CS378
Autonomous Multiagent Systems
Spring 2005

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Week 5b: Thursday, February 17th

Good Afternoon, Colleagues

Are there any questions?

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- Persistent vs. normal weak achievement goals

Logistics

- Programming assignment 4 - any questions?

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- Scheduled exam time: Friday 5/13, 2–5pm

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- CMU Roadshow: Monday 2/21, 5pm (refreshments 4:30)

Soccer server communication

- What is the soccer server communication protocol?
- Does an ACL make sense in the soccer server? If so, under what circumstances?

An example protocol

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- Attempt to program common sense

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- Potential applications?
  - Some listed on their web site
  - Question answering, retrieval of captioned information, machine translation, speech recognition, semantic data mining, . . .

Joint Intentions – Setting

How agents **form and disband** teams

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How agents **form and disband** teams

- Agents in dynamic multiagent world
- Neither complete nor correct beliefs
- Changeable goals, fallible actions
- Don't know others' beliefs/goals

Starting Point – Individuals

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- What's the role of q?

- What's the difference between goal, intention?

2 proposals for teams

Joint commitment not just intention where agent is team

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Weak: Joint intention $\equiv$ mutually known intention: each intend to do their part of collective action

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Why too weak and too strong?

Joint Commitment

Weak achievement goal (WAG): relative to q *with respect to a team* to achieve p

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Weak achievement goal (WAG): relative to q *with respect to a team* to achieve p

- Individually wants p
  OR
- Believes p true, impossible, or irrelevant, AND has a goal of team knowing it.

4 cases

Joint Commitment

Joint Persistent Goal (JPG): relative to q to achieve p

- mutually believe p false, but mutually know all desire p true
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- Overhead: automatic goal to communicate status

Establishing JPGs

- Communication (basis for KQML)
- Observation (requires co-presence)

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- Communication (basis for KQML)
- Observation (requires co-presence)
- Any other way?

{Per,Il}locution - p.14

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Perlocution: Intended effects

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Locution: What is said (physical)

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Perlocution: Intended effects

Example: "Please close the window."

Beliefs, Desires, Intentions

- Beliefs: What the agent thinks to be true
- Desires: What it wants to be true
- Intentions: What it plans to do

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- A way of organizing an agent
- Not a well-defined method

Discussion

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- Agree or disagree?

STEAM

- An implementation/extension of joint intentions
- Goals
  - Anticipate teamwork failures
  - Flexibility and re-use

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- Goals
  - Anticipate teamwork failures
  - Flexibility and re-use
- Joint intentions doesn't do it all, though
  - Coherence: all use same plan, commitment protocols
  - Communication cost — decision theoretic
  - Replanning — role dependencies

Team Operators

- Have preconditions, effects, termination rules
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Domains

- Attack:
  - Fly to holding point
  - Send out scouts
  - Shoot at enemy
- Transport:
  - Escorts protect transports
- RoboCup

Observed Problems

- Commander returns to home alone after failing, others stayed

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Solved generally with STEAM

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- STEAM rules can be re-used
- Flexibility: solves initial problems, can deal with small changes to environment
- Communication efficiency
- Encoding and modification effort