Sistemas multiagentes

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Chapter 1

SISTEMAS MULTIAGENTES

Topics

| 1. AGENTES INTELIGENTES				
1. Introducción 2. Propiedades de los agentes 3. Clasificación de los agentes 4. Arquitectura de agentes	1	APRENDIZAJE EN CONTACTO CON EL DOCENTE (ACD)	Presentación de la asignatura	2 horas
	2	APRENDIZAJE EN CONTACTO CON EL DOCENTE (ACD)	Exposición de material docente	4 horas
		APRENDIZAJE AUTÓNOMO (AA)	Revisión de la historia y evolución de la tecnología de agentes.	4 horas
	4	APRENDIZAJE EN CONTACTO CON EL DOCENTE (ACD)	Prueba sobre el capítulo	2 horas

INTRODUCTION

CHAPTER 1

Introduction

▶ In life, in order to get things done we set goals for us to achieve, this pushes us to make the right decisions when we need to. A simple example would be the shopping list; our goal is to pick up every thing on that list. This makes it easier to decide if you need to choose between milk and orange juice because you can only afford one. As milk is a goal on our shopping list and the orange juice is not we chose the milk.

▶ So in an intelligent agent having a set of goals with desirable situations are needed. The agent can use these goals with a set of actions and their predicted outcomes to see which action(s) achieve our goal(s).

"An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors"
- (Artificial Intelligence: A Modern Approach by Stuart Russell and Peter Novig)

Introduction

- "Autonomous agents are computational systems that inhabit some complex dynamic environment, sense and act autonomously in this environment, and by doing so realise a set of goals or tasks for which they are designed" *- (Pattie Maes, MIT Media Lab).*
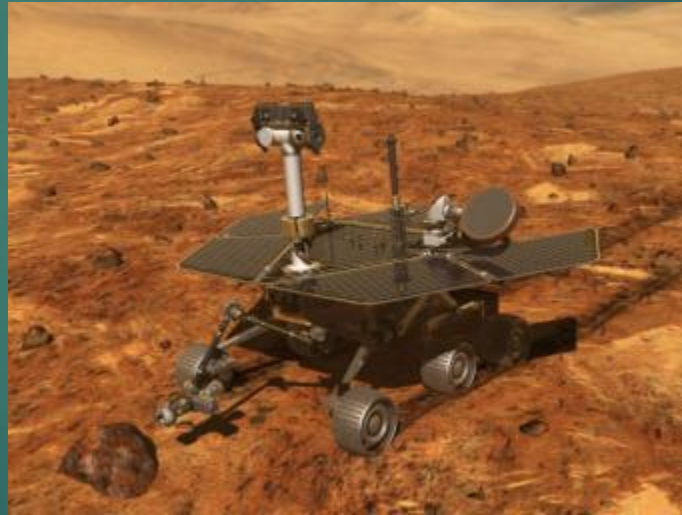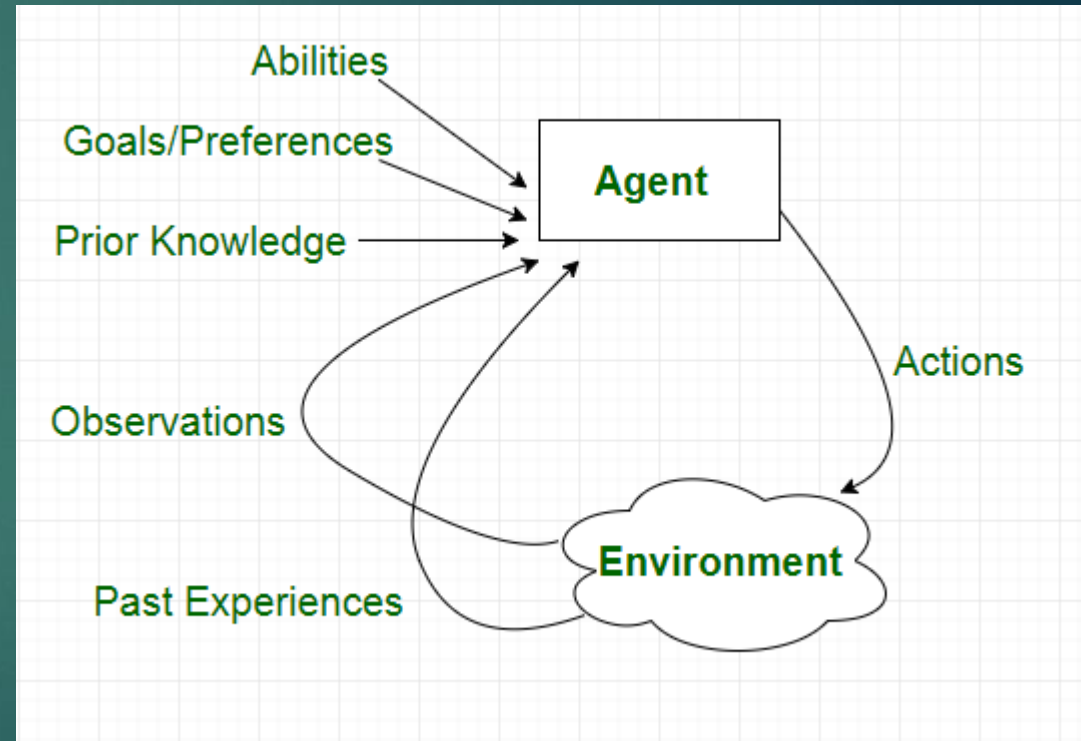
Agents in AI

- In the context of the AI field, an "agent" is an independent program or entity that interacts with its environment by perceiving its surroundings via sensors, then acting through actuators or effectors.

- Intelligent agents may learn from the environment to achieve those goals. Driverless cars and the Siri virtual assistant are examples of intelligent agents in AI.
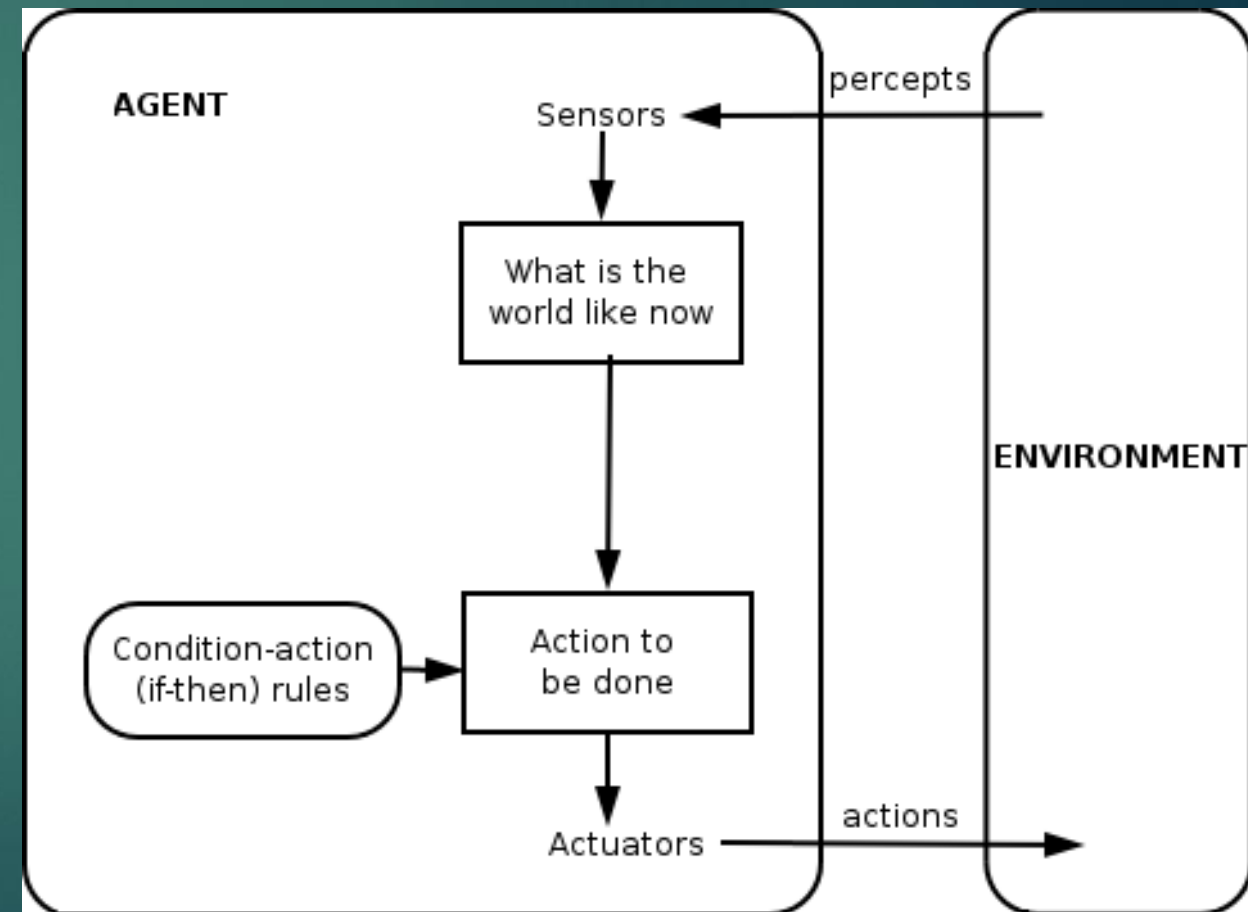
Agents in AI

- In artificial intelligence, an agent is a computer program or system that is designed to perceive its environment, make decisions, and take actions to achieve a specific goal or set of goals.

- The agent operates autonomously, meaning it is not directly controlled by a human operator. An AI system is composed of an agent and its environment. The agents act in their environment, which may contain other agents.

Examples of agents in AI

- Agents use their actuators to run through a cycle of perception, thought, and action. Examples of agents in general terms include:
  - Software: This Agent has file contents, keystrokes, and received network packages that function as sensory input, then act on those inputs, displaying the output on a screen.
  - Human: Humans have eyes, ears, and other organs that act as sensors, and hands, legs, mouths, and other body parts act as actuators.
  - Robotic: Robotic agents have cameras and infrared range finders that act as sensors, and various servos and motors perform as actuators.

Examples of agents in AI

- There are many examples of intelligent agents in AI, including:

  - Autonomous Robots: These agents are designed to operate in physical environments, such as factories, warehouses, and hospitals.

  - Intelligent Personal Assistants: These agents are designed to help users with various tasks, such as scheduling appointments, sending messages, and making phone calls.

  - Chatbots: These agents are designed to simulate human conversation and provide customer service.

  - Game Agents: These agents are designed to play games, such as chess and Go, at a high level.

Examples of AI agents

- Escanee el código QR siguiente y responda la pregunta:

Rules of the AI agents

▶ These are the main four rules all AI agents must adhere to:

   ▶ Rule 1: An AI agent must be able to perceive the environment.

   ▶ Rule 2: The environmental observations must be used to make decisions.

   ▶ Rule 3: The decisions should result in action.

   ▶ Rule 4: The action taken by the AI agent must be a rational. Rational actions are actions that maximize performance and yield the best positive outcome.

Functions of AI agents

- Artificial Intelligence agents perform these functions continuously:
  - Perceiving dynamic conditions in the environment
  - Acting to affect conditions in the environment
  - Using reasoning to interpret perceptions
  - Problem-solving
  - Drawing inferences
  - Determining actions and their outcomes

Rationality

▶ An intelligent agent is said to be rational if it selects actions that maximize its expected utility, based on its current percept and its knowledge of the environment.

▶ Rationality is a key concept in AI, as it is the basis for designing agents that can make optimal decisions in complex environments.
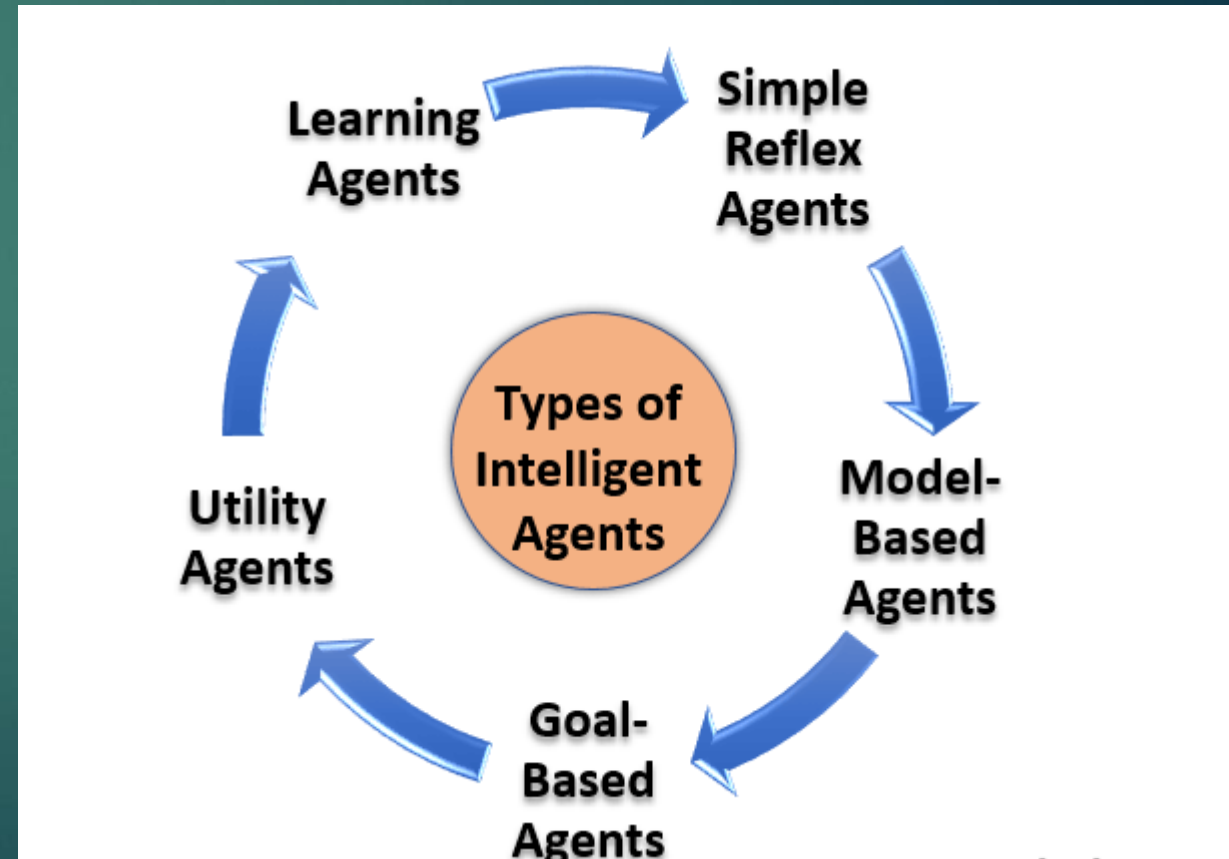
# CLASSIFICATION OF AI AGENTS

CHAPTER 1

Types of AI agents

▶ There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:
  - ▶ Reflex Agents
  - ▶ Model-based Agents
  - ▶ Goal-based agents
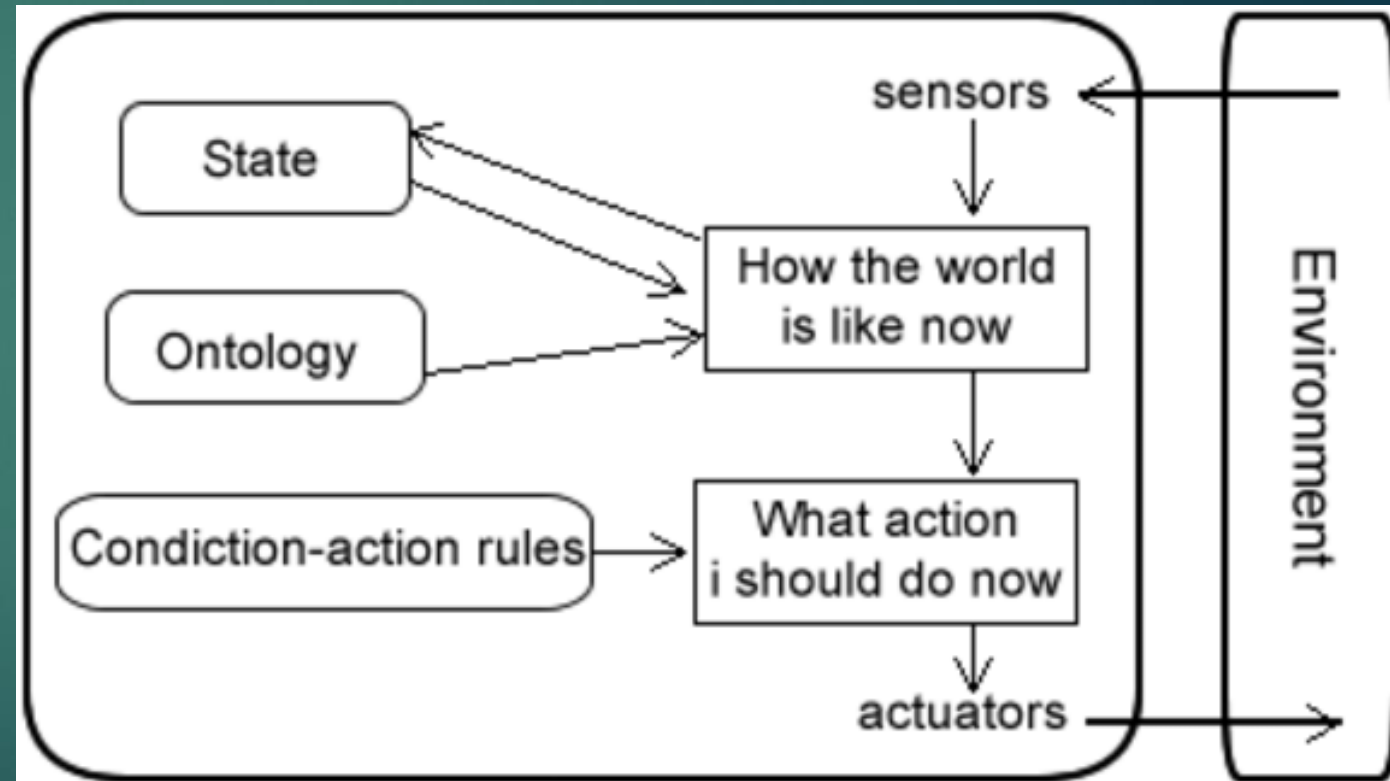 - ▶ Utility-based agents
  - ▶ Learning agents

Reflex agents

- Reflex Agents: These agents work here and now and ignore the past. They respond using the event-condition-action rule. The ECA rule applies when a user initiates an event, and the Agent turns to a list of pre-set conditions and rules, resulting in pre-programmed outcomes.
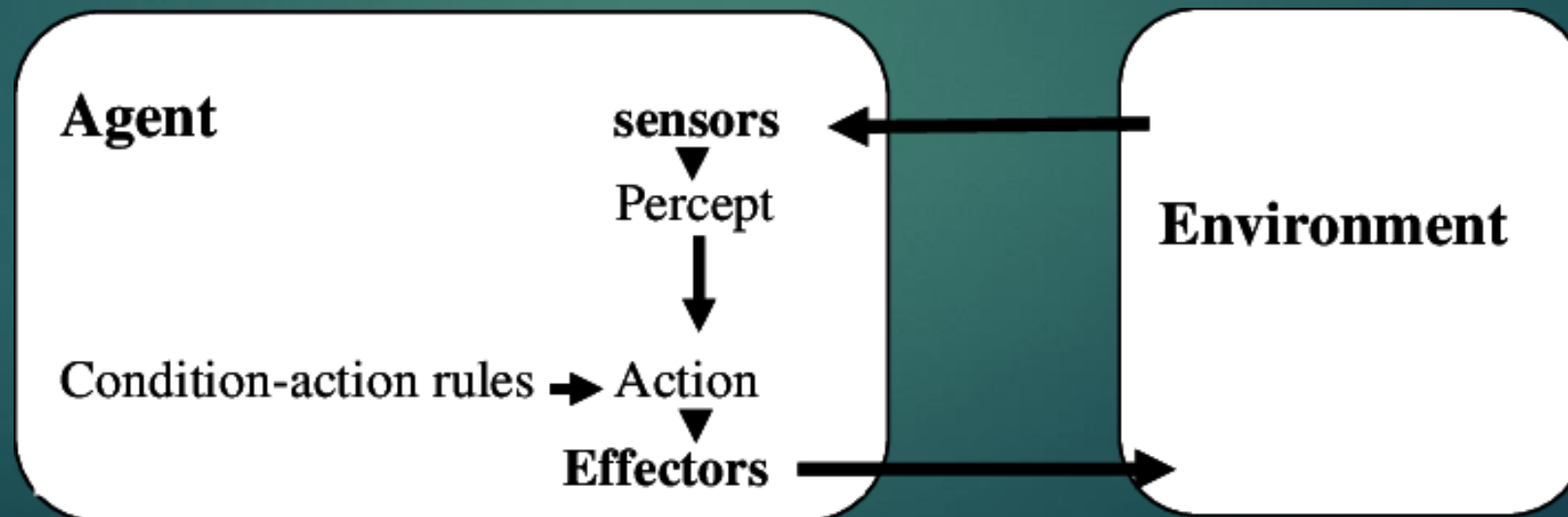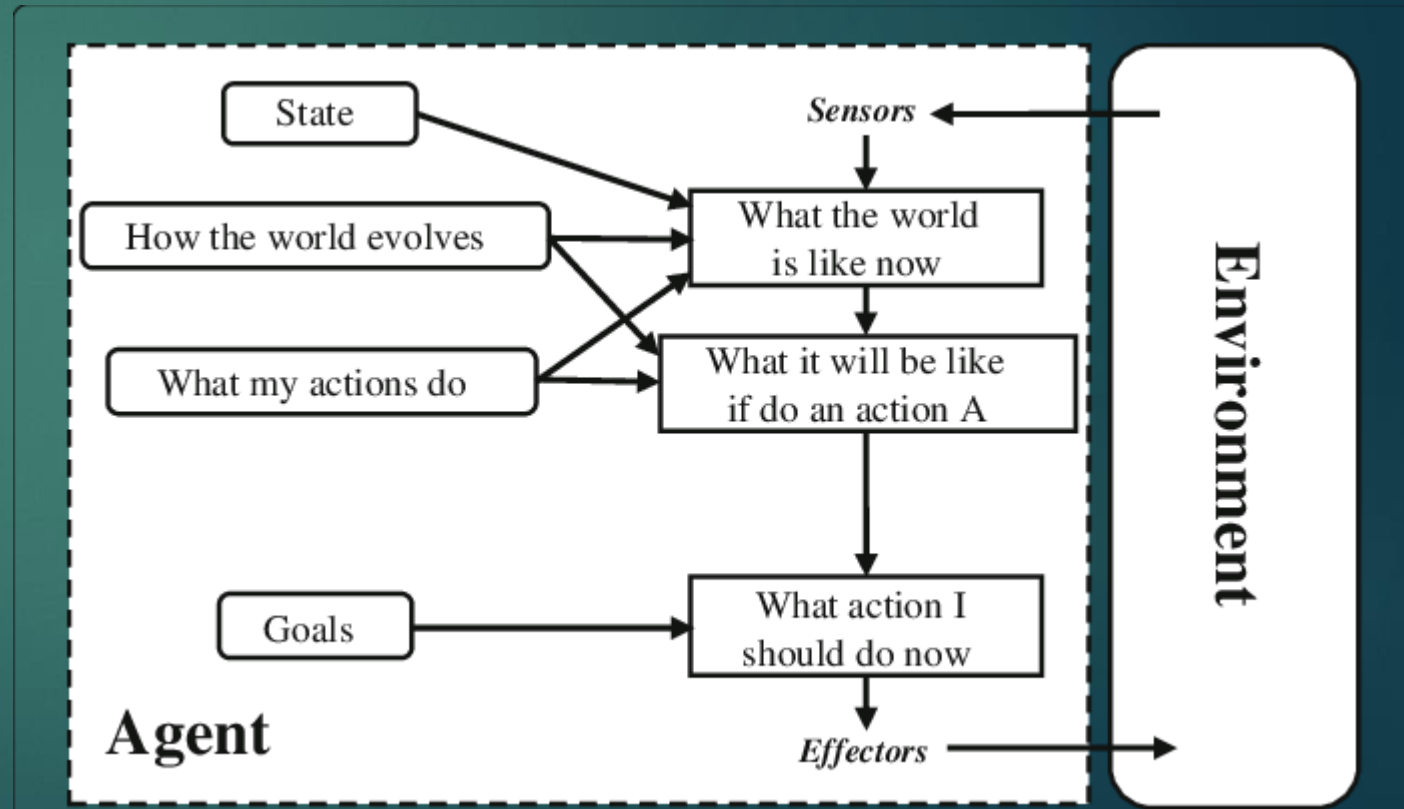
Model-based agents

▶ Model-based Agents: These agents choose their actions like reflex agents do, but they have a better comprehensive view of the environment. An environmental model is programmed into the internal system, incorporating into the Agent's history.

Goal-based agents

▶ Goal-based agents:
These agents build on the information that a model-based agent stores by augmenting it with goal information or data regarding desirable outcomes and situations.

Utility-based agents

► Utility-based agents: These are comparable to the goal-based agents, except they offer an extra utility measurement. This measurement rates each possible scenario based on the desired result and selects the action that maximizes the outcome. Rating criteria examples include variables such as success probability or the number of resources required.
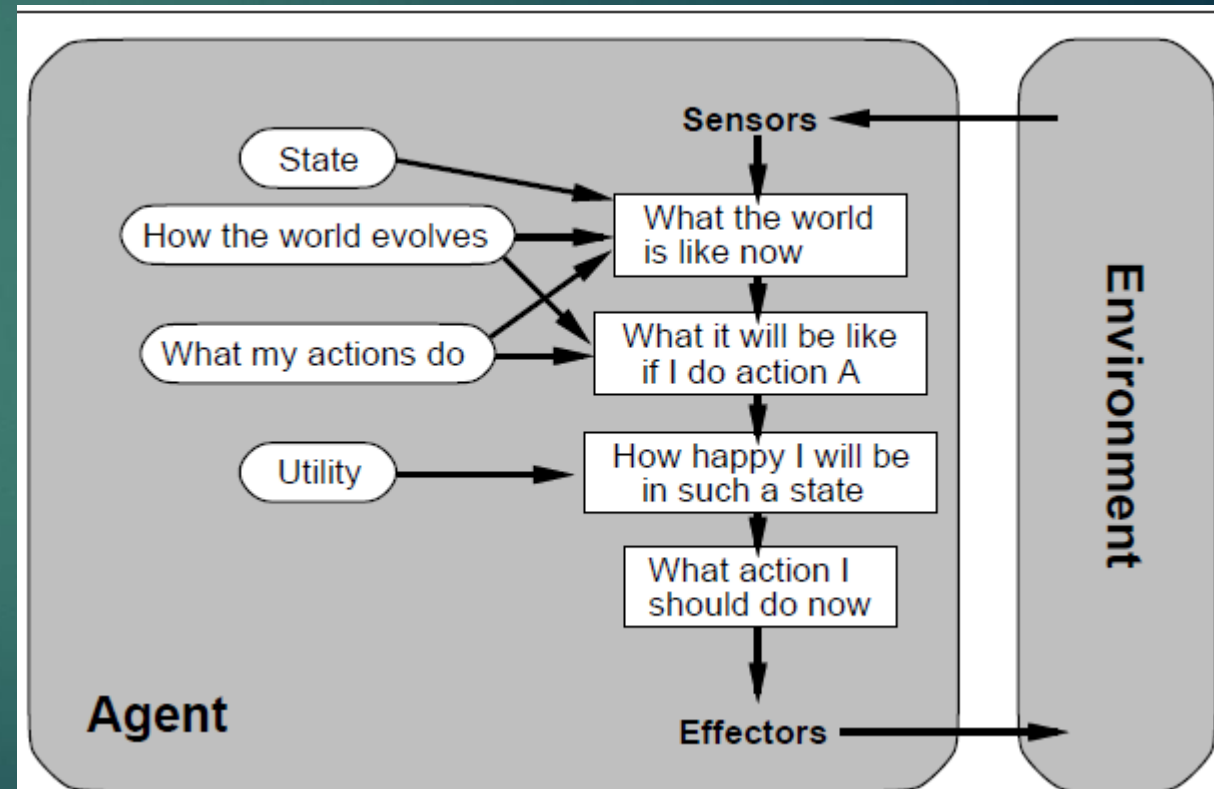
Learning agents

▶ Learning agents: These agents employ an additional learning element to gradually improve and become more knowledgeable over time about an environment. The learning element uses feedback to decide how the performance elements should be gradually changed to show improvement.
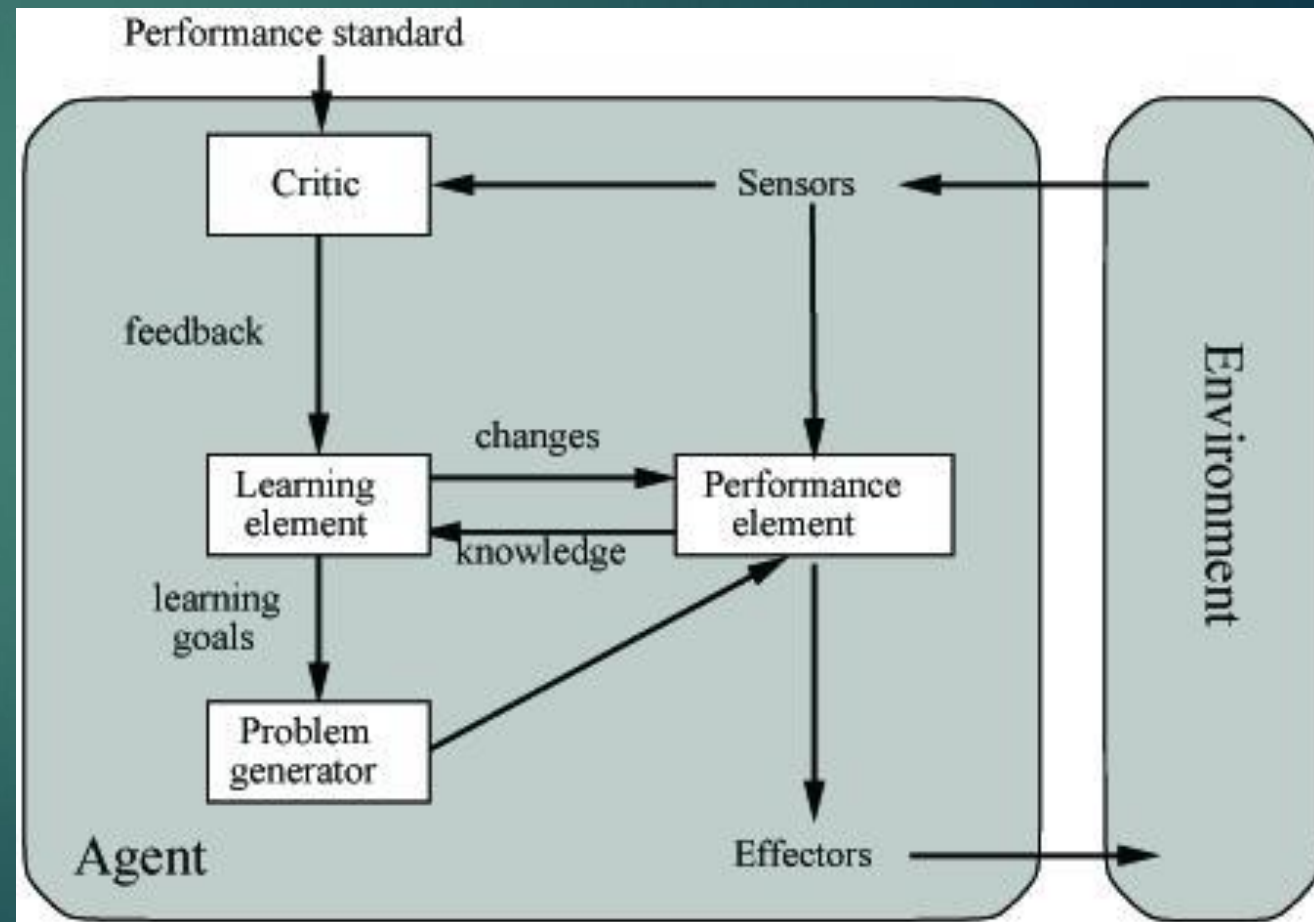
Tarea en clase

- Escriba un reporte acerca de un tipo de agente:
  - Descripción del sistema
  - Función que cumple
  - Entorno en el cual trabaja
  - Si existe el producto, incluya un ejemplo de su funcionamiento.