Good Afternoon, Colleagues
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Are there any questions?
Logistics

- Questions about the syllabus?
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- Class registration
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  - Too many for student-led discussions
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- Next week’s readings are up:
  - Brooks’ reactive robots
  - A more deliberative architecture
  - RoboCup challenge paper
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- Change rooms?
Words without (accepted) definitions

- Intelligence
- Agent
Words without (accepted) definitions

• Intelligence

• Agent

All proposed definitions include too much or leave gaps.
Words without (accepted) definitions

- Intelligence
- Agent

All proposed definitions include too much or leave gaps.

But there are examples...
Thermostats

- Are they agents or not?
- How does Wooldridge resolve this?
Intelligent (autonomous) Agents

- Autonomous robot
Intelligent (autonomous) Agents

- Autonomous robot
- Information gathering agent
  - Find me the cheapest?
Intelligent (autonomous) Agents

- Autonomous robot

- Information gathering agent
  - Find me the cheapest?

- E-commerce agents
  - Decides what to buy/sell and does it
Intelligent (autonomous) Agents

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- Air-traffic controller
Intelligent (autonomous) Agents

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- Meeting scheduler
Intelligent (autonomous) Agents

- Autonomous robot
- Information gathering agent
  - 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

Automotive: cruise control, parallel parker, traffic detecting agent
Physical Control: Elevators, oil spill robots, DARPA mule, Roomba
Simple: water boiler, smoke detector
Software: antivirus software, MS Windows
Telecom: portable GPS device, cell phone, computer monitors
Game/entertainment: MMO gold farming agent, NPC in video game, pacman player, backgammon player
Service: Stock trading agent, “carebot”
An Example
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• You, as a class, act as a learning agent
An Example

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- **Actions**: Wave, Stand, Clap
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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:

- $O = \{ \text{Blue, Red, Green, Black, ...} \}$
- Rewards in $\mathbb{R}$
- $A = \{ \text{Wave, Clap, Stand} \}$

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

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- $A = \{ \text{Wave, Clap, Stand} \}$

Unknowns:

- $o_0, o_1, o_2, ...$
- $r_0, r_1, r_2, ...$
- $a_0, a_1, a_2, ...$
Formalizing My Example

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

Unknowns:
- \( S = 4 \times 3 \) grid
- \( \mathcal{R} : S \times \mathcal{A} \mapsto \mathbb{R} \)
- \( \mathcal{P} = S \mapsto \mathcal{O} \)
- \( \mathcal{T} : S \times \mathcal{A} \mapsto S \)
- \( o_0, a_0, r_0, o_1, a_1, r_1, o_2, \ldots \)
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$s_i = \mathcal{P}(s_i)$
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\( o_i = \mathcal{P}(s_i) \quad r_i = \mathcal{R}(s_i, a_i) \)
Formalizing My Example

Knowns:

- $O = \{\text{Blue, Red, Green, Black, \ldots}\}$
- Rewards in $\mathbb{R}$
- $A = \{\text{Wave, Clap, Stand}\}$

Unknowns:

- $S = \text{4x3 grid}$
- $R: S \times A \mapsto \mathbb{R}$
- $P = S \mapsto O$
- $T: S \times A \mapsto S$

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