

Modern Topics in Algorithms: Game Theory

Chien-Chung Huang and Kurt Mehlhorn

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Synopsis

This seminar course focuses on algorithmic game theory. In game theory, we study collective human behavior by means of mathematical models. The basic assumption is that each person is rational and acts selfishly. We are interested in investigating the social outcome when a (large) number of players behave selfishly. Besides the obvious applications in large-scale networks and the online auction, the subject matter itself is of interest to theoretical computer scientists, who often study it with an algorithmic viewpoint.

This seminar will be based on a recent book of Nisan, Roughgarden, Tardos and Vazirani and will cover the following topics:

1. Efficiency of Equilibria
 - (a) Routing Games (Chap 17,18)
 - (b) Potential Games (Chap 19)
 - (c) Selfish Load Balancing (Chap 20)
2. Mechanism Design
 - (a) Combinatorial Auctions (Chap 11)
 - (b) Profit Maximization (Chap 13)
 - (c) Resource Allocation Mechanisms (Chap 21)