Agents & Environments

473 Topics

- Agents & Environments
- Problem Spaces
- Search & Constraint Satisfaction
- Knowledge Repr’n & Logical Reasoning
- Machine Learning
- Uncertainty: Repr’n & Reasoning
- Dynamic Bayesian Networks
- Markov Decision Processes

Intelligent Agents

- Have sensors, effectors
- Implement mapping from percept sequence to actions
- Performance Measure

Types of Agents: Robots

- Xavier (CMU)
- Walking (MIT)
- Aibo (Sony)
- Humanoid - Cog (MIT)

Types of Agents: Immobots

- Autonomous spacecraft
- Intelligent buildings

- Softbots
  - Jango.excite.com
  - Askjeeves.com
  - Expert Systems
  - Cardiologist
Defn: Ideal rational agent

“For each possible percept sequence, does whatever action is expected to maximize its performance measure on the basis of evidence perceived so far and built-in knowledge.”

- Rationality vs omniscience?
- Acting in order to obtain valuable information
**Defn: Autonomy**

An agent is autonomous to the extent that its behavior is determined by its own experience

*Why is this important?*

The parable of the dung beetle

---

**Implementing ideal rational agent**

- Table lookup agents
- Agent program
  - Simple reflex agents
  - Agents with memory
    - Reflex agent with internal state
    - Goal-based agents
    - Utility-based agents

---

**Simple reflex agents**

- **Environment**
- **Agent**
- **Sensors**
  - what world is like now
- **Condition/Action rules**
  - what action should I do now?
- **Effectors**

---

**Reflex agent with internal state**

- **Environment**
- **Agent**
- **Sensors**
  - what world is like now
- **Condition/Action rules**
  - what action should I do now?
- **Effectors**
- **What world was like**
- **How world evolves**

---

**Goal-based agents**

- **Environment**
- **Agent**
- **Sensors**
  - what world is like now
- **Goals**
  - what action should I do now?
- **What my actions do**
- **How world evolves**
- **What my actions do**
- **Utility function**
  - what it’ll be like if I do acts A1-An

---

**Utility-based agents**

- **Environment**
- **Agent**
- **Sensors**
  - what world is like now
- **Utility function**
  - how happy would I be?
- **What my actions do**
- **What it’ll be like if I do acts A1-An**
- **How happy would I be?**
- **What action should I do now?**
Properties of Environments

- Observability: full vs. partial vs. non
- Deterministic vs. stochastic
- Episodic vs. nonepisodic
- Static vs. ... vs. dynamic
- Discrete vs. continuous

- Travel agent
- WWW shopping agent
- Coffee delivery mobile robot

While driving, what’s the best policy?

- Always put blinker on before turning
- Never use your blinker
- Look in mirror, and use blinker only if you observe a car that can observe you

- What kind of reasoning?
  - logical, goal-based, utility-based?
- What kind of agent is necessary?
  - reflex, goal-based, utility-based?