

1.3 Intelligent Agents and Environments

Intelligent agents

Definition: An intelligent agent is any entity that can perceive its environment and act upon it to achieve specific goals.

Perception: Agents use sensors to take in information from their environment.

Examples: Human eyes/ears, a robot's cameras/microphones, or a software agent's ability to read file contents or network packets.

Action: Agents use actuators (or effectors) to perform actions in their environment.

Examples: A human's hands/legs, a robot's motors, or a software agent sending a message or displaying results on a screen.

Decision-making: The agent's decision-making process is based on its perceptions, its goals, and potentially prior experiences or training. The goal is to choose the most rational action to maximize its performance.

Adaptation: More complex agents can learn and adapt to changing conditions over time, improving their performance based on the feedback they receive from their actions.

Environments

Definition: The environment is the external world where the agent exists and operates.

Examples: A physical room, a video game, the internet, or a collection of internal business data.

Characteristics: The nature of the environment—whether it's fully observable, dynamic, or continuous—is a key factor in designing an agent's behavior.

Constraints and uncertainties: The environment provides the context, constraints, and uncertainties that the agent must navigate to achieve its goals.

The agent-environment loop

This is the fundamental cycle of operation for any AI agent.

Perception: The agent observes its environment through sensors.

Action: The agent decides on and performs an action through its actuators.

Feedback: The action changes the environment, and the agent receives feedback (e.g., a reward, a new state, or a failure signal) through its sensors, which informs its next perception and action.

