“Human matching behavior in social networks: an algorithmic perspective”

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In this talk we argue for an algorithmic approach to understanding the collective dynamics of human behavior. We consider the distributed game of pairing up individuals connected over a network of social contacts. Our experimental set-up is simple. Individuals are represented by nodes of a network with edges representing potential matches. They are connected over a virtual network and interact with their neighbors through a computer interface. They are given only local information about the network, and can only communicate with their immediate neighbors. They have the shared goal of maximizing the total number of matches in the network. We have conducted over 200 experiments with human subjects on a pool of over 50 networks with up to 24 nodes each. From a first set of experiments we identify a behavioral principle called ``prudence'' and develop an algorithmic model to analyze its properties mathematically and by simulations, and finally validate the model with additional human subject experiments for various network sizes and topologies. We show that the human subjects largely abide by prudence and their collective behavior is closely tracked by the predictions of the mathematical model. Hence, we argue that 1) observational data collected from experiments on human subjects interacting using a simple computer interface can be useful to uncover basic behavioral properties such as prudence, that may not be apparent from the more classic approach of off-line surveys; and 2) algorithmic modeling and the mathematical analysis of algorithms can be a useful tool to systematically predict aggregate social behavior and the dynamics of coordination over social networks. Possible extensions of this work to hybrid computer-human networks, preferential goals, and incentive mechanisms will be discussed.

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