Tutorial No:-01

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subject :- AI

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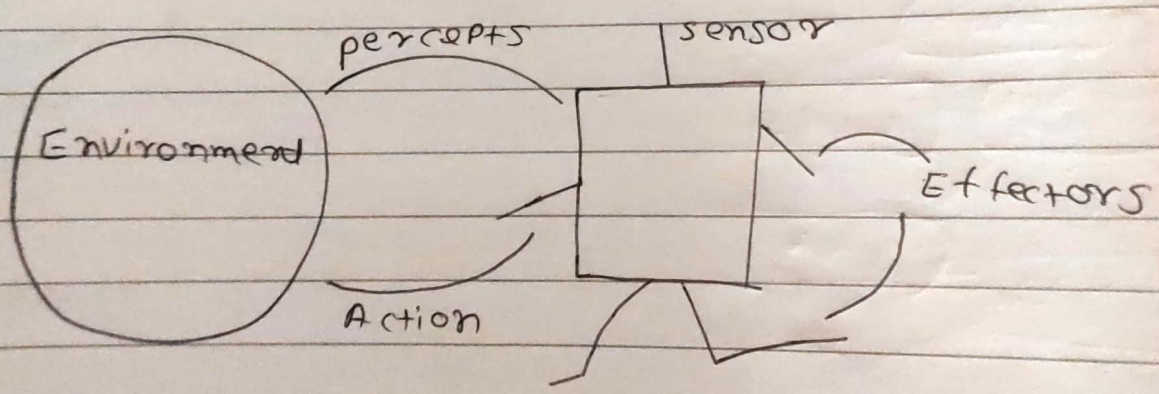
Tutorial :- Design of Intelligent Agent

Aim :- To understand the concept of Agent Abstraction by studying definition of Rational Agent, Agent environment, Task Environment Descriptors environment types.

Theory :- An Artificial Intelligent (AI) system is composed of an agent and it en-vironment. The agents act in their environment. An agent is anything that can perceive it's environment through sensors and acts upon that environment.



AI Agent with Environment.

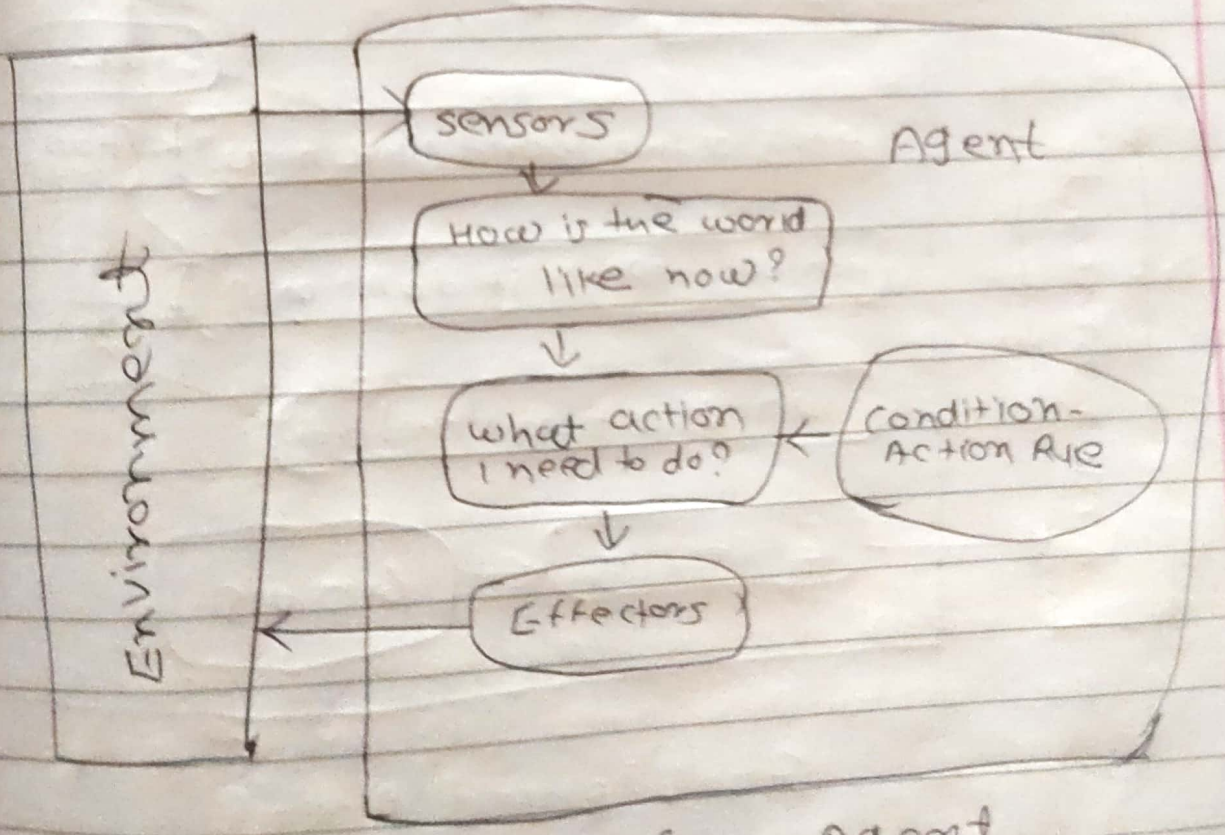
Agent in Particular can be :-

- Human agent has sensory organs such as eyes, ears, nose, thongue and skin parallel to the sensors, and other organs such as hands legs, mouth for effectors.

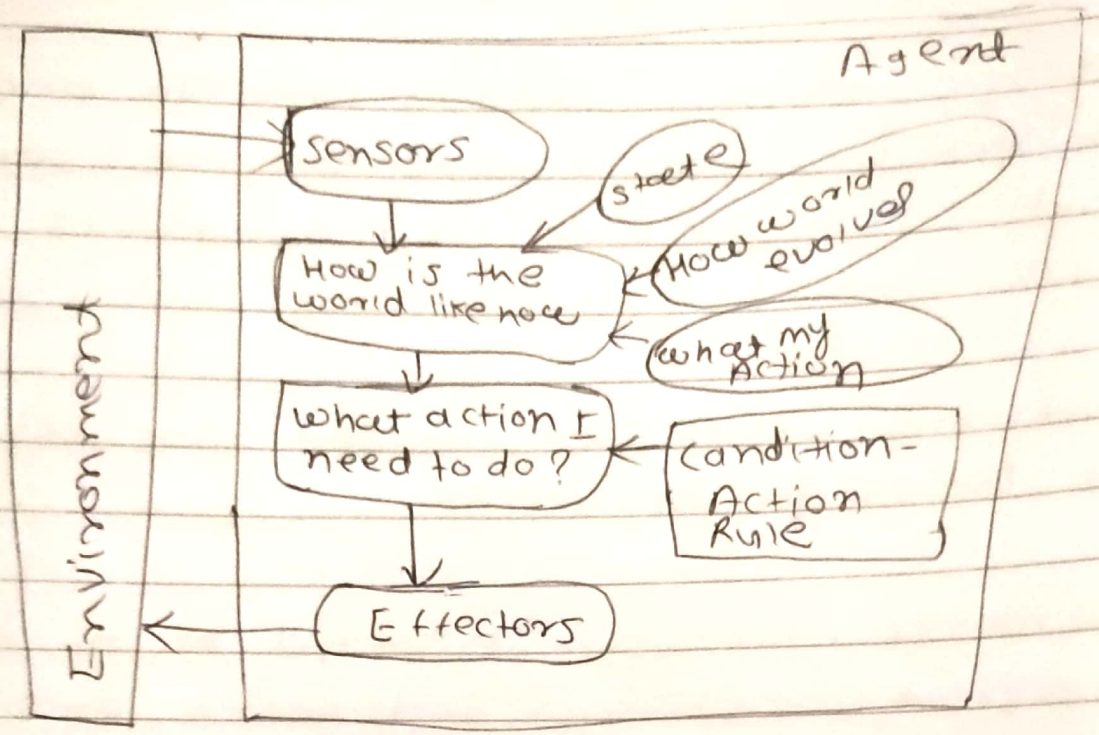
- Robotic agent :- Replaces cameran and infrared range finders for the sensors, and various motors and actuators for effectors.

- software agent has encoded bit strings as it's Programs and actions.

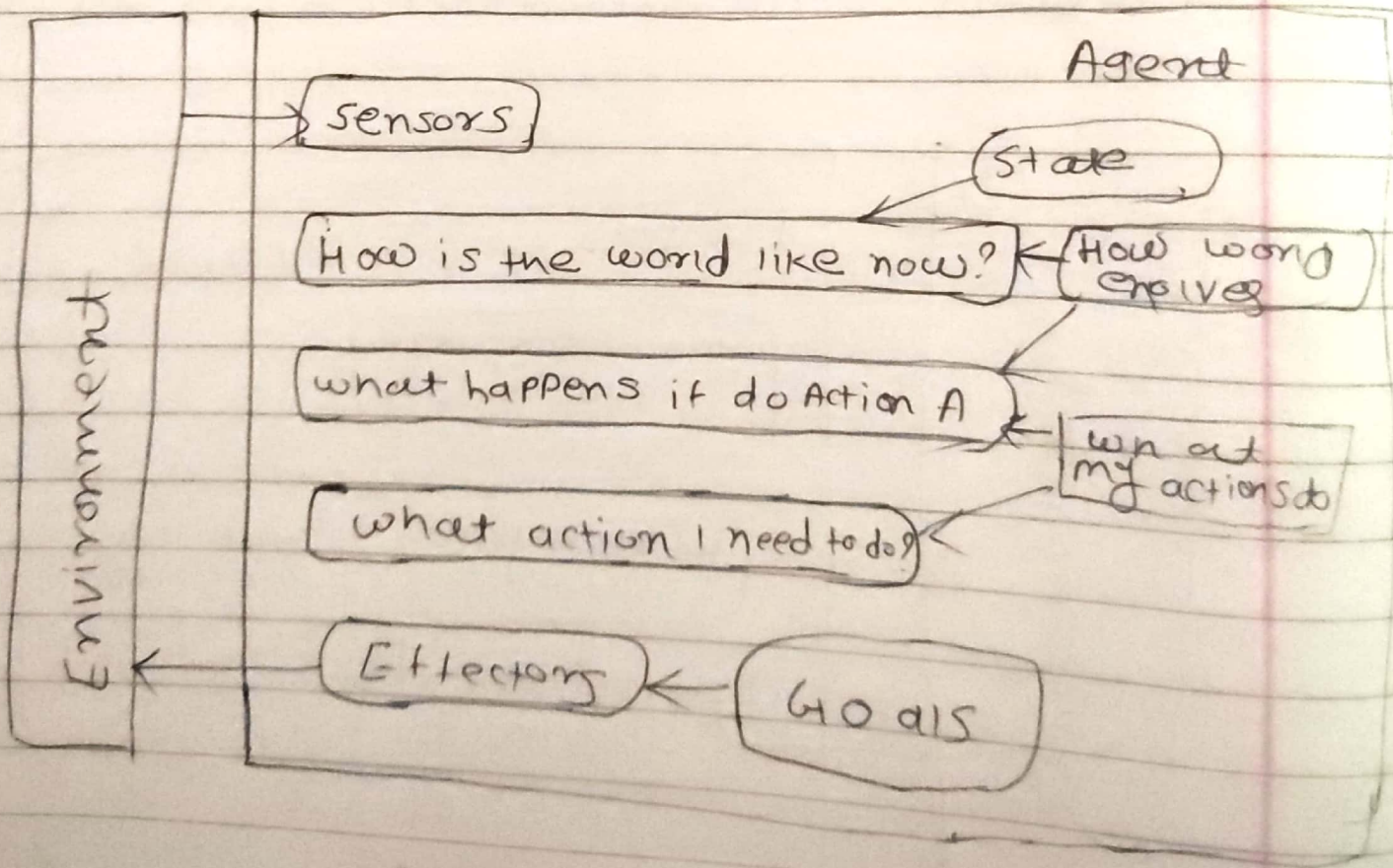
- Agent structure can be viewed as a combination of Agent architecture and Agent program. Agent Architecture refers to the machinery that an agent executes on whereas Agent program is an implementation of an agent function.



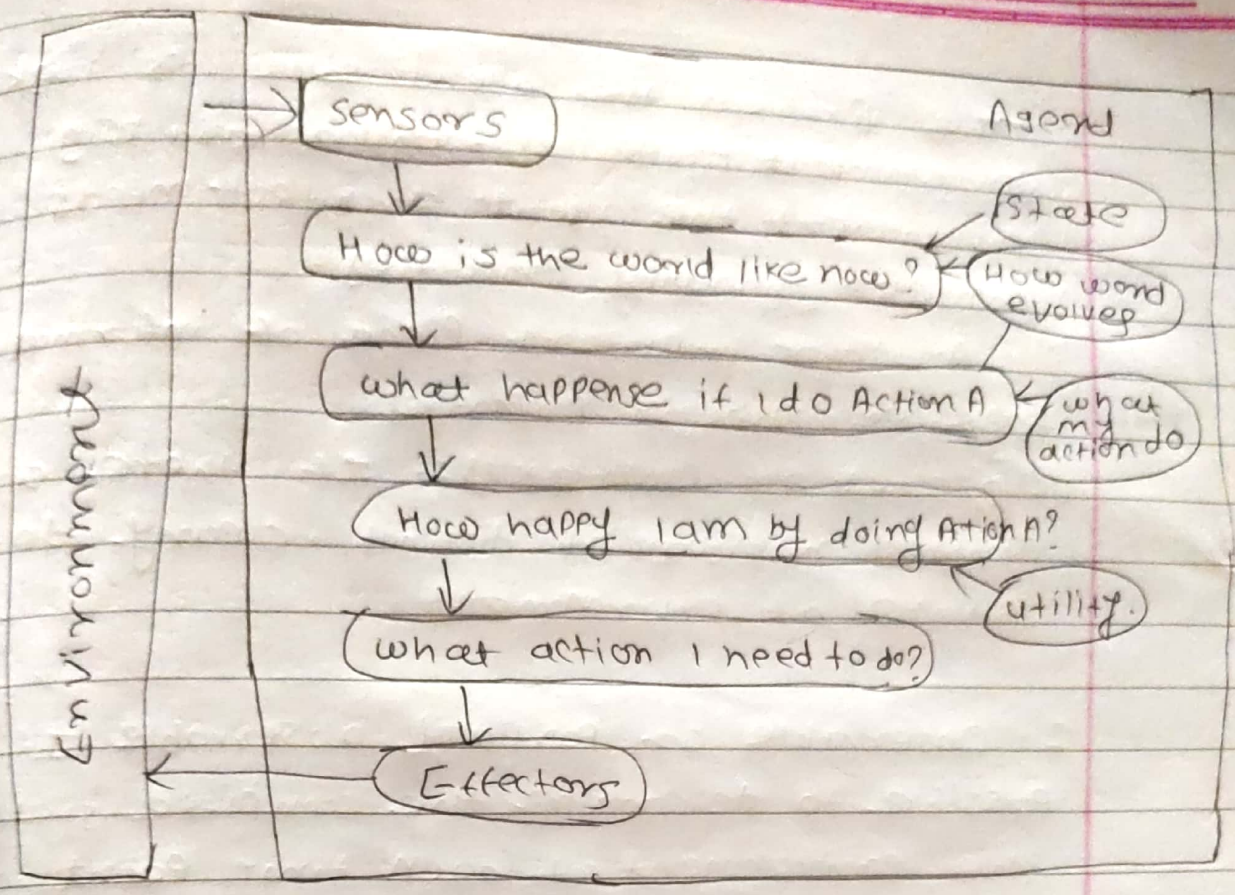
Simple Reflex Agent



Model Based Reflex Agent



Goal Based Agent



Utility Based Agent:

As Seen in figure 2a Simple Reflex agents choose action only based on the current percept only. They are rational only if a correct decision is made only on the basis of current precept. Agent environment for such agents is fully observable. Model Based Reflex Agents as shown 2b we a model of the world to choose their action.

An AI agent is referred to as Rational Agent. A rational agent always Performs right action. where the right action means the action that causes the agent to be most succesful in the given percept sequence.

The Problem the agent solves is task environment properties. while analysing task environment the agent architect needs to consider following properties.

Another important piece of information is task environment properties.

1. Discret or continuous :- If there are a limited number of distinct, clearly defined state of environment.

2. Observable or Partially observable :- If it's possible to determine the complete state of the environment at each time point from the process

3. Static or Dynamic if the environment does not change while an agent is acting.

4. Deterministic or Non-deterministic :- If the next state of the environment is completely determined by the current state

5. Episodic or sequential :- In an episodic environment, each episode of events consists of the agent Perceiving and then acting.

6. single agent or multiple agents The environments may contain single agent or other agents which may be of the agent.

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7. Accessible or Inaccessible If the agent's sensory apparatus can have access to the complete state of environment, then the environment is accessible to that agent.

Working :- search internet for AI based Application in following scenarios and identify who agent for that application Further list out PEAS descriptors for agent enori environment in each of the case. finally try to classify task environment properties like a list of attributes from above list of 7 task environment properties.

1] Deep Blue chess playing computer program Performance measure: win case, draw, safety of chess pieces, safety of king piece, no. of moves, time for each move Environment: chess board, chess pieces.

Task environment properties; Discrete, fully observable, static, Deterministic, sequential, Single agent, Accessible.

2] Eliza the Natural Language Processing computer Program created from 1964 to 1966 of the MIT Artificial Intelligence Laboratory by Joseph weizenbaum.

Performance measure: understanding user, maintaining conversation.

Environment user, Program keyboard, user text input, output window Actuators Texts.

3] Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics
Performance measure understanding user, maintain conversation Humans, objects Actuators: Arms mouth, legs, speaker
sensors: Eyes, ears, mic, audio, speaker
Task environment Properties, continuos, fully observable, Dyanamic, Deterministic sequential, single Agent, Accessible

4] Apples virtual assistant siri:
Performance measure: understanding user text and speech producing best result sume (trigger) response speed.
Environment: user, speech, text
Actuators: mobile screen, speaker
sensors: Mobile screen, mic
Task Environment Properties: continous, fully observable, Static, Deterministic, single agent, Accessible.

5] Automated cross word solver
Performance measure:- understanding hints onlyzing hidden and visible letters time to solve, Environment, visible letters, cross word

Actuators :- Desktop Screen

Sensors :- Crossword board

Task Environment Properties : Discrete, fully observable, Static, Deterministic, Episodic single agent, Accessible.