CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

Uleam
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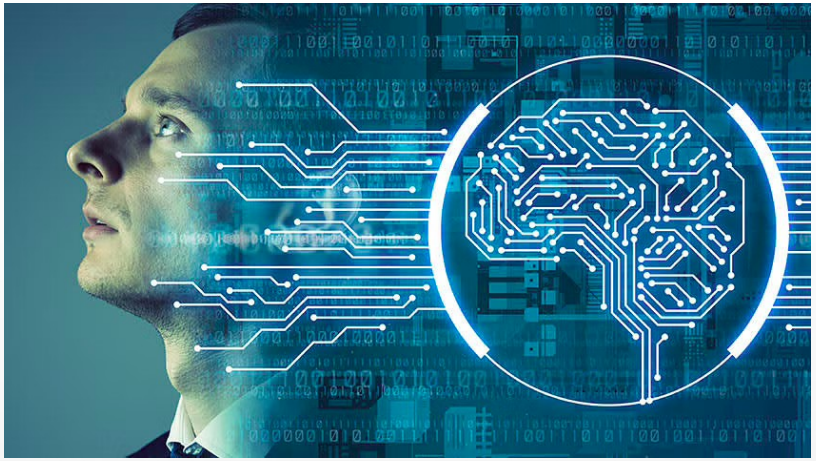
AI introduction part 2

Master. Cesar Sinchiguano
Robotics and Cybernetics

Today's lecture



AI - Agents & Environments

The Functions of an Artificial Intelligence Agent

The Number and Types of Agents in Artificial Intelligence

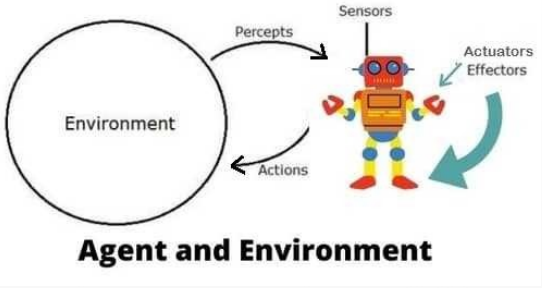
The Structure of Agents in Artificial Intelligence

What Are Agents in Artificial Intelligence Composed Of?

AI - Agents & Environments

An AI system is composed of an agent and its environment.

The agents act in their environment.

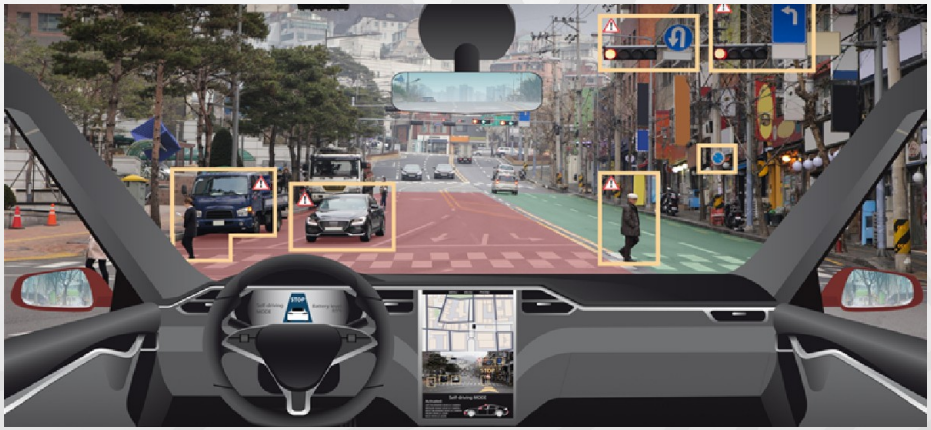


Agent and Environment

Agent is an independent program that interacts with its environment

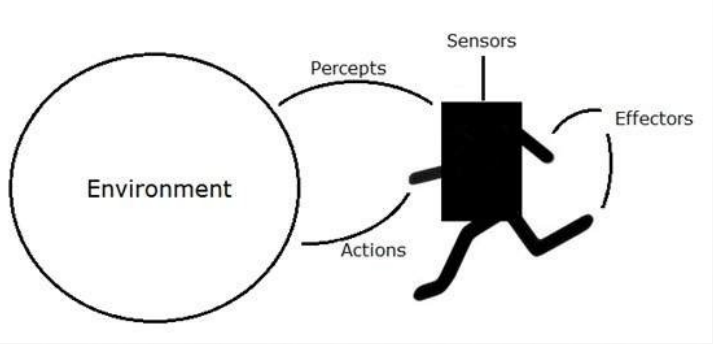
by perceiving its surroundings via sensors, then acting through actuators.

Agents	Environments
Robot	Room
Chatbot	Chatting
Vehicle	Road
Program	Data & Rules
Machine	Working Field



Cognitive: relating to the processes of thinking and reasoning

AI - Agents & Environments



An agent is anything that can perceive its environment through sensors and acts upon that environment through effectors.

A human agent has sensory organs such as eyes, ears, nose, tongue and skin to the sensors, and other organs such as hands, legs, mouth, for effectors.

A robotic agent replaces cameras and infrared range finders for the sensors, and various motors and actuators for effectors.

A software agent has encoded bit strings as its programs and actions.

Rationality: Rationality is nothing but status of being reasonable, sensible, and having good sense of judgment.

The Functions of an Artificial Intelligence Agent

AI agents perform these functions continuously:

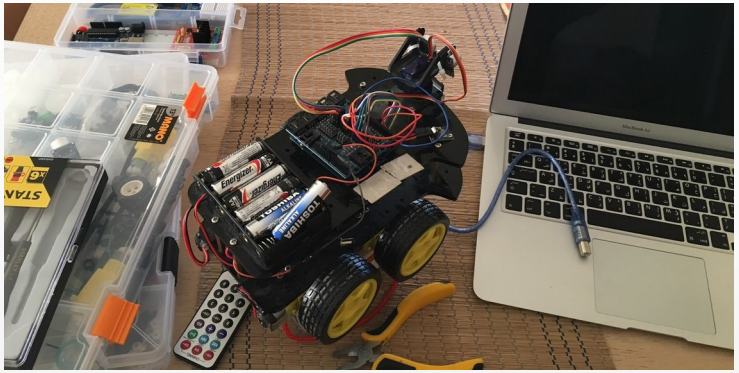
Perceiving dynamic conditions in the environment

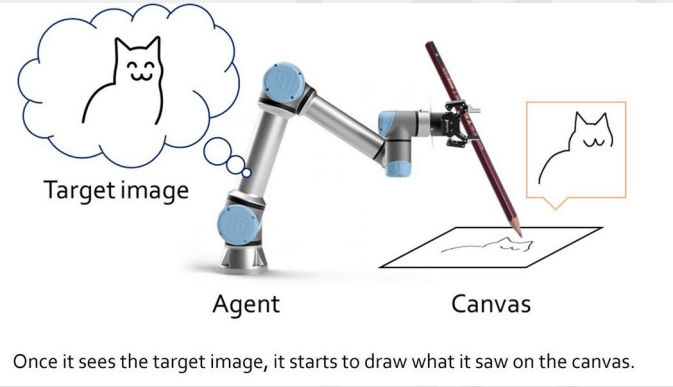
Acting to affect conditions in the environment

Using reasoning to interpret perceptions

Problem-solving

Determining actions and their outcomes





Once it sees the target image, it starts to draw what it saw on the canvas.

Perceive: to see something or someone

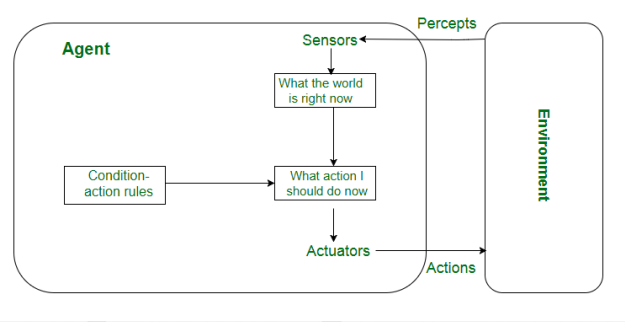
The Number and Types of Agents in Artificial Intelligence

There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:

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.

Take immediate actions

If this, then that

Works in fully observable environment

Problems with Simple reflex agents are :

Very limited intelligence.

If there occurs any change in the environment, then the collection of rules need to be updated

Perceive: to see something or someone

Link1

The Number and Types of Agents in Artificial Intelligence

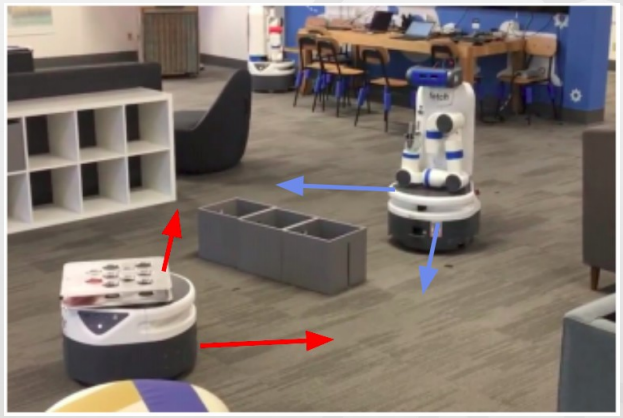
There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:

Model-based reflex agents

These agents choose their actions like reflex agents do, but they have a better comprehensive view of the environment.

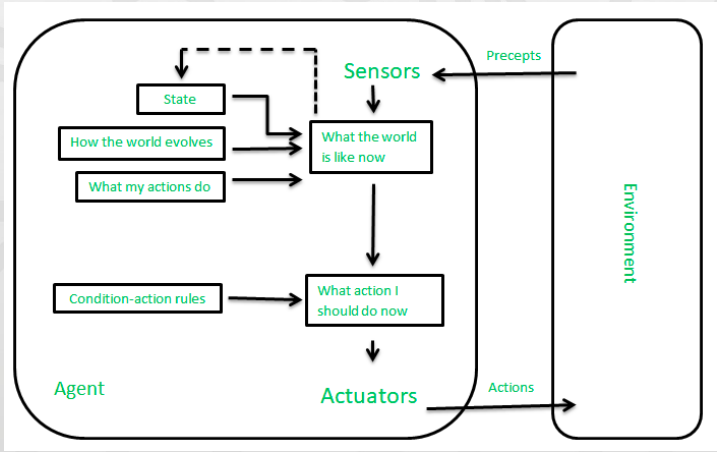
It works by finding a rule whose condition matches the current situation.

An environmental model is programmed into the internal system, incorporating into the Agent's history



Model − knowledge about “how the things happen in the world”.

Link 2



The Number and Types of Agents in Artificial Intelligence

There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:

Goal Based Agents

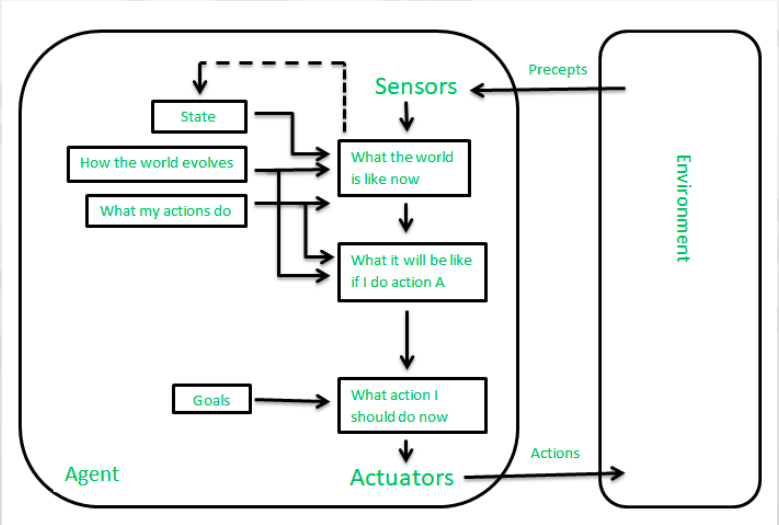
These kinds of agents take decisions based on how far they are currently from their goal.

They choose their actions in order to achieve goals.

Their every action is intended to reduce its distance from the goal.

Model − knowledge about “how the things happen in the world”.

Link 2



The Number and Types of Agents in Artificial Intelligence

There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:

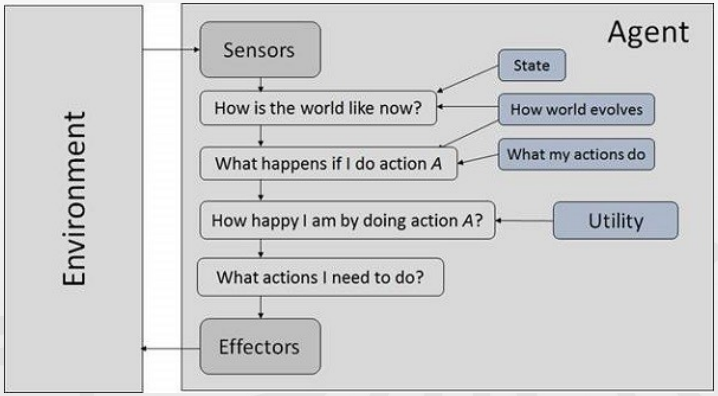
Utility-based agents

They choose actions based on a preference (utility) for each state.

Goals are inadequate when:

There are conflicting goals, out of which only few can be achieved.

Goals have some uncertainty of being achieved and you need to weigh likelihood of success against the importance of a goal.



Model − knowledge about “how the things happen in the world”.

Link 2

The Number and Types of Agents in Artificial Intelligence

There are five different types of intelligent agents used in AI. They are defined by their range of capabilities and intelligence level:

Learning agents:

A learning agent in AI is the type of agent that can learn from its past experiences or it has learning capabilities. It starts to act with basic knowledge and then is able to act and adapt automatically through learning.

These agents employ an additional learning element to gradually improve and become more knowledgeable over time about an environment.

Model − knowledge about “how the things happen in the world”.

Link 2

The Structure of Agents in Artificial Intelligence

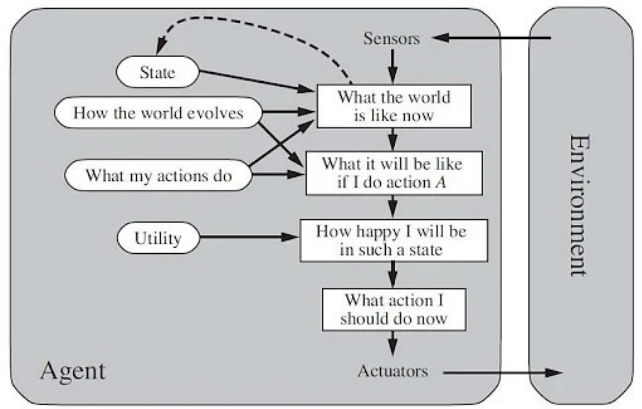
Agents in Artificial Intelligence follow this simple structural formula:

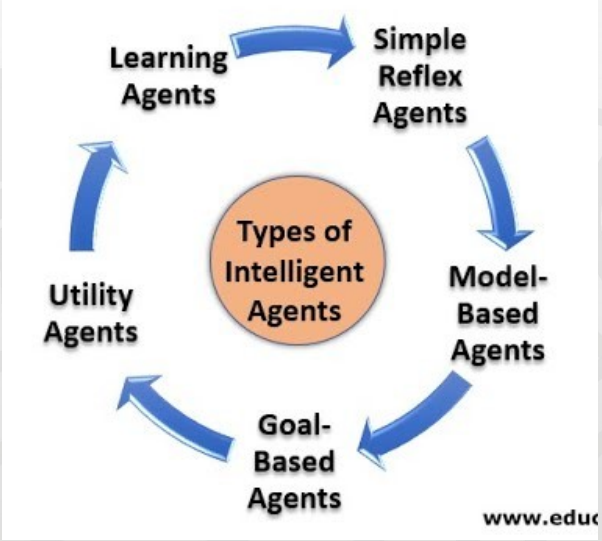
Architecture + Agent Program = Agent

Architecture: This is the machinery or platform that executes the agent.

Agent Function: The agent function maps a precept to the Action, represented by the following formula: f:P* - A

Agent Program: The agent program is an implementation of the agent function. The agent program produces function f by executing on the physical architecture.





Rationality: Rationality is nothing but status of being reasonable, sensible, and having good sense of judgment.

What Are Agents in Artificial Intelligence Composed Of?

Agents in Artificial Intelligence contain the following properties:

Environment

The agent is situated in a given environment.

Autonomous

The agent can operate without direct human intervention or other software methods.

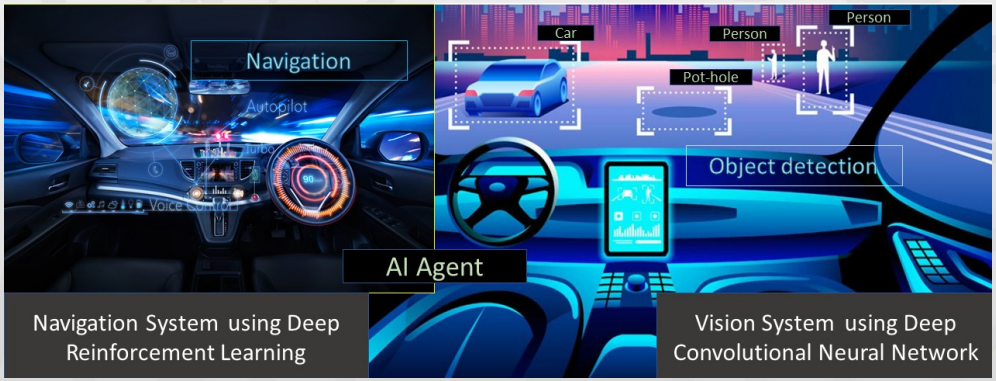
Flexibility

Proactive: Agents shouldn't only act in response to their surroundings but also be able to take the initiative when appropriate and effect an opportunistic, goal-directed performance.

Social: Agents should work with humans or other non-human agents.

Reactive

Reactive systems maintain ongoing interactions with their environment, responding to its changes.



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Thanks

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