RUSSELL & NORVIG'S FIVE AGENTS.

The authors of our text, *Artificial Intelligence: A Modern Approach*, develop an agent-based model of AI.

In the agent model, the agent interacts with its world, the "environment," by receiving percepts (sensor data) and taking actions (via its actuators).

Our goal is to design agents that behave in an "intelligent" way.

Russell and Norvig propose five agent types. These are:

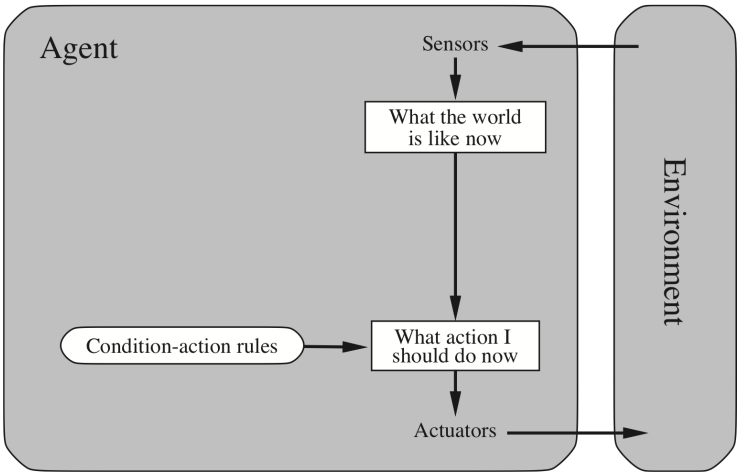
- simple reflex agent
- model-based reflex agent
- model-based, goal-based agent
- model-based, utility-based agent
- general learning agent

In the exercises that follow, you are to identify one or more examples of a specific entity which would exemplify each type of agent. You will also identify entity's corresponding environment, and write a sentence or two about why you think it's that type of agent.

The entities might be animals or organisms, physical systems, software agents, or anything.

Begin with the simple reflex agent when directed.

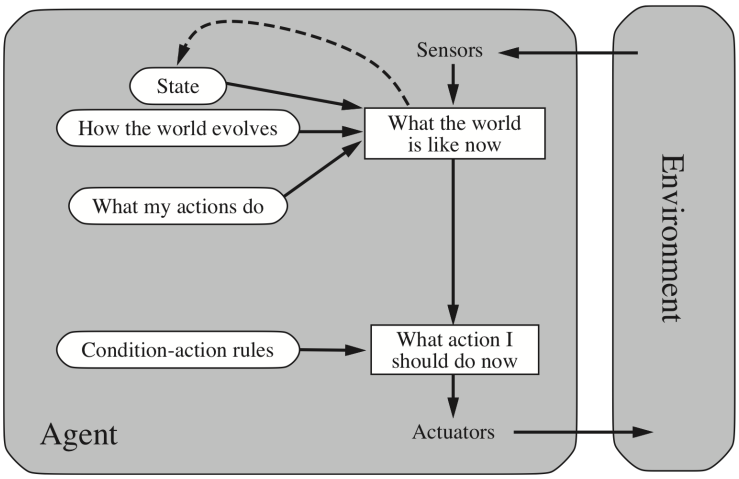
Simple Reflex Agent



The simplest kind of agent is the **simple reflex agent**. It has no internal state. It takes percepts and immediately translates them to actions, via a table (or similar structure) of "condition-action rules."

In the space below, identify one or more simple reflex agents, their corresponding environments, and describe why each is this type of agent.

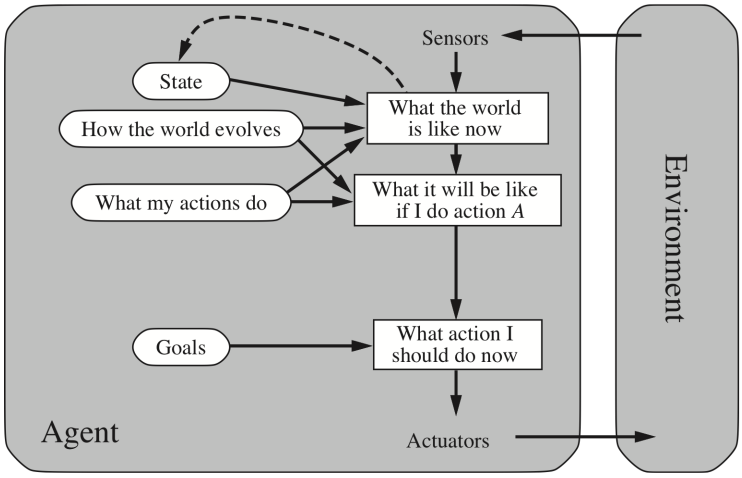
Model-Based Reflex Agent



The **model-based reflex agent** keeps track of the world by maintaining some state. The state represents the world, including the world that is not presently perceivable. This agent also has a model about what its actions might do. It gives its model of the world to the condition-action rules of the reflex agent.

In the space below, identify one or more model-based reflex agents, their corresponding environments, and describe why each is this type of agent.

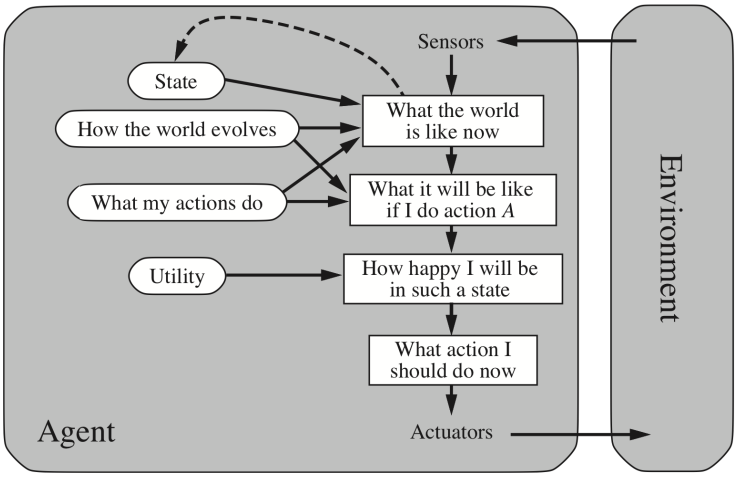
Model-Based, Goal-Based Agent



The **goal-based agent** includes the world model introduced by the model-based agent. It is able to reason about how the world will change if it takes specific actions. It also has goals, and can plan its action to achieve them—e.g., minimizing the distance between its current state and a goal state.

In the space below, identify one or more goal-based agents, their corresponding environments, and describe why each is this type of agent.

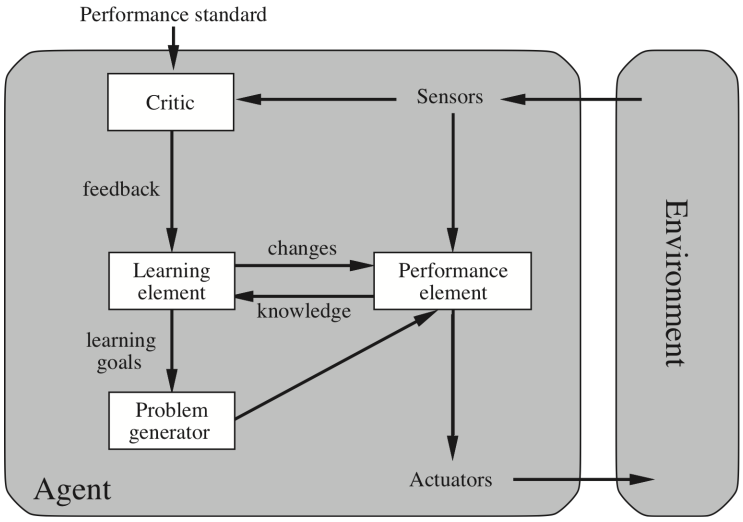
Model-Based, Utility-Based Agent



The **utility-based agent** evaluates its state using a utility function, which provides some measure of "goodness." The utility function may take into account both the world state and the agent's own position in the world. The agent attempts to take actions that maximize the utility function.

In the space below, identify one or more utility-based agents, their corresponding environments, and describe why each is this type of agent.

Learning Agent



The **general learning agent** includes a "learning element," which is responsible for making improvements to the agent's "performance element," which takes decisions. This agent also includes a "critic," which provides feedback to the learning element, and a "problem generator," which suggests actions that should lead the agent into unfamiliar situations from which it can continue to learn.

In the space below, identify one or more learning agents, their corresponding environments, and describe why each is this type of agent.