Autonomous Multiagent Systems

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Week 4, Thursday (9/19)

Any Questions?

Overview of the Readings

- Sycara: Multiagent Systems – an overview
  - Stone and Veloso: another overview focussed on ML (optional)
- Mataric: Pushing Brooks' approach to MAS
- CMUnited-98 champion team – skills

Organizations

- Hierarchy
- Community of Experts
- Market
- Scientific community

When would you use market vs. hierarchy?

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Conflicts, Resources

- Omniscience for one agent creates bottleneck
- Self-interested agents: each agent maximizes own local utility
  - Will that be good for global performance? (invisible hand)
  - Pitfall: tragedy of the commons
  - Pitfall: no stability
  - Pitfall: lying
- Market-based methods/auctions
- Negotiation, game theory

Negotiation

- Example: Split the dollar
  - One person makes an offer
  - Other accepts or rejects
  - If rejects, both get nothing

Negotiation

- Example: Split the dollar
  - One person makes an offer
  - Other accepts or rejects
  - If rejects, both get nothing
- Another version
  - One person makes an offer
  - Other accepts, rejects, or counters
  - If counters, $.05 lost
  - Game ends with an accept or reject

Multiagent Planning

- Complex individual agents
- Teamwork modeling
  - Modeling of teammates and opponents
- Recent: emphasis on flexibility in dynamic environments

Communication

- Middle agents (brokers)
- Standard languages
- Ontologies

$\boxed{\text{More next week}}$

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Mataric: Adaptive Group Behavior

- Built using subsumption architecture
- More complex behaviors than in Brooks' article
  - Multiagent

Basis Behaviors

- Necessary and sufficient, not “optimal”
  - Task dependent
  - Combinations: complementary, contradictory
- Example: locomotion
  - Safe-wandering, following, dispersion, aggregation, homing
  - Purely reactive?
  - Anything special about this domain? Or could it apply just as well to others?
  - What 2 multiagent architecture does she compare?