepted for presentation at the workshop. The program committee invited the authors of the five best papers to write expanded and revised versions of their papers and to submit them to the special issue. Each one of these papers underwent a rigorous reviewing process, in accordance with the high standards of this journal.

The five selected papers address fundamental topics related to approximation and online algorithms. The diversity of the particular topics, including scheduling, packing, routing and network design, reflects the wide range of problems in which methods from approximation and online algorithms are relevant.

This article belongs to the Topical Collection: *Special Issue on Approximation and Online Algorithms (2019)*
Guest Editors: Evripidis Bampis and Nicole Megow

✉ Evripidis Bampis
evripidis.bampis@sorbonne-universite.fr

Nicole Megow
nicole.megow@uni-bremen.de

[1] Sorbonne Université, CNRS, LIP6 UMR 7606, 4 place Jussieu, 75005 Paris, France

[2] University of Bremen, Faculty of Mathematics and Computer Science, Bibliotheksstr. 5, 28359 Bremen, Germany

In their article *Approximation results for makespan minimization with budgeted uncertainty*, Bougeret, Jansen, Poss and Rohwedder, study approximation algorithms for the robust scheduling problem of minimizing the makespan on a set of machines with uncertainty on the processing times of jobs. They consider both, identical and unrelated machines, and propose approximation and inapproximability results.

Cormode and Veselý consider in their contribution *Streaming Algorithms for Bin Packing and Vector Scheduling* problems involving the efficient arrangement of simple objects, as captured by bin packing and makespan scheduling. They investigate a streaming model of computation, where the aim is to approximate the cost of the solution in one pass over the data, using small space. They propose streaming approximation algorithms for bin packing and vector bin packing problems. They also construct an input summary for the related vector scheduling problem.

In their work entitled *Managing Multiple Mobile Resources*, Feldkord, Knollmann, Malatyali and Meyer Auf der Heide extend the Mobile Server Problem, to a model where k identical mobile resources, named servers, answer requests appearing at points in the Euclidean space. They prove impossibility results for the general case of their model and propose lower bounds for a case where the power of the adversary is restricted. Furthermore, they present a deterministic online algorithm with bounded competitiveness when augmented moving distance and locality of requests is assumed.

Finding better approximation algorithms for the Cactus Augmentation Problem is a known open problem. Gálvez, Grandoni, Jabal Ameli and Sornat, are making a first significant step in their paper entitled *On the Cycle Augmentation Problem: Hardness and Approximation Algorithms*. They consider the special case where the input cactus consists of a single cycle, namely the Cycle Augmentation Problem (CycAP) and they are able to show that it is APX-hard. They also present an approximation algorithm for CycAP, as well as an LP formulation with a matching integrality gap.

In their paper *Greedy is Optimal for Online Restricted Assignment and Smart Grid Scheduling for Unit Size Jobs*, Liu, Liu and Wong study online scheduling of unit-sized jobs in two related problems, namely, the restricted assignment problem and the smart grid problem. They show that the greedy algorithm is an optimal online algorithm for both problems.

We would like to thank the authors for their interesting contributions and the referees for their valuable reports. We also thank the members of the Program Committee of the workshop and the members of the TOCS editorial office for the efficient cooperation when preparing this special issue.

Evripidis Bampis and Nicole Megow, Guest Editors, February 2021