# Intelligent Agents

# Outline

- Agents and environments

- Rationality

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- PEAS (Performance measure, Environment, Actuators, Sensors)

- Environment types

- Agent types

# Agents

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- An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through actuators

Human agent:

- Eyes, ears, and other organs for sensors;

- Hands, legs, mouth, and other body parts for actuators

Robotic agent:

- Cameras and infrared range finders for sensors;

## Agents and environments

- The agent function maps from percept histories to actions:

$$[f: \mathcal{P}^* \rightarrow \mathcal{A}]$$

- Various motors for actuators

- The agent program runs on the physical architecture to produce *f*

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- agent = architecture + program

# Vacuum-cleaner world

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- Percepts: location and contents, e.g., [A,Dirty]

- Actions: *Left, Right, Suck, NoOp*

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# Rational agents

- An agent should strive to "do the right thing", based on what it can perceive and the actions it can perform. The right action is the one that will cause the agent to be most successful

- Performance measure: An objective criterion for success of an agent's behavior

- E.g., performance measure of a vacuum-cleaner agent could be amount of dirt cleaned up, amount of time taken, amount of electricity consumed, amount of noise generated, etc.

# Rational agents

- Rational Agent: For each possible percept sequence, a rational agent should select an action that is expected to maximize its performance measure, given the evidence provided by the percept sequence and whatever built-in knowledge the agent has.

# Rational agents

- Rationality is distinct from omniscience (all-knowing with infinite knowledge)

- Agents can perform actions in order to modify future percepts so as to obtain useful information (information gathering, exploration)

- An agent is autonomous if its behavior is determined by its own experience (with ability to learn and adapt)

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