Networking games and applications

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The recent years have been remarkable for a technological breakthrough in the analysis of the virtual information world. In terms of game theory, all participants of the Internet and mobile communication networks are interacting players who receive and transmit information by appropriate data channels. Each player pursues individual interests, acquiring some information or complicating this process. For example, in routing games the players choose data channels, which have limited capacity. As a result, jamming occurs in networks, causing interesting effects and even paradoxes such as the well-known Braess's paradox. The players need high-capacity channels, and the channel distribution problem arises naturally in the case of numerous players. Game-theoretic methods are of assistance here.

The global control of the Internet turns out to be impossible. One may speak about distributed control of the network where each user manages his traffic to maximize his utility or the amount of information or to minimize delays. In this context, we consider a series of problems such as optimal routing, transportation games, behavioral equilibrium, analysis of social networks, comparison of selfish and cooperative behavior (Price of anarchy) and the problems of appropriate management. These problems can be solved using noncooperative game theory methods.

The theme of the course is devoted to discussion of new results in this direction, mostly, game-theoretic methods in networks.