K.G.C.E.
Karjat - Raigad

Tutorial-01.

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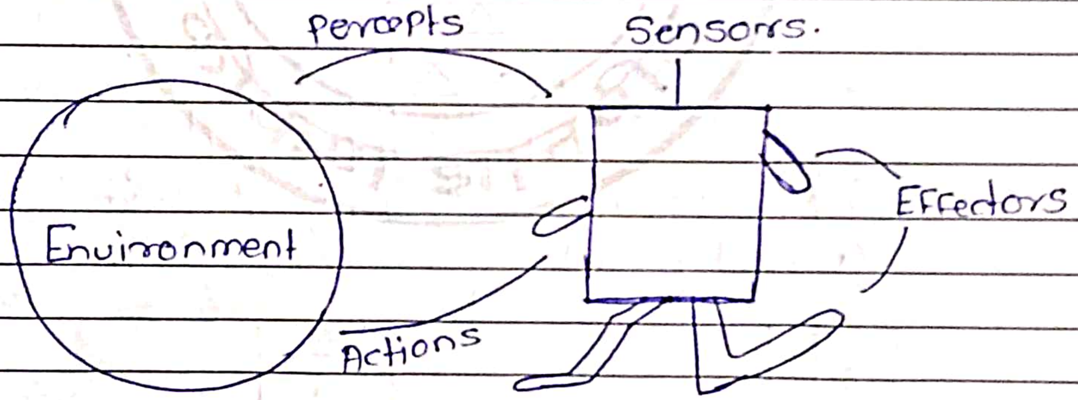
Subject : AI

Module - 1

Tutorial 1 : Design of Intelligent Agent.

Aim - To understand the concept of agent abstraction by studying: definition of Rational Agent, Agent environment, Task environment Discriptions, environment types.

Theory : AI system is composed of an agent and it's environment. The agents acts in their environment. An agent is anything that can percieve it's environment through sensors & acts upon that environment through effectors.

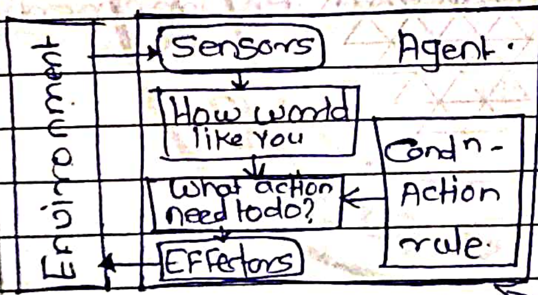


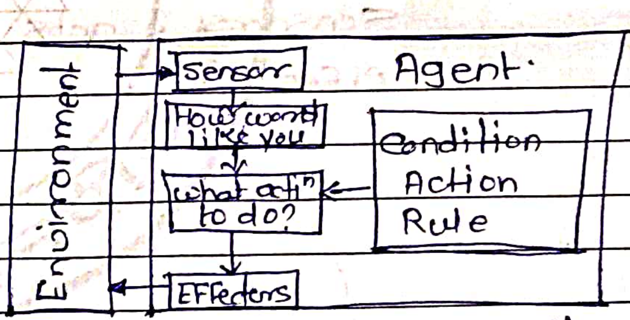
- Human agent has sensory organs such as eyes, ears, nose tounge & skin parallel to the sensors & other organs such as hands legs, mouth for effectors.

Robotic agent replaces cameras & infrared range finders for the sensors & various motors & actuators for effectors.

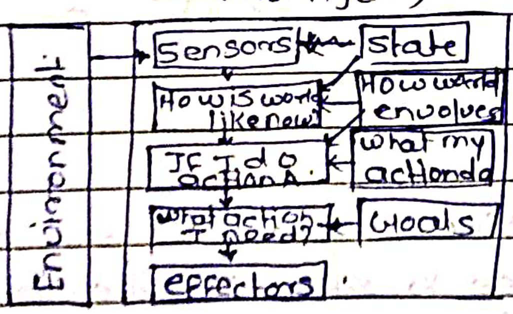
Software agent has ended bit strings as it's programs & actions.

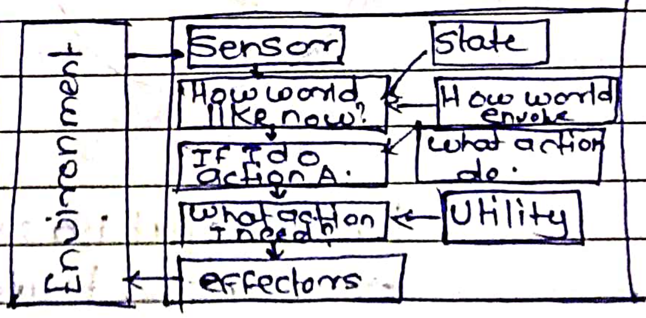
Agent structures can be viewed as a Combⁿ of agent architecture and agent program. Agent Architecture refers to the machinery that an agent executes on whereas agent program is an implementation of an agent function.





(Model based Reflex Agent)   (Simple Reflex Agent)





(Goal based agent).   (utility based agent)

Simple Refler agents choose actions only based on the current percept only. They are rational only if a correct decision is made only on the basis of current percept. Agent environment for such agents is fully observable. Model based Refler Agents as 2b use a model of the world to choose their actions. They maintain an internal state as a persistent info^. Agent take into account how it's actions affect the world. Goal based agents choose their actions in order to achieve goals. Goal-based approach is more flexible than reflex agent since the knowledge supporting a decision is explicity modeled. Finally Utility based agents choose actions based on utility for each state. Goals are indequate when there are conflicting goals, out of which only few can be achieved, goals have some uncertainly of being achieved goal. On other hand utility function objectively map how much being in a perticular state is desirable.

An AI agent is reffered to as Rational Agent. It always performs right action. where the right action means the action that causes the agents to be most successful in given percept sequence.

The problem the agent solves is characterized by performance measure, Environment, Actuators & Sensors (PEAS). PEAS descriptors provide important insight into agent & the task environment it operates in these insights are very useful in agent design.

The agent architect needs to consider following properties:

1. Discrete or Continuous: If there are a limited number of distinct clearly defined states of the environment, the environment is discrete otherwise it's continuous.

2. Observable or partially observable: If it is possible to determine the complete state of environment at each time point from the percepts it is observable.

3. Static or Dynamic: If the environment does not change while an agent is acting then it's static.

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

5. 5. Episodic or Sequential: In an episodic environment, each episode of events consist of the agent perceiving & then acting. The quality of it's action depends just on the episode itself.

6. Single agent or Multiple agents: The environment may contain single agent or other agents which may be of the same or different kind as that of the agent.

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

Taking Search for AI based applications in following scenarios & identify who is agent for that applications. Further list out PEAS descriptors for agent environment in each of the case.

- list of 7 task environment properties:

1. Autonomous Lunar Rover.
2. Deep blue chess playing computer program.
3. Eliza the natural language Processing Computer program created from 1964 to 1966 at the MIT Artificial Intelligence Laboratory by Joseph Weizenbaum.

4. Automatic Portfolio management.
5. Sophia is a social humanoid robot developed by hong kong based company Hanson Robotics
6. Alpha Go is a computer program that plays the board game Go.
7. Apples Virtual assistance Siri.
8. Endurance: A Companion for Dementia patients
9. Casper: helping Insomniacs Get Through the Night.
10. Marvel: Guarding the Galaxy with Comic-Book Crossovers
11. Automated Cross word Solver.

Resources: The above diagrams are taken from tutorial available at Tutorials point.