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Preface to Special Issue on Algorithmic Game Theory

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This special issue contains ten expanded papers from the 7th and 8th Symposia on Algorithmic Game Theory (SAGT), which took place in Patras, Greece, in September 2014, and Saarbrücken, Germany, in September 2015. The purpose of SAGT is to bring together researchers from computer science, economics, and mathematics to present and discuss original research at the intersection of algorithms and game theory.

The papers invited to this special issue were among the best papers in the conferences. They have undergone multiple rounds of a rigorous reviewing process, according to the usual high journal standards. Various central aspects of the field of algorithmic game theory are covered in this issue: price of anarchy, mechanism design and auctions, matching under preferences, and other issues related to classic game theory.

- Three papers study *price of anarchy* problems. The paper "Profit Sharing with Thresholds and Non-monotone Player Utilities", by Anshelevich and Postl, studies Strong Price of Anarchy in resource selection games when player utilities might be non-monotone and when various coalitional constraints are present (like a restricted ability to join or leave a coalition). The paper "Welfare guarantees for proportional allocations", by Caragiannis and Voudouris, shows that the Price of Anarchy in proportional allocation games for a single resource is at least 0.5,

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for coarse-correlated and Bayes-Nash equilibria in the full and incomplete information settings, respectively. The paper "On the Efficiency of the Proportional Allocation Mechanism for Divisible Resources", by Christodoulou, Sgouritsa, and Tang, generalizes and extends previous results that assume a single resource and/or complete information to the case of multiple resources with incomplete information.

- Three papers study *mechanism design and auctions*. The paper "Efficient Money Burning in General Domains", by Fotakis, Tsipras, Tzamos, and Zampetakis, studies a general mechanism design setting where the objective is to maximize the so-called residual surplus, which is the total value of the outcome minus the payments charged to the agents. The paper describes randomized truthful mechanisms that obtain an $O(\log m)$-fraction of the maximum social surplus as residual surplus. The paper "Towards More Practical Linear Programming-based Techniques for Algorithmic Mechanism Design", by Elbassioni, Mehlhorn, and Ramezani, shows how to obtain truthful-in-expectation mechanisms using the fast multiplicative-weights update method. The paper "Prediction and Welfare in Ad Auctions", by Sundararajan and Talgam-Cohen, studies how the social efficiency of standard sponsored search auctions is affected by better prediction (machine learning) algorithms.
- Two papers study *matching under preferences*. The paper "Stable marriage with general preferences", by Farczadi, Georgiou, and Könemann, proposes a generalization of the classical stable marriage problem, in which the preferences on one side of the partition are given in terms of arbitrary binary relations, which need not be transitive nor acyclic. The paper "Pareto Optimal Matchings in Many-to-Many Markets with Ties", by Cechlarova et al., considers Pareto-optimal matchings in a many-to-many market of applicants and courses where applicants have preferences over individual courses and lexicographic preferences over sets of courses. The paper unifies and generalizes several known results for many special cases.
- Two papers study *issues related to classic game theory*. The paper "When Can Limited Randomness Be Used in Repeated Games?", by Hubacek, Naor, and Ullman, study how many random bits are needed for the existence of mixed Nash equilibria in finitely repeated games, motivated by the observation from theoretical computer science that true unlimited randomness is hard to obtain. The paper "Network Characterizations for Excluding Braess's Paradox", by Chen, Diao, and Hu, characterizes the topologies of k-commodity undirected and directed networks in which Braess's paradox never occurs.

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