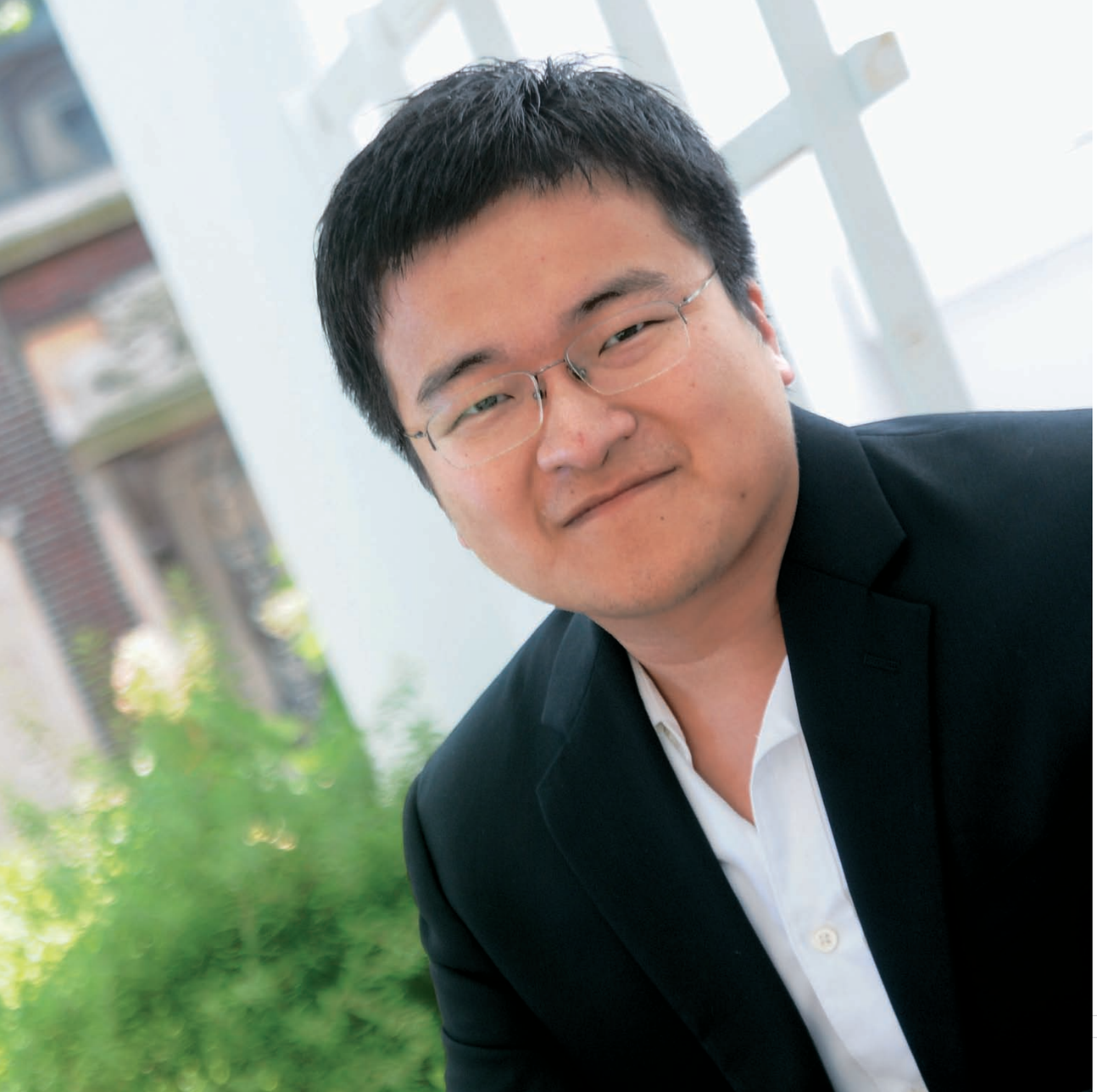

Using Game Theory to Study the Internet and E-Commerce

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The underlying impetus to every human interaction is competition, which, in turn, affects our decision making. As individuals, we decide how fast we drive in a specific lane of a highway, alongside other drivers, in order to get to a desired destination at a particular time. In business, a board of directors undertakes merger negotiations with another corporate entity in order to achieve an outcome that is profitable for their shareholders. Governments negotiate diplomatically in order to achieve economic and political benefits. In all these interactions, the need to make good decisions is important. To make good decisions, we need to understand how outside influences impact the process.

Game theorists have traditionally applied mathematics to help understand the competitive behavior of rational agents and the decision-making process in the context of economic systems. It's an area of study that is highly valued: eight game theorists have won Nobel Prizes in economics.

In the past decade, computer scientists have witnessed numerous applications of game theoretic approaches and concepts in the study of the Internet and e-commerce, where an absence of central authority opens a new frontier in understanding decision making. Much interest has centered around the new and rapidly growing field called algorithmic game theory. This theory lies at the intersection of computer science, mathematical economics, game theory, and operations research, and examines new and classic game theoretic models through the lens of computation. The goals of algorithmic game theory are to understand and even predict the behavior of selfish agents in order to make Internet-based applications more successful.

Xi Chen studies algorithmic game theory and theoretical computer science with an emphasis on natural and fundamental computational problems that arise from the game-theoretic study of Internet, e-commerce, and other decentralized systems. His current research examines algorithmic issues related to some of the most classic and fundamental models in game theory and economics, and seeks to understand and characterize the intrinsic difficulties in the computation of classical solution concepts in game theory and economics. He is especially interested in how social influence can change the computational landscape of market equilibrium problems.

Chen has won awards for his work on the computation of Nash equilibria and on the computation of market equilibria.

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