Week 8b: Thursday, March 11th
Good Afternoon, Colleagues

Are there any questions?
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• Belief/Desire/Intention-accessible?
Good Afternoon, Colleagues

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- Belief/Desire/Intention-accessible?
- Accessibility relation?
Logistics

• Give yourself some time for the game theory readings
Proposals

• Overall, very good!
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Peter Stone
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  – Be more realistic
– Be much more specific
Surveys

- Exam times not known
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- Discussions:
  - Longer/shorter discussions
  - Call on people more
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  – Less discussion, more lecture
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  - Like/Don’t like free responses
  - Readings too hard in parts (or boring)
  - More recent readings
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Syllabus:

- More theory
- More time per topic
- No clear direction (non-linear flow of topics)
● Syllabus:
  – More theory
  – More time per topic
  – No clear direction (non-linear flow of topics)

● Webpage:
  – more resources on the web pages
  – Assignments webpage to this week
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● Classes fly by
Class Discussion

Chris Clark on BDI
Electric Elves: Human Org. Support

- Proxy agents for meeting scheduling
- Activities within an individual research project
- Meeting planning with participants outside the organization
Challenges

- Adjustable autonomy
- Reliable information access
- Capability matching
- Agent coordination
- Scaling up to continual, reliable usability
Technologies

• Adjustable autonomy motivated by CAP
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- MDPs to choose to delay risky decisions
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- Adaptive wrappers for info sources
- Data mining from publication records
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Used continuously for several months
Question

- Are we ready for free flight and automatic proxy agents?
Past years’ applications

- OASIS
- Archon — an early MAS
- Trafficopter — highway traffic planning
- AntNet — network routing using ant metaphor
  - Competitive results
- Elevator control — using RL
Archon — Cockburn and Jennings ’96

- Large, industrialized systems (e.g. electricity distribution)

- A general system (methodology)
  - many applications

- Clearly distinguish between:
  - social know-how (AL)
  - domain-level problem solving (IS)

- Built to combine legacy systems
Trafficopter — Moukas et al. ’98

- Intelligent highways without the infrastructure
- Oncoming cars report upstream traffic
- Cars equipped with PDAs, GPS, wireless transceivers
  - Cheap equipment
  - Cars easily equipped
  - Not needed on all cars
Data Transfer

- Cars query about specific map locations
- Messages propagated by other cars
- Some controls to keep data fresh:
  - Half-time decay function of traffic data
  - Requests die after number of hops, amount of time
  - Farther messages propagates first (hop minimizer)
  - Only 3 propagations per message
Results

- Feasability studies in simulation
- Studied percentage of queries answered as a function of number of cars equipped
- Also studied effect of data cache and hop minimizer
AntNet

- Network routing example
- Randomized algorithm (packets sent probabilistically)
- Travel to destination and back, leaving time-to-dest data at nodes
- Follow the “pheromones” probabilistically
RL for elevator control

- Modeling elevator traffic during lunch

- Huge state space
  - Which call buttons are pressed
  - Which car buttons are pressed
  - Times since buttons pressed

- Small action space
  - Move up/down (when at a floor)
  - Stop/continue (when moving)
  - Some action constraints
Function approximation

- Neural network to approximate Q

- 47 inputs: ("after considerable experimentation")
  - call buttons (18)
  - car location (16)
  - other car locations (10)
  - domain info: at highest-needed floor or longest-waiting passenger (2)
  - bias unit (1)
Two architectures

• Parallel: all elevators share the same network (homogeneous)

• Decentralized: each elevator has its own network (heterogeneous)

Results

• Both outperform many other standard algorithms

• Why not use it?
Continue ML crash course

- Genetic algorithms/programming
- Neural networks
- Reinforcement learning