Agents and Definitions of Artificial Intelligence

Definitions of AI

Behave Like a Person
- A computer passes the Turing test if a person, though written conversation (think instant messaging), cannot tell whether the responses come from a person or not.
- Passing this test requires natural language processing, knowledge representation, automated reasoning, and machine learning.

Think Like a Person
- Cognitive science uses computer models from AI and experimental techniques from psychology and biology to construct theories of how the human mind works.
- One problem with this and the previous definition is we can make progress on problems without having a complete robot.
- Another problem is the computer making mistakes like people do.

Think Correctly
- Logic and probability provide precise notations for knowledge representation and rules for reasoning.
- However, it is very difficult to represent informal knowledge formally, and to reason about it efficiently.

Behave Correctly
- An agent inputs percepts from and performs actions on its environment.
- A rational agent should do whatever action is expected to maximize its performance measure, on the basis of the evidence provided by the percept sequence and whatever built-in knowledge the agent has.
Agents

Illustration

Example 1

Figure 2.1 Agents interact with environments through sensors and effectors.

Example 2

Agent Behavior

function Agent(initial-knowledge)
  variable: brain,
  the agent’s memory and knowledge
  brain ← initial-knowledge
  loop (until a final state)
    percept ← perceive environment
    brain ← Update-Brain(brain, percept)
    action ← Choose-Action(brain)
    perform action on environment
    brain ← Update-Brain(brain, action)
**Types of Environments, Part 1**

- Fully Observable: The agent knows the current state of the environment and the previous actions of any other agents.

  compared to

- Partially Observable: The agent has some uncertainty about the current state and/or previous actions of other agents.

**Types of Environments, Part 2**

- Deterministic: The next state of the environment is completely determined by the current state and the action(s) of the agent(s).

  compared to

- Stochastic: The next state of the environment is probabilistically determined. In cases of partially observable or complex environments, it is often useful to treat it as stochastic.

**Types of Environments, Part 3**

- Episodic vs. sequential: Does the agent perform a sequence of actions for each problem (sequential) or just one?

- Static vs. dynamic: Can the environment change while the agent is thinking (dynamic)?

- Discrete vs. continuous: Are the variables of the environment continuous or discrete?

- Single agent vs. multiagent: Does the agent need to consider other agents in the environment (multiagent)?