Good Afternoon, Colleagues

Are there any questions?
Logistics

- Next week’s readings posted
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- What did you think of Barto talk?
Logistics

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- Holte talk tomorrow at 4pm
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- Final project — have partners?
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- What did you think of Barto talk?
- Holte talk tomorrow at 4pm
- Final project — have partners?
- Use the undergrad writing center!
Final Projects

Proposal (3/2): 3+ pages
• What you’re going to do; graded on writing

Progress Report (4/6): 5+ pages + binaries + logs
• What you’ve been doing; graded on writing
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Team (5/2): source + binaries
- The tournament entry; make sure it runs!
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Final Report (5/4): 8+ pages
• A term paper; the main component of your grade
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Tournament (5/16 ?): nothing due
  • Oral presentation
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Due at beginning of classes
Overview of the Readings

Darwin: genetic programming approach
Overview of the Readings

**Darwin:** genetic programming approach

**Stone and McAllester:** Architecture for action selection
Overview of the Readings

**Darwin:** genetic programming approach

**Stone and McAllester:** Architecture for action selection

**Riley:** Coach competition, extracting models
Overview of the Readings

Darwin: genetic programming approach

Stone and McAllester: Architecture for action selection

Riley: Coach competition, extracting models

Kuhlmann: Learning for coaching
Overview of the Readings

**Darwin:** genetic programming approach

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**Kok03:** Coordination graphs
Overview of the Readings

Darwin: genetic programming approach

Stone and McAllester: Architecture for action selection

Riley: Coach competition, extracting models

Kuhlmann: Learning for coaching

Kok03: Coordination graphs

Riedmiller05: Reinforcement learning
Architecture for Action Selection
Coordination Graphs

• \( n \) agents, each choose an action \( A_i \)
Coordination Graphs

- $n$ agents, each choose an action $A_i$

- $A = A_1 \times \ldots \times A_n$
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- $R_i(A) \mapsto \mathbb{R}$
Coordination Graphs

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- \( A = A_1 \times \ldots \times A_n \)

- \( R_i(A) \rightarrow \mathbb{R} \)

- Coordination problem: \( R_1 = \ldots = R_n = R \)
Coordination Graphs

- $n$ agents, each choose an action $A_i$

- $A = A_1 \times \ldots \times A_n$

- $R_i(A) \mapsto \mathbb{R}$

- Coordination problem: $R_1 = \ldots = R_n = R$

- Nash equilibrium: no agent could do better given what others are doing.
Coordination Graphs

- $n$ agents, each choose an action $A_i$

- $A = A_1 \times \ldots \times A_n$

- $R_i(A) \mapsto \mathbb{R}$

- Coordination problem: $R_1 = \ldots = R_n = R$

- Nash equilibrium: no agent could do better given what others are doing.

- May be more than one (chicken)
Example from the paper

- Understand the rule syntax
Example from the paper

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- Form the coordination graph
Example from the paper

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- First eliminate rules based on context
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- What does it mean for $G_3$ to collect all relevant rules?
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- Form the coordination graph
- First eliminate rules based on context
- What does it mean for $G_3$ to collect all relevant rules?
- What does it mean for $G_3$ to maximize over all actions of $a_1$ and $a_2$?
Example from the paper

- Understand the rule syntax
- Form the coordination graph
- First eliminate rules based on context
- What does it mean for $G_3$ to collect all relevant rules?
- What does it mean for $G_3$ to maximize over all actions of $a_1$ and $a_2$?
- How are the results propagated back?
Example from the paper

- Understand the rule syntax
- Form the coordination graph
- First eliminate rules based on context
- What does it mean for $G_3$ to collect all relevant rules?
- What does it mean for $G_3$ to maximize over all actions of $a_1$ and $a_2$?
- How are the results propagated back?
- Let’s try again with $G_1$ eliminated first
Application to soccer

- Make the world discrete by assigning roles, using high-level predicates
Application to soccer

- Make the world discrete by assigning roles, using high-level predicates
- Assume global state information
Application to soccer

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- Assume global state information
- Finds pass sequences and starts players moving ahead of time.
Application to soccer

• Make the world discrete by assigning roles, using high-level predicates

• Assume global state information

• Finds pass sequences and starts players moving ahead of time.

• Note the results: with and without coordination.
Class Discussion

Safder Hasan on “action selection” vs. coordination graphs