Multiagent Learning: A Game Theoretic Perspective

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What is Multiagent Learning?
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What is Game Theory?

- Game Theory = The Theory of Strategic Interaction.
  - *Interaction* means **multiple agents**.
  - *Strategic* means the agents are **goal driven**.
“Game theory is for doing theory not for playing games.” (Reinhard Selten, 1975)

“When economists say that the evidence is mixed, they often mean that the theory says one thing and the data something else.” Richard Thaler.
Why Game Theory? – Good News

“Of course, game theory is now widely applied not only in biology and economics, but in anthropology, political science, sociology, and social psychology as well.” (Gintis, 2000)

“High-rationality solution concepts in game theory can emerge in a world populated by low-rationality agents.” (Young, 1998)

“Stochastic game theory: for playing games not just for doing theory.” (Goeree and Holt, 1999)
“...we do not generally have the luxury of assuming rationality – it is our burden to explain how to realize approximately rational behaviors in operational computational terms.” (Boutilier, Shoham, and Wellman, 1997)
A Game Theoretic Perspective?

- Use models and concepts from game theory.
- Build learning systems that exhibit game theoretically justified behavior.
Outline

A. Introduction

B. Single Agent Learning

C. Game Theory

D. Multiagent Learning

E. Future Issues and Open Problems