Strategic Games as a Tool to Analyze Social Networks

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Strategic games are used to analyze situations in which simultaneous decisions of a group of agents (players) affect everybody in the group. Such games can capture many natural situations. The most famous example is the Prisoner's Dilemma game that shows the inherent conflict between social and private benefits. The main results by John Neumann and John Nash focused on the concept of an equilibrium, a situation in which each player is satisfied with the decision he/she took.

In this lecture we introduce briefly the main concepts and results of strategic games and explain how they can be used to analyze interactions within social networks. We show that the resulting games may have no Nash equilibrium. In fact, determining an existence of a Nash equilibrium is NP-complete.

Further, we exhibit in this framework some paradoxes. One of them allows us to explain `bubbles' in a financial market, in which a decision of a trader to switch to some new financial product triggers a sequence of transactions, as a result of which all traders involved become worse off.

Based on joint works with Evangelos Markakis and Sunil Simon.