



Special issue on algorithmic game theory (SAGT 2019)

Dimitris Fotakis¹ · Evangelos Markakis²

Accepted: 25 May 2022 / Published online: 14 June 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

The Symposium on Algorithmic Game Theory (SAGT) is a well-established annual event, aiming to bring together researchers from Computer Science, Economics and Mathematics, and to present original research at the intersection of Algorithms and Game Theory. This volume contains the expanded versions of eight selected papers from the 12th edition of SAGT, which was held in Athens, Greece, from September 30 till October 3, 2019.

The following eight papers, which were invited for submission to the special issue, were among the best papers of the conference. The expanded versions of these papers have been rigorously reviewed according to the high standards of the journal.

- *On the Computational Complexity of Decision Problems about Multi-Player Nash Equilibria*, by Marie Louisa Tolboll Berthelsen and Kristoffer Arnsfelt Hansen, which revisits several decision problems for multi-player games and shows that computationally, they are at least as hard as the decision problem for the existential theory of the reals.
- *The Declining Price Anomaly Is Not Universal in Multi-Buyer Sequential Auctions (but almost is)*, by Vishnu V. Narayan, Enguerrand Prebet and Adrian Vetta, which studies the declining price anomaly, i.e., that the price weakly decreases when multiple copies of an item are sold sequentially over time, and shows that the anomaly is not guaranteed in full-information first-price or second-price

✉ Dimitris Fotakis
fotakis@cs.ntua.gr

✉ Evangelos Markakis
markakis@gmail.com

¹ School of Electrical and Computer Engineering, National Technical University of Athens, Athens, Greece

² Department of Informatics, Athens University of Economics and Business (AUEB), Athens, Greece

sequential auctions with three or more buyers. This paper received the *SAGT 2019 best paper award*.

- *Risk-Free Bidding in Complement-Free Combinatorial Auctions*, by Vishnu V. Narayan, Gautam Rayaprolu and Adrian Vetta, which obtains bounds on profit guarantees for a bidder in a combinatorial auction against individually rational bidders. The main results of the paper concern fractionally subadditive (XOS) bidders in sequential and simultaneous auctions under both the first and second price rule for each item.
- *Risk-Robust Mechanism Design for a Prospect-Theoretic Buyer*, by Siqi Liu, J. Benjamin Miller and Alexandros Psomas, which studies revenue maximization in a setting with heterogeneous items, whose values are drawn from known distributions, where the seller is risk-neutral and there is a single additive buyer that is not risk-neutral. The main result is that a simple and risk-agnostic mechanism, namely the better of selling separately or pricing only the grand bundle, is a good approximation to three natural classes of optimal non-agnostic mechanisms.
- *Maximum Stable Matching with One-Sided Ties of Bounded Length*, by Chi-Kit Lam and Gregory Plaxton, which studies the problem of finding weakly stable matchings in the presence of one-sided ties of bounded length. The paper obtains an algorithm whose approximation ratio is dependent on the maximum tie length.
- *On the Existence of Three-Dimensional Stable Matchings with Cyclic Preferences*, by Chi-Kit Lam and Gregory Plaxton, which shows that contrary to published conjectures, weakly stable three-dimensional matchings need not exist. Moreover, the paper shows that determining the existence of weakly stable three-dimensional matchings is NP-complete.
- *Obvious Strategyproofness, Bounded Rationality and Approximation*, by Diodato Ferraioli and Carmine Ventre, which suggests a relaxed definition of obvious strategyproofness, that accommodates for agents less restricted in terms of rationality, and investigates the trade-off between approximation and agents' rationality for the problems of machine scheduling and facility location. The main result is that reasonable approximations are possible if and only if the agents' rationality allows for a significant number of contingencies to be considered.
- *Impartial Selection with Additive Approximation Guarantees*, by Ioannis Caragiannis, George Christodoulou and Nicos Protopoulos, which considers the problem of selecting a winner out of a nomination profile, under impartiality constraints. The main results of the paper involve additive approximation guarantees of impartial algorithms against the optimal solution.

We are largely indebted to all authors that contributed to the success of both the SAGT conference and this special issue. Our warmest thanks goes to all of them.

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.