

Multiagent Learning: A Game Theoretic Perspective

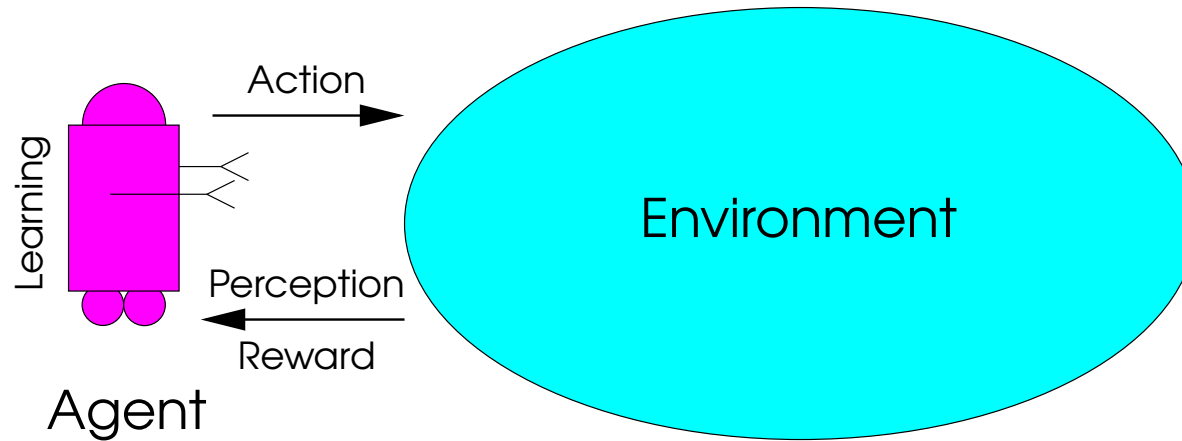
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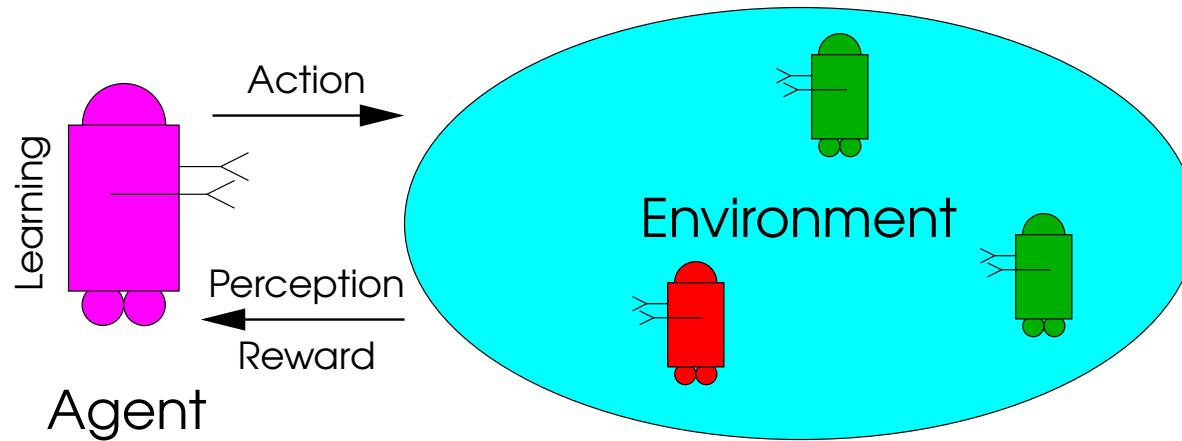
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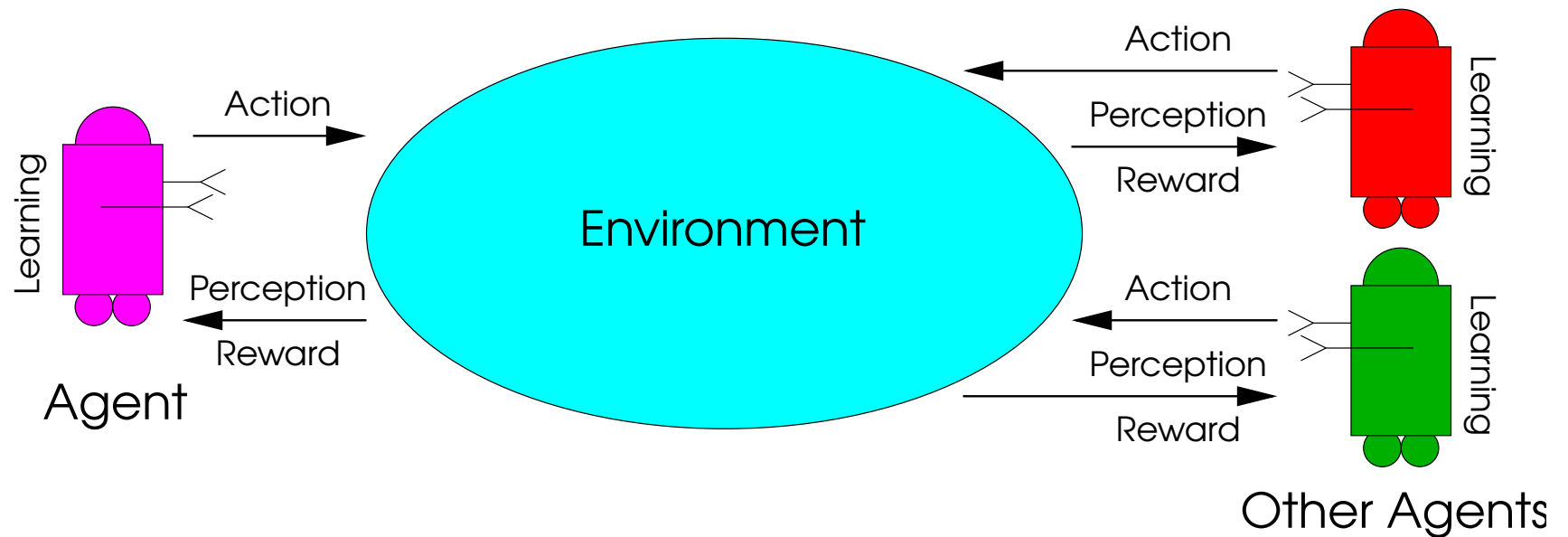
What is Multiagent Learning?



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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.

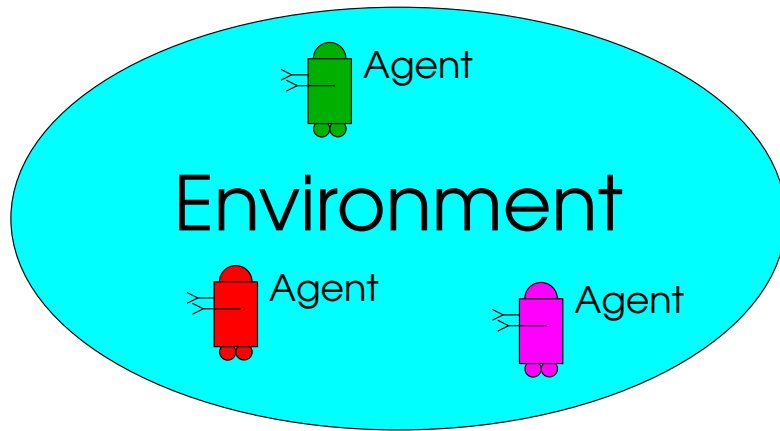
Why Game Theory? – Bad News

- “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.

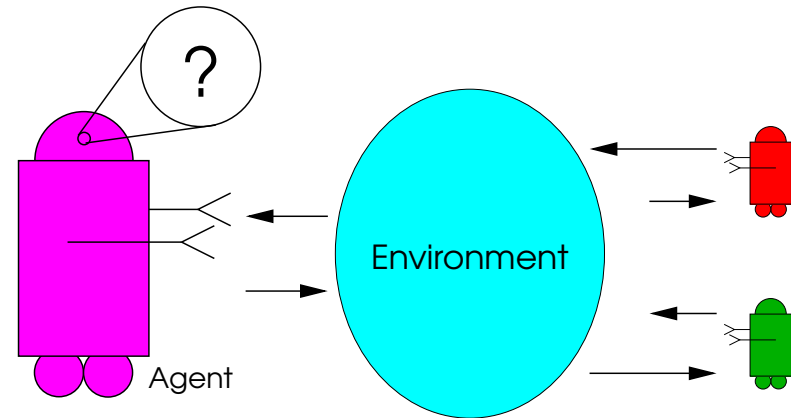
Why Game Theory? – Good News

- “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)

A Game Theoretic Perspective?



Game Theory



Multiagent Learning

- “... 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