Good Afternoon, Colleagues

Are there any questions?
Logistics

- Heterogeneous players exist
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- Coach: 30 sec. interval; 5 sec. delay; CLANG
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  - UvA base; UTAV base
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- Surveys due Thursday
Logistics

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- Coach: 30 sec. interval; 5 sec. delay; CLANG
  - UvA base; UTAV base
- Surveys due Thursday
- Next week’s readings posted
Readings Overview – OASIS

• Concretization of BDI
  – Decision nodes, chance nodes ⇒ beliefs, desires, intentions trees
  pause

• Real time: assume significant changes to state can be determined instantaneously
  – No blind execution
  – No constant reevaluation
Readings Overview – OASIS

- Concretization of BDI
  - Decision nodes, chance nodes \( \Rightarrow \)
    beliefs, desires, intentions trees
  - pause

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Implemented in an airport!

Department of Computer Sciences
The University of Texas at Austin
Class Discussion

Charles Su on BDI
General Domain Characteristics

- Non-deterministic (⇒ beliefs)
- Action choices (⇒ intentions)
- Multiple objectives, possibly incompatible (⇒ desires)
- Environment determines best actions (⇒ desires)
- Incomplete information (⇒ beliefs)
- Dynamic world (⇒ intentions)
General Domain Characteristics

- Non-deterministic ($\Rightarrow$ beliefs)
- Action choices ($\Rightarrow$ intentions)
- Multiple objectives, possibly incompatible ($\Rightarrow$ desires)
- Environment determines best actions ($\Rightarrow$ desires)
- Incomplete information ($\Rightarrow$ beliefs)
- Dynamic world ($\Rightarrow$ intentions)

Can’t just use decision theory
Decision Theory

- Choice nodes: system gets to choose
- Chance nodes: environment selects randomly
Decision Theory

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- Chance nodes: environment selects randomly

Deliberation Functions

- Maximin: aim for a best, worst case
- Expected utility: aim for a best expected case
Decision Theory

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Deliberation Functions

- Maximin: aim for a best, worst case
- Expected utility: aim for a best expected case

Examples
Air-traffic Management

70–80 agents at a time
Air-traffic Management

70–80 agents at a time

- One agent per aircraft
- Sequencer
- Wind modeller
- Coordinator
- Trajectory checker
Air-traffic Management

70–80 agents at a time

- One agent per aircraft
- Sequencer
- Wind modeller
- Coordinator
- Trajectory checker

Keep schedule until complete or impossible
Beliefs: All possible wind velocities and trajectories
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Desires: Pruned to only keep the right ETA
Beliefs: All possible wind velocities and trajectories

Desires: Pruned to only keep the right ETA

Intentions: Pruned further to keep only the best in terms of fuel consumption, etc.
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
Technologies

- Adjustable autonomy motivated by CAP
- MDPs to choose to delay risky decisions
Technologies

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- MDPs to choose to delay risky decisions
- Capability characterization language
- Adaptive wrappers for info sources
- Data mining from publication records
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Used continuously for several months
• Are we ready for free flight and automatic proxy agents?