

CS344M

Autonomous Multiagent Systems

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Good Afternoon, Colleagues

Are there any questions?

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- Why have ACL?
- How is a conversation policy implemented?
- Standards for communication today?
- How is second paper relevant to RoboCup?
- How does second paper deal with subgoalings?
- Do teams try and understand other team's messages?
- Can you interrupt other team's communication?

Logistics

- Programming assignment 4 - any questions?

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- Week 5 readings – choose 2 papers and one team description paper

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An example protocol

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
 - Positive introspection: know own 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 achievement goal (WAG): relative to q *with respect to*
a team to achieve p

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

4 cases

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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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- Observation (requires co-presence)
- Any other way?

{Per,Il}locution - p.14

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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

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
- Automatically establish joint intentions

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- Have preconditions, effects, termination rules
- Automatically establish joint intentions
- To establish, “all team members must simultaneously select” a team operator to establish a joint intention
- Agents maintain “team state:” model of team’s mutual beliefs

Domains

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

Observed Problems

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Solved generally with STEAM

Work on learning languages

- Evolving language for predator-prey domain (Jim and Giles)
- Work by Luc Steels group

Activity: Sort yourselves alphabetically by last name

- No verbal or written language is allowed (including typing something).
- Any form of gesturing is OK, except for “skywriting” or writing with one’s finger.
- Other ways of conveying characters are OK.
- All other forms of communication are allowed, be creative.