Good Afternoon, Colleagues
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Are there any questions?
Logistics

• Questions about the syllabus?
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- Questions about the syllabus?
- Class registration
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- Problems with the assignment?
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- Piazza and Canvas — announcements yesterday
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  - Brooks’ reactive robots
  - A more deliberative architecture
  - RoboCup challenge paper
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  - RoboCup challenge paper
- Seating arrangement
Thermostats

• Are they agents or not?

• How does Wooldridge resolve this?
Intelligent (autonomous) Agents

- Autonomous robot
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- Information gathering agent
  - Find me the cheapest?
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  - Decides what to buy/sell and does it
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- Meeting scheduler
Intelligent (autonomous) Agents

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  - Find me the cheapest?
- E-commerce agents
  - Decides what to buy/sell and does it
- Air-traffic controller
- Meeting scheduler
- Computer-game-playing agent
Not Intelligent Agents

- Thermostat
- Telephone
- Answering machine
- Pencil
- Java object
Your Agent Examples
Your Agent Examples

**Simple**  home alarm; cat food dispenser

**Software:**  anti-virus/malware agent; spam filter; web crawler; iOS autocorrect correct daemon

**Automotive:**  smart keys; digital highway speed sign; traffic light with sensors; autonomous car; cruise control

**Telecom:**  GPS device; cell phone

**Physical Control:**  Roomba; lawn watering system

**Health:**  pacemaker

**Game/Entertainment:**  chess player; first person shooter

AI
An Example
An Example

- You, as a class, act as a learning agent
An Example

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- Actions: Wave, Stand, Clap
An Example

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- **Actions**: Wave, Stand, Clap
- **Observations**: colors, reward
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- **Goal**: Find an optimal *policy*
An Example

• You, as a class, act as a learning agent

• Actions: Wave, Stand, Clap

• Observations: colors, reward

• Goal: Find an optimal policy
  – Way of selecting actions that gets you the most reward
How did you do it?
How did you do it?

- What is your policy?
- What does the world look like?
Formalizing My Example

Knowns:
Formalizing My Example

Knowns:

- \( \mathcal{O} = \{ \text{Blue, Red, Green, Yellow, \ldots} \} \)
- Rewards in \( \mathbb{R} \)
- \( \mathcal{A} = \{ \text{Wave, Clap, Stand} \} \)

\[ o_0, a_0, r_0, o_1, a_1, r_1, o_2, \ldots \]
Formalizing My Example

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Unknovns:

\[ o_0, a_0, r_0, o_1, a_1, r_1, o_2, \ldots \]
Formalizing My Example

Knowns:
• $O = \{\text{Blue, Red, Green, Yellow, ...}\}$
• Rewards in $\mathbb{R}$
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$O_0, a_0, r_0, o_1, a_1, r_1, o_2, \ldots$

Unknowns:
• $S = 4 \times 3$ grid
• $R : S \times A \mapsto \mathbb{R}$
• $P = S \mapsto O$
• $T : S \times A \mapsto S$
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$o_i = P(s_i)$
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- \( o_i = P(s_i) \)
- \( r_i = R(s_i, a_i) \)
Formalizing My Example

**Knowns:**
- \( \mathcal{O} = \{ \text{Blue, Red, Green, Yellow, …} \} \)
- Rewards in \( \mathbb{R} \)
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\[
\begin{align*}
o_0, a_0, r_0, o_1, a_1, r_1, o_2, & \ldots
\end{align*}
\]

**Unknowns:**
- \( S = 4 \times 3 \) grid
- \( \mathcal{R} : S \times \mathcal{A} \mapsto \mathbb{R} \)
- \( \mathcal{P} = S \mapsto \mathcal{O} \)
- \( \mathcal{T} : S \times \mathcal{A} \mapsto S \)

\[
\begin{align*}
o_i &= \mathcal{P}(s_i) & r_i &= \mathcal{R}(s_i, a_i) & s_{i+1} &= \mathcal{T}(s_i, a_i)
\end{align*}
\]