



SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING-IOT Including CS&BCT

**COURSE NAME :19SB601 ARTIFICIAL INTELLIGENCE AND NATURAL
LANGUAGE PROCESSING**

III YEAR / VI SEMESTER

Unit II-AGENTS AND ENVIRONMENTS

Topic : Agents and Environment

ARTIFICIAL INTELLIGENCE





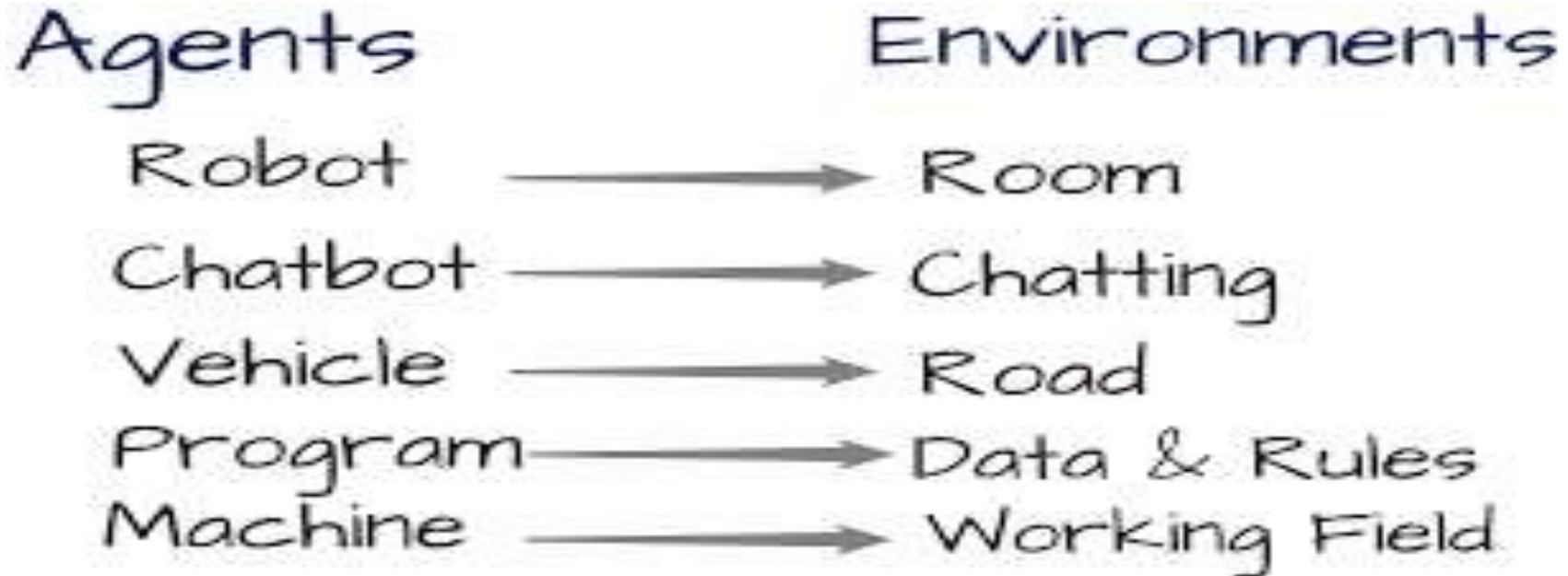
Agent and Environment

AGENT

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

OR

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.





Agent and Environment-Types

Human Agent

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

Robotic Agent

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

Software Agent

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



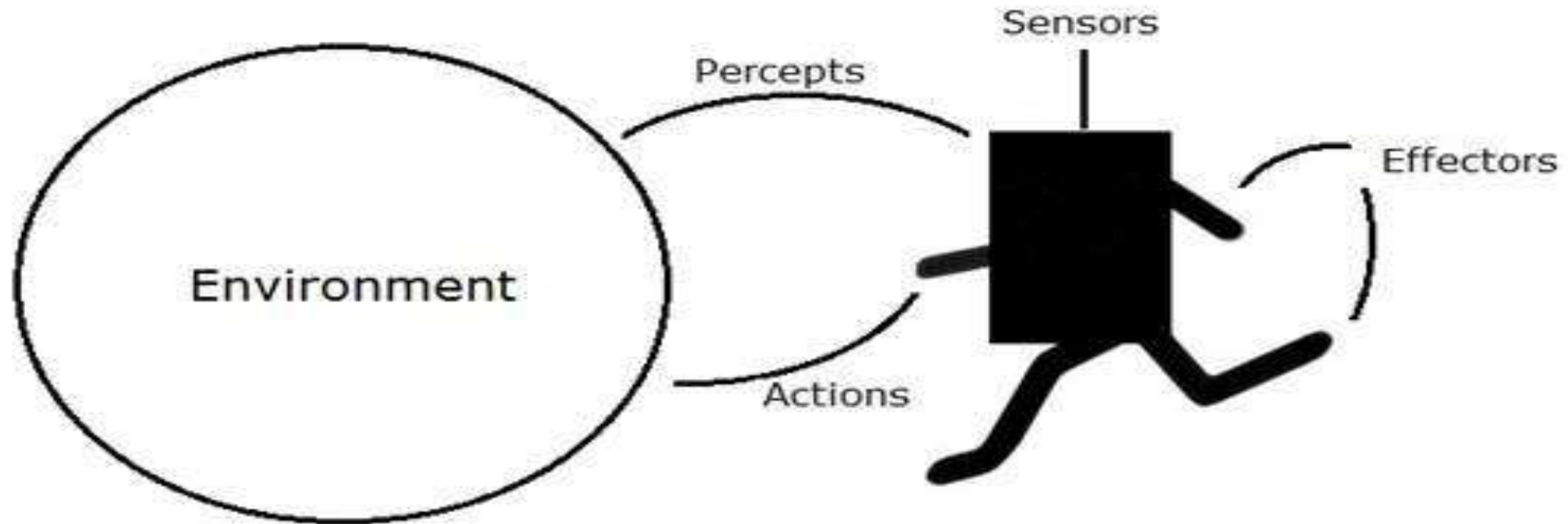
Rules all AI Agents



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.

Agent and Environment





Features of Environment



As per Russell and Norvig, an environment can have various features from the point of view of an agent:

1. Fully observable vs Partially Observable
2. Static vs Dynamic
3. Discrete vs Continuous
4. Deterministic vs Stochastic
5. Single-agent vs Multi-agent
6. Episodic vs sequential
7. Known vs Unknown
8. Accessible vs Inaccessible



Fully observable vs Partially Observable:

- If an agent sensor can sense or access the complete state of an environment at each point of time then it is a **fully observable** environment, else it is **partially observable**.
- A fully observable environment is easy as there is no need to maintain the internal state to keep track history of the world.
- An agent with no sensors in all environments then such an environment is called as **unobservable**.



Deterministic vs Stochastic:



- If an agent's current state and selected action can completely determine the next state of the environment, then such environment is called a deterministic environment.
- A stochastic environment is random in nature and cannot be determined completely by an agent.
- In a deterministic, fully observable environment, agent does not need to worry about uncertainty.



Episodic vs Sequential

- In an episodic environment, there is a series of one-shot actions, and only the current percept is required for the action.
- However, in Sequential environment, an agent requires memory of past actions to determine the next best actions.



Single-agent vs Multi-agent



- If only one agent is involved in an environment, and operating by itself then such an environment is called single agent environment.
- However, if multiple agents are operating in an environment, then such an environment is called a multi-agent environment.
- The agent design problems in the multi-agent environment are different from single agent environment.



Static vs Dynamic



If the environment can change itself while an agent is deliberating then such environment is called a dynamic environment else it is called a static environment.

Static environments are easy to deal because an agent does not need to continue looking at the world while deciding for an action.

However for dynamic environment, agents need to keep looking at the world at each action.

Taxi driving is an example of a dynamic environment whereas Crossword puzzles are an example of a static environment.



Discrete vs Continuous:

- If in an environment there are a finite number of percepts and actions that can be performed within it, then such an environment is called a discrete environment else it is called continuous environment.
- A chess game comes under discrete environment as there is a finite number of moves that can be performed.
- A self-driving car is an example of a continuous environment.



Known vs Unknown

- Known and unknown are not actually a feature of an environment, but it is an agent's state of knowledge to perform an action.
- In a known environment, the results for all actions are known to the agent. While in unknown environment, agent needs to learn how it works in order to perform an action.
- It is quite possible that a known environment to be partially observable and an Unknown environment to be fully observable.



Accessible vs Inaccessible

If an agent can obtain complete and accurate information about the state's environment, then such an environment is called an Accessible environment else it is called inaccessible.

An empty room whose state can be defined by its temperature is an example of an accessible environment.

Information about an event on earth is an example of Inaccessible environment.



Any Query????



Thank you.....