

Tutorial 1 :- Design of Intelligent Agent

Aim :- To understand the concept of Agent

Abstraction by studying definition of Rational Agent - Agent environment, Task environment Descriptions, environment types.

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

Theory :- An Artificial Intelligence (AI) system is composed of an agent and its environment. The agents act in their environment through sensors and acts upon that environment through effectors.

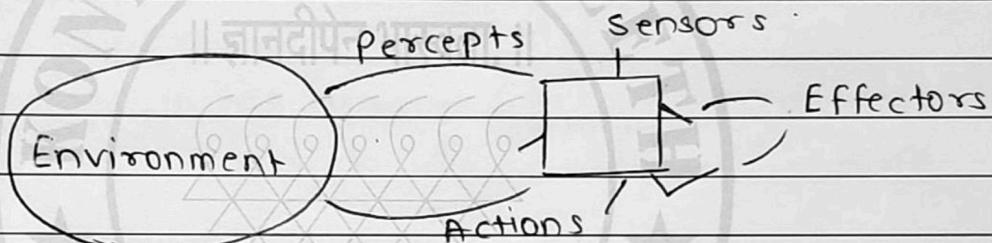


fig 1 AI Agent with Environment

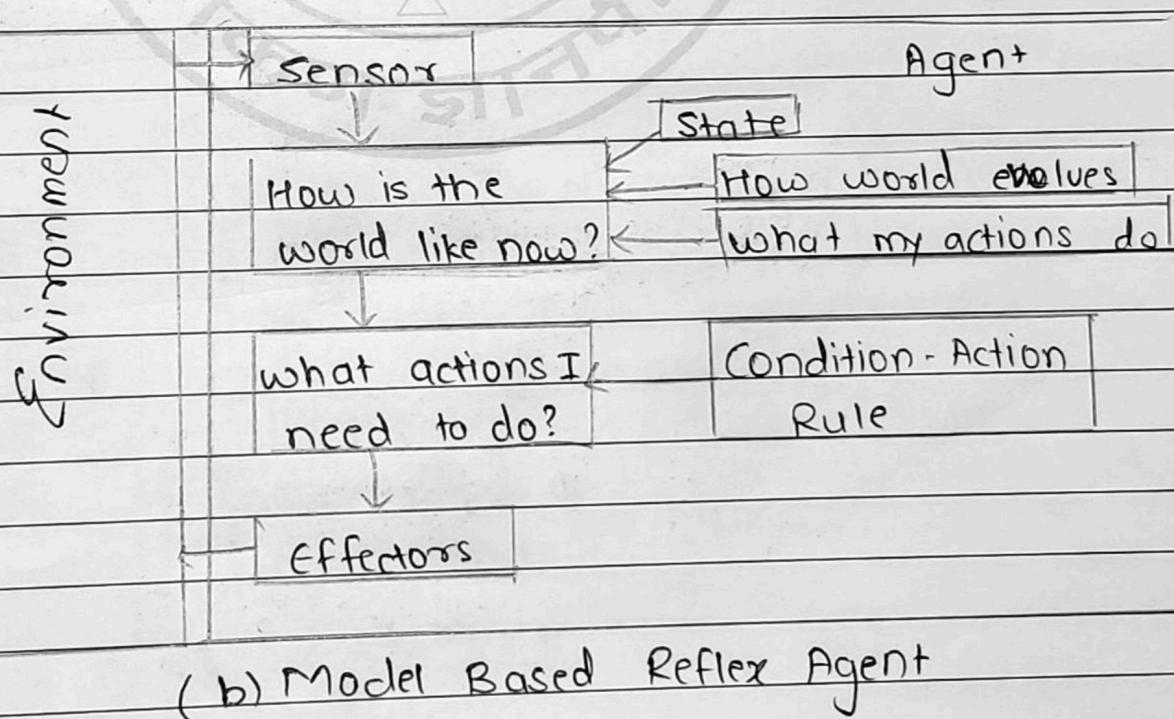
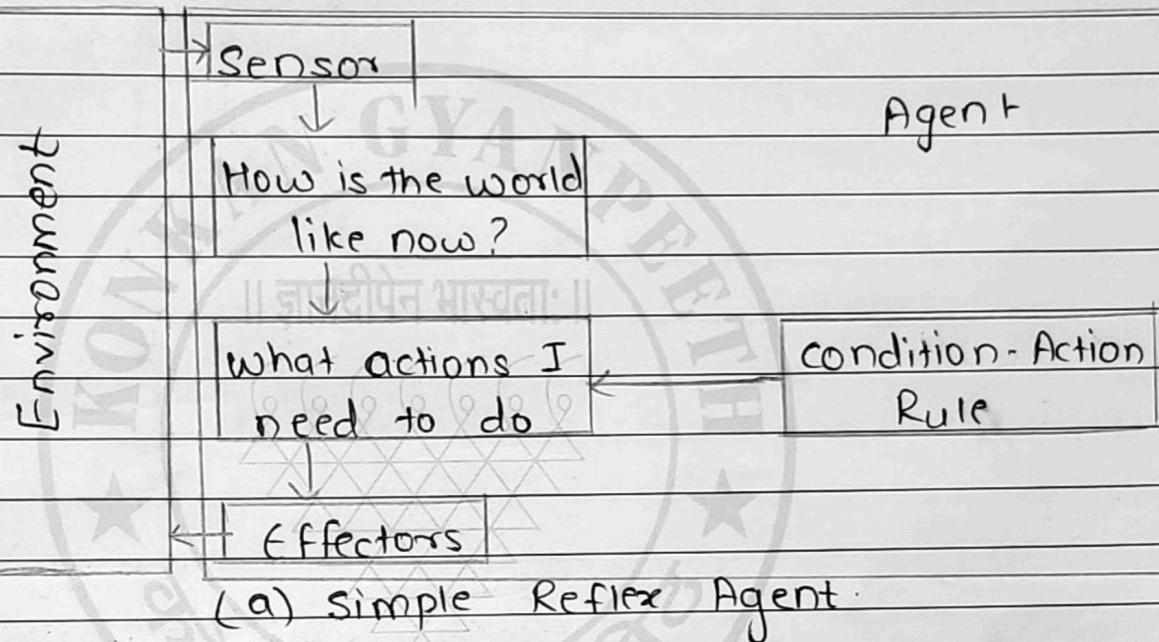
Human agent has sensory organs such as eyes, ears, nose, tongue and skill parallel to sensors, and other organs such as hands, legs, mouth for effectors.

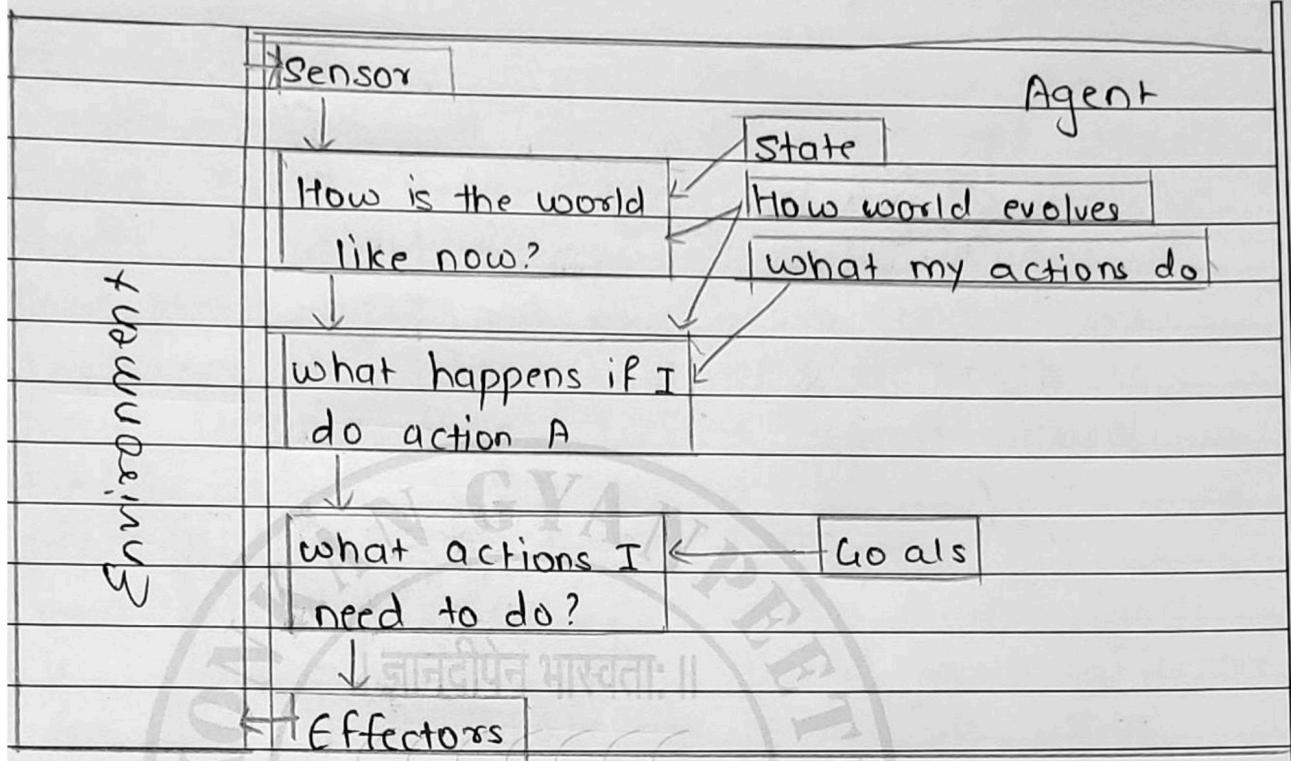
Robotic agent replaces cameras and infrared range finders for sensors, and various motors and actuators for effectors.

Software agent has encoded bit strings as its programs and actions.

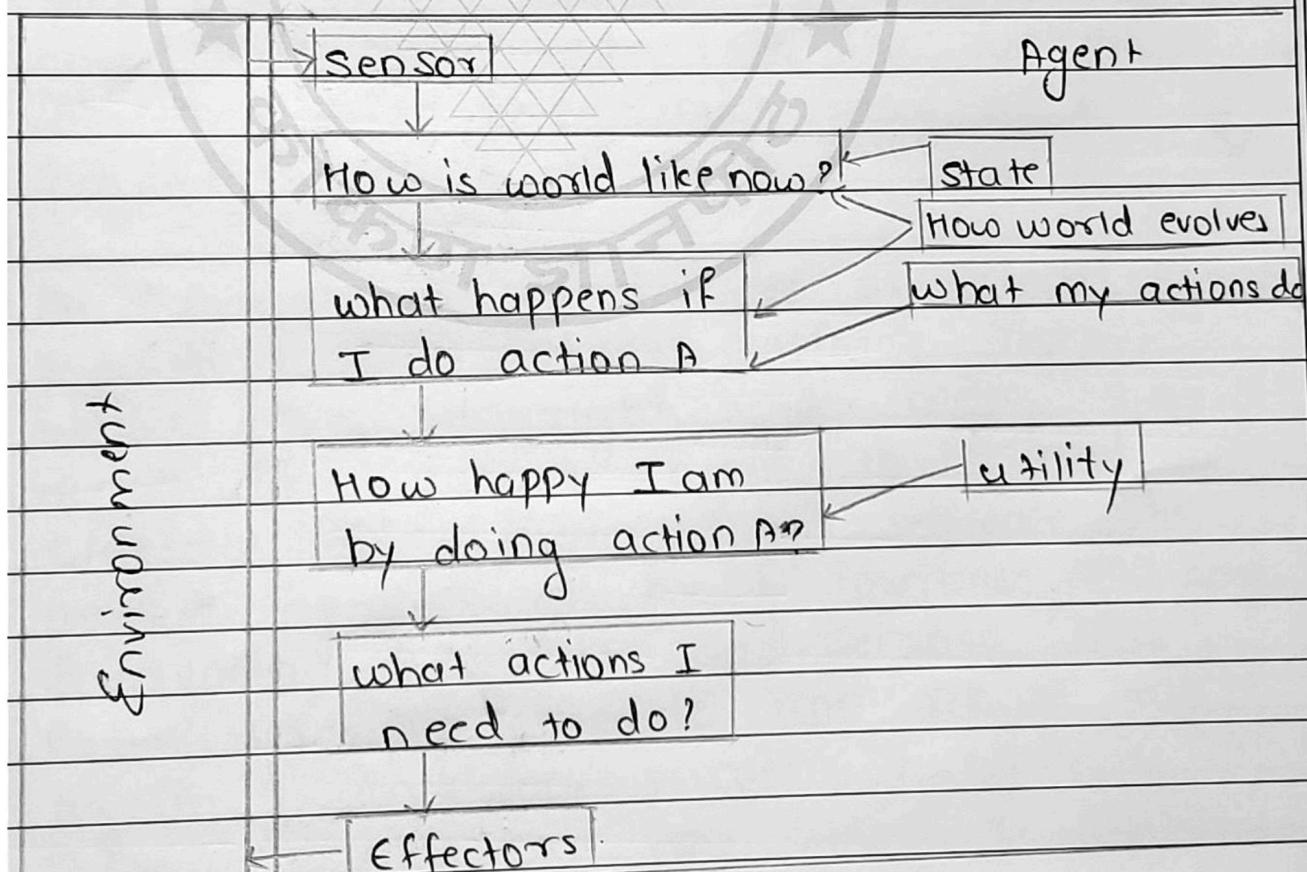
Agent structure can be viewed as combination

of Agent architecture and Agent Program. Agent Architecture refer to machinery that an agent execute on whereas Agent Program is an implementation of an agent functions. four imp types of agent architecture.





(c) Goal Based Agent



(d) utility Based Agent

fig 2. Agent Architecture Types

As seen in fig 2a, simple Reflex agent choose action only based on current percept only. Model Based Reflex Agent in fig 2b use model of world to choose their actions. Goal based agent in 2c, choose their actions in order to achieve goal, this approach is more flexible than reflex agent since the knowledge supporting a decision is explicitly modeled, thereby allowing for modifications. Finally, the Utility Based Agents in fig 2d choose actions based on a preference for each state. Goals are inadequate when there are conflicting goals, out of which only few can be achieved, goals have some uncertainty. On other hand utility function objectively map how much being in a particular state is desirable.

An AI agent is referred to as Rational Agent. A rational agent always performs right action, where the right actions means - the action that cause the agent to be most successful in the given percept sequence. The problem agent solves by Performance Measure, Environment, Actuators and sensors (PEAS). PEAS descriptors provide imp insight into agent of task environment it operates in. These insights are very useful in agent design.

Another imp piece of info is task environment properties.

- 1) Discrete or continuous :- If there are a limited no. of distinct clearly defined, states of environment, the environment is discrete; otherwise it is 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; otherwise it is only partially observable.
- 3) static or Dynamic :- If the environment does not change while an agent is acting, then it is static, otherwise it is dynamic.
- 4) Deterministic or Non-deterministic :- If next state of environment is completely determined by current state of action of agent, then the environment is deterministic, otherwise non-deterministic.
- 5) Episodic or Sequential :- In episodic environment each episode of event consists of agent perceiving and then acting. The quality of action depends just on episode itself. This are much simpler because the agent does not need to think ahead. eg. Part Picking robots. Complementary to this is sequential environment where current action dictates the future action.
- 6) Single agent or Multiple agents :- The environment may contain single agents or other agents which may be of same or different

kind as that of the agent.

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

Working :- Search internet for AI based application in following scenarios and identify who is agent for application. further list out PEAS descriptor for agent environment in each of case. finally try to classify task environment properties like a list of attributes from above list of 7 task environment properties.

1) Autonomous Lunar Rovers.

2) Deep Blue chess Playing computer program.

3) Eliza the natural language Processing computer program created from 1964 to 1966 at MIT AI laboratory by Joseph Weizenbaum.

4) Automatic Portfolio management.

5) Sophia is a social humanoid robot developed by Hong Kong based company Hanson Robotics.

6) AlphaGo is a computer program that plays the board game Go. It was developed by Alphabet Inc DeepMind lab in London.

7) Apples visual 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) Automate crossword solver