Good Afternoon, Colleagues

Are there any questions?
Logistics

- Final tournament: Tuesday, May 16th, 1pm
Logistics

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• All readings up
Logistics

- Final tournament: Tuesday, May 16th, 1pm
- All readings up
- Final projects due in 2 weeks!
Recursive Modeling Method

- What should I do?
Recursive Modeling Method

- What should I do?
- What should I do given what I think you’ll do?
Recursive Modeling Method

- What should I do?
- What should I do given what I think you’ll do?
- What should I think you’ll do given what I think you think I’ll do?
Recursive Modeling Method

- What should I do?
- What should I do given what I think you’ll do?
- What should I think you’ll do given what I think you think I’ll do?
- etc.
Prediction Method

- Rely on communication
Prediction Method

- Rely on communication
  - What to say? What to trust?
Prediction Method

• Rely on communication
  – What to say? What to trust?

• Watch for patterns of others
Prediction Method

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• Watch for patterns of others
  – Might have incorrect expectations, especially if environment changes
Prediction Method

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• Use deeper models
  – Includes physical and mental states
Prediction Method

- Rely on communication
  - What to say? What to trust?

- Watch for patterns of others
  - Might have incorrect expectations, especially if environment changes

- Use deeper models
  - Includes physical and mental states
  - Could be computationally expensive
Types of models

Example: pursuit task

No-information: Random choice
Types of models

Example: pursuit task

No-information: Random choice

Sub-intentional: Not rational
Types of models

Example: pursuit task

No-information: Random choice

Sub-intentional: Not rational

Intentional: Others use same model
Lessons

- Modeling can help
- There is a lot of useless information in recursive models
- Approximations (limited rationality) can be useful
Tracking Dynamic Team Activity

- Use your own plans to model others
Tracking Dynamic Team Activity

- Use your own plans to model others
- Use explicit team operators
Tracking Dynamic Team Activity

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  - Introduces challenges of role assignments, and
  - Minimum cost repair
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- Assume agent is using a plan that you could use,
  - But not modeling you
Tracking Dynamic Team Activity

- Use your own plans to model others
- Use explicit team operators
  - Introduces challenges of role assignments, and
  - Minimum cost repair
- Assume agent is using a plan that you could use,
  - But not modeling you
- Act based on assumed actions of others
Where do Models Come From

Observation:

• Tambe and RMM: use existing model
  – No building a model
Where do Models Come From

Observation:

- Tambe and RMM: use existing model
  - No building a model

What if we can’t build a full model in advance?
Where do Models Come From

Observation:

- Tambe and RMM: use existing model
  - No building a model

What if we can’t build a full model in advance?

- What are some incremental approaches for building a predictive model?
Play me at RoShamBo

- Rock beats scissors
- Scissors beats paper
- Paper beats rock
Play me at RoShamBo

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- What is your strategy before modeling me?
Play me at RoShamBo

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- What is your strategy before modeling me?
- What is your strategy after modeling me?
Play me at RoShamBo

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- What is your strategy before modeling me?
- What is your strategy after modeling me?
- Am I modeling you?
Play me at RoShamBo

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- What is your strategy before modeling me?
- What is your strategy after modeling me?
- Am I modeling you?
- Would your end strategy change if I can?
## Stackelburg Game

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<thead>
<tr>
<th>Player 1</th>
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<tbody>
<tr>
<td><strong>Action 1</strong></td>
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- Nash equilibrium?
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- Action 2 is dominant for Player 1. End of story?
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- Change the best response of the other agent
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- What would you do as player 2?
- **Threats** can stabilize a non-equilibrium strategy
- Change the **best response** of the other agent

Threats slides
Discussion

- How useful is the concept of Nash equilibrium?
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- Shoham:
  - 0-sum = single agent problem
  - common payoff = search for pareto optimum
Discussion

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  – General sum is the interesting case:
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  – General sum is the interesting case:
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Discussion

- How useful is the concept of Nash equilibrium?

- Shoham:
  - 0-sum = single agent problem
  - common payoff = search for pareto optimum
  - General sum is the interesting case:
  - Learning in an environment with other, unknown, independent agents who may also be learning
  - Need to do well against some set of agents, never too poorly, and well against yourself.