

Tutorial 1 :- 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 its environment.
The Agents act in their environment. An
agent is anything that can perceive its environment
through sensors & acts upon that environment
through effectors.

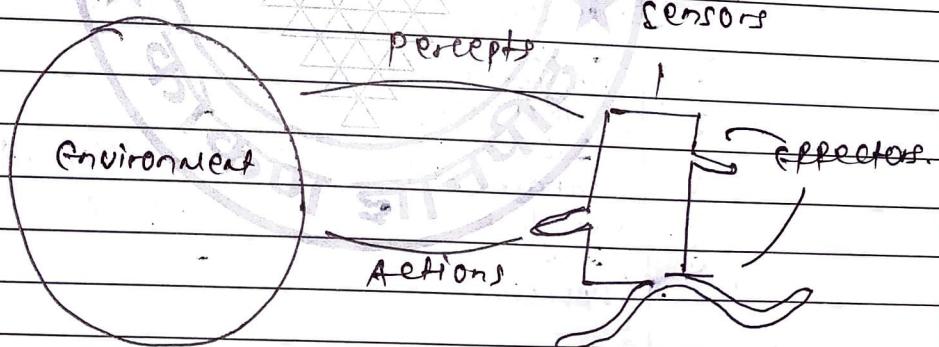


Fig 1:- AI agent with environment

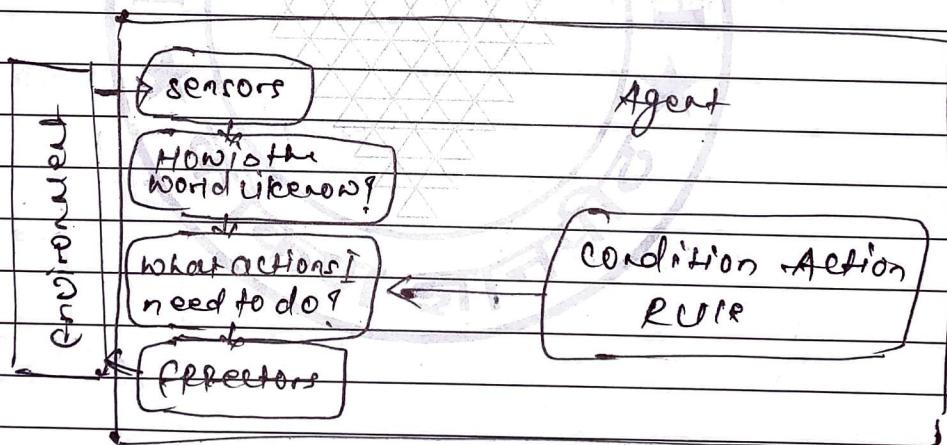
Agent in particular can be :-

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

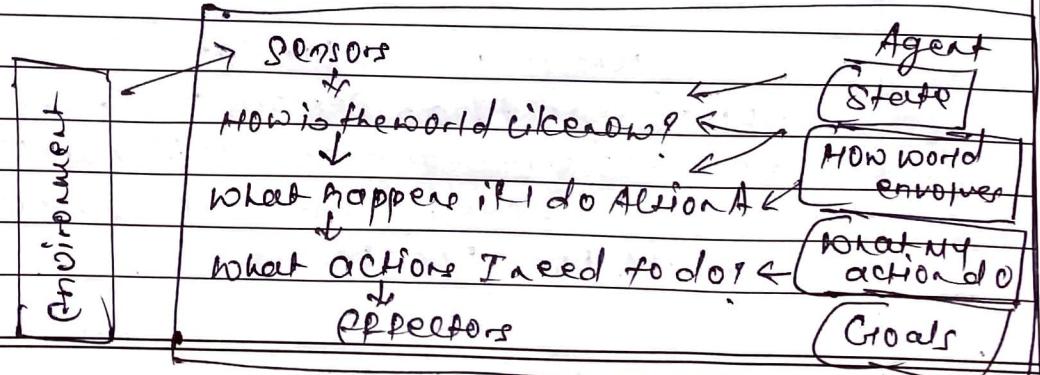
Robotic agent replaces cameras & infrared range finders for the sensors and various motors and actuators for effectors.

Software agent has encoded bit strings as its programs and actions

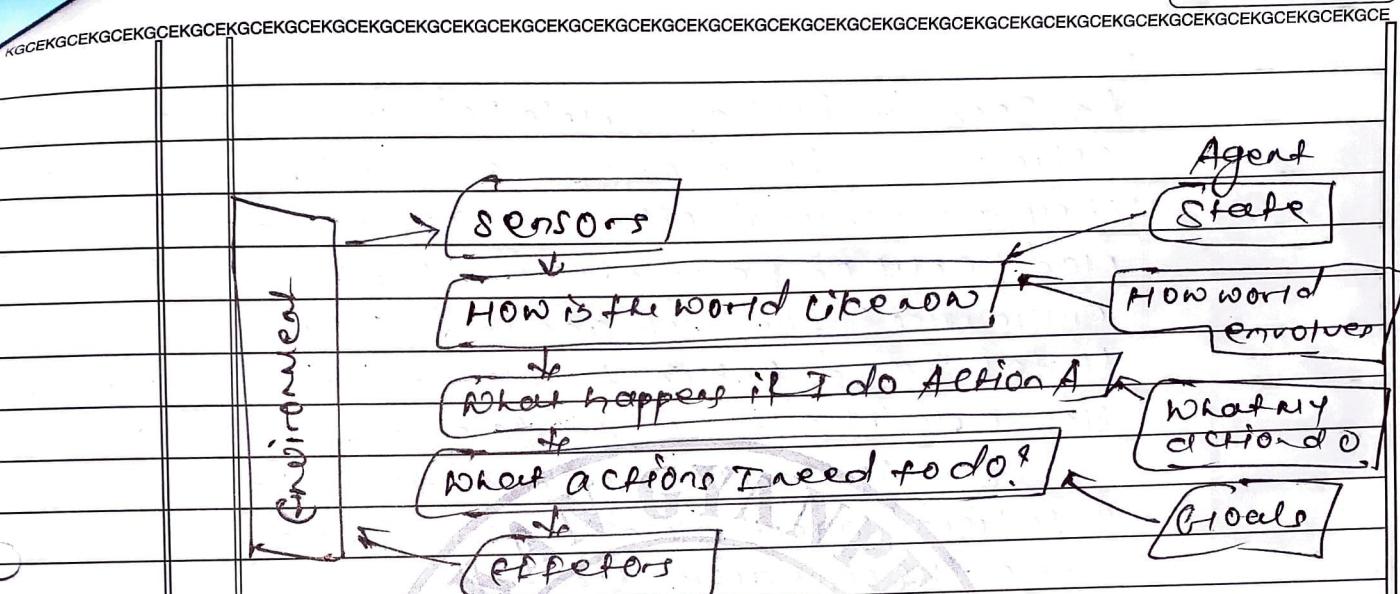
Agent structure can be viewed as a combination of Agent architecture & Agent program.
Fig 2 shows the important types of agent architecture



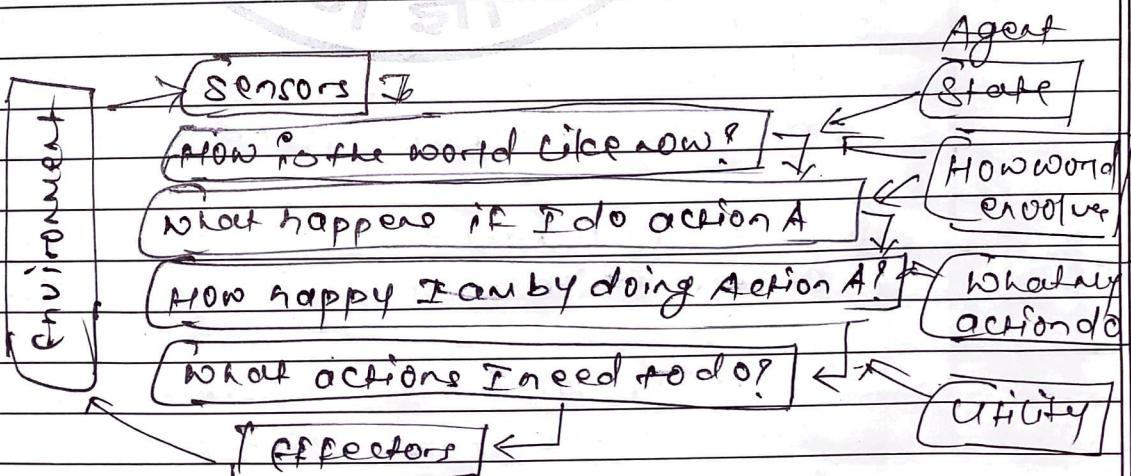
(a) Simple Reflex Agent



(b) Model Based reflex Agent



(c) Goal Based Agent



(d) utility Based Agent

Fig 2:- Agent Architecture Types

As seen in fig 2a, simple reflex agents choose actions only based on the current percept only. They are rational only if a correct decision is made only on basis of current percept. Agent environment for such agents is fully observable. Model Based reflex Agents as shown in fig 2b use a model of the world to choose their actions.

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 successful in given percept sequence.

Another important piece of information is task environment properties.

- 1) Discrete or continuous If there are limited number of distinct clearly defined states of environment, the environment is discrete.
- 2) Observable or partially observable It is possible to determine the complete state of environment at each time point from the precepts is observable.
- 3) Static Or Dynamic If the environment does not change while an agent is acting, then it is static.
- 4) Deterministic or Non-deterministic If the next state of the environment is completely determined by current state.

6) Single agent or Multiple agents the environment may contain single agent or other agents which may be of the same or different kinds that of agent

7) Accessible or Inaccessible if the agents sensory apparatus can have access to the complete state of may become

working

Search internet for AI based application in following scenario & identify who is agent for that application finally try to classify task environment properties

1) Deep Blue chess playing computer program
Performance measure :- Win/lose/draw, safety of chess pieces safety of king piece, no. of moves, time for each move

Environment :- Chess board, chess pieces

Actuators :- Desktop source, CPU

Sensor :- Chess board

Task environment properties :- Discrete, Partially Observable, static, Deterministic, sequential, single agent, Accessible

2) ELIZA the natural language processing computer program created from 1964 to 1966 at MIT

Performance measure :- Understanding user, Maintaining

Environment :- User, program, keyword, user text input

pira texts, output consider

Actuators :- Text

Sensors :- Uses texts inputs

Task environment properties :- continuous, fully
Observable

3) Sophia is social humanoid robot developed by Hong Kong based company Hanson robotics

Performance measure :- Understanding user, maintaining conversation, Facial expression

Environment :- Humanoid object ...

Actuators :- Arms, face, legs, speaker

Sensor :- Eyes, ears, mic, audio sensors

Task environment properties :- continuous, fully observable

Dynamic, Deterministic, sequential, single agent

4) Apple Virtual Assistant Siri

Performance measure :- Understanding user text & speech response speed

Environment :- User, Speech text

Actuators :- Mobile screen, Speakers

Sensors :- Mobile screen, mic, button

Task environment properties :-

Continuous, fully observable, static, Deterministic
single agent, Accessible

