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Tutorial 1: Design of Intelligent Agent

Aim:- To understand the concept of Agent Abstraction by studying defination of rational agent, agent environment Task Environment description, environment types

Theory:- An artificial intelligent (AI) system is composed of an agent and its environment. The agent act in their environment. An agent is anything that can perceive its environment through sensor & acts upon that environment through efforts.

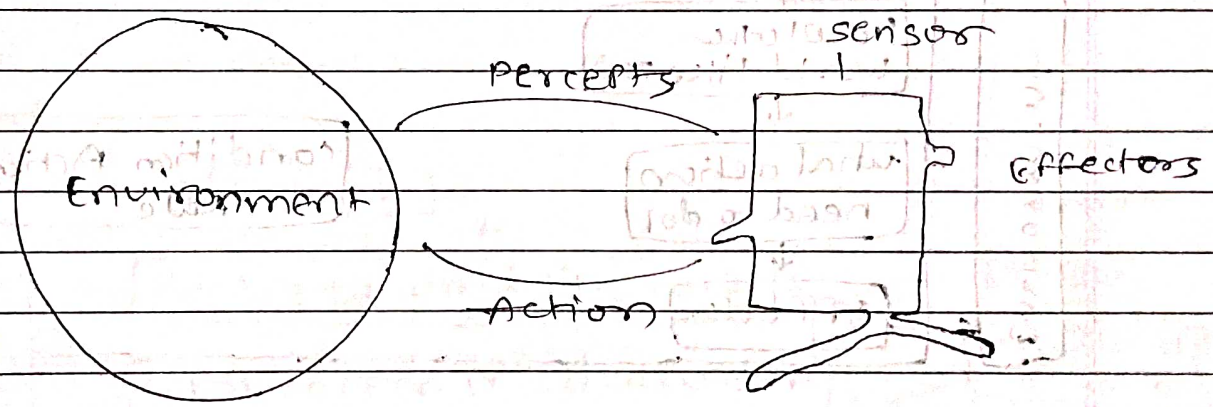


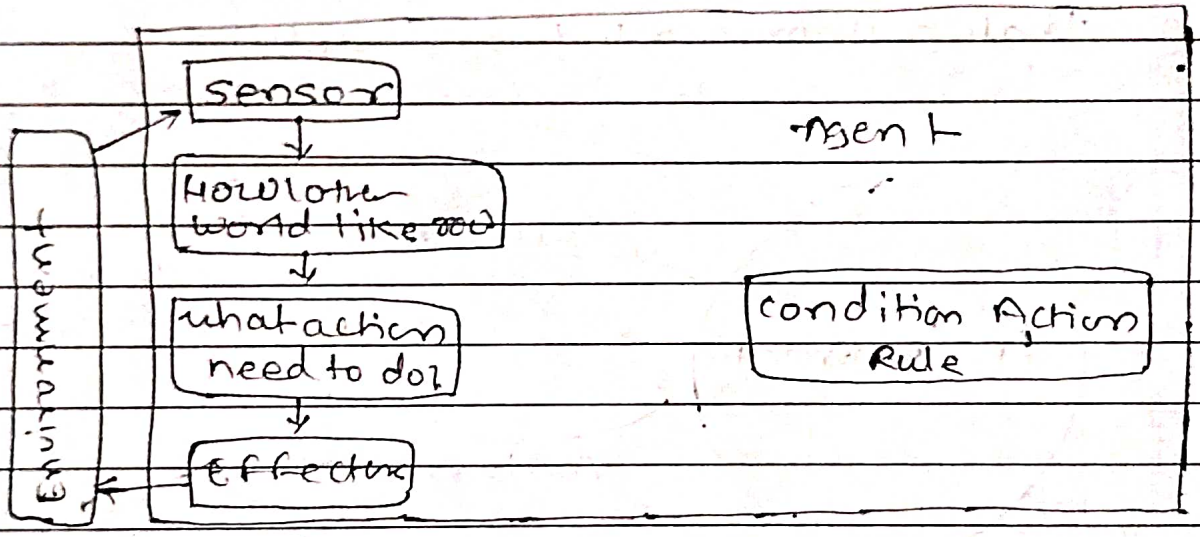
fig. AI agent with environment

agent in particular can be!
Human agent has sensor organs such as eyes, ears, nose, tongue and skin parallel to the sensor & other organs such as hands, legs, mouth for the effectors.

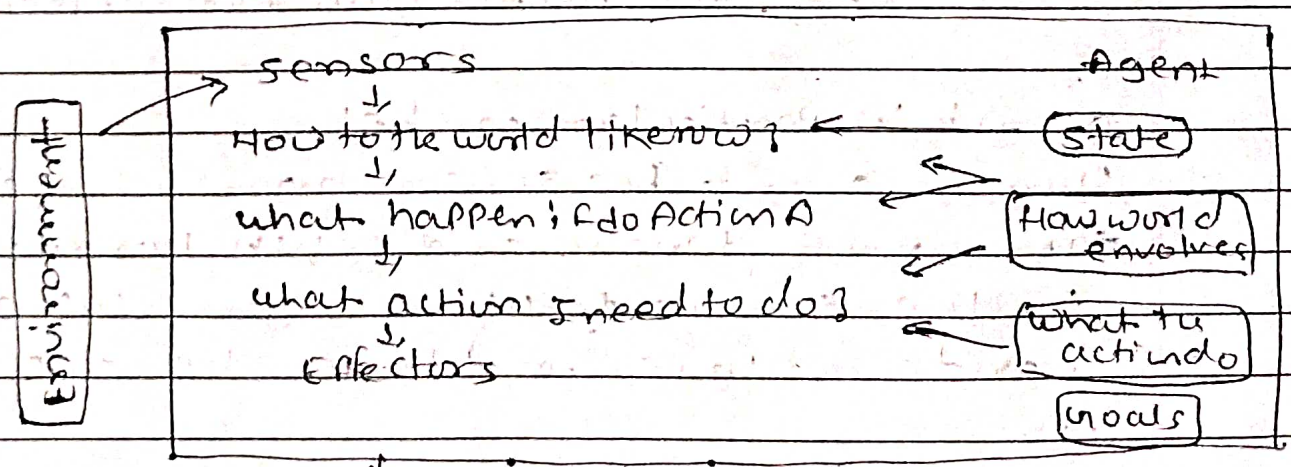
Robotic agent replace cameras & infrared range finders for the sensors and various motors and actuators for effectors.

software agent has encoded bit strings as its programs and action.

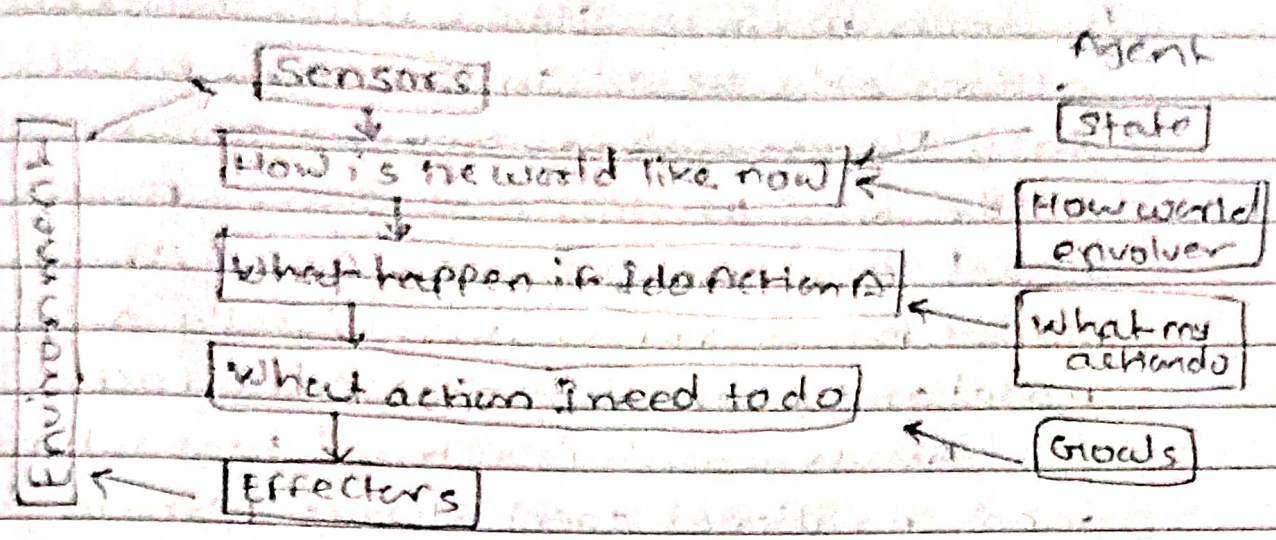
Agent structure can be viewed as a combination of agent architecture & Agent program. fig shows the important types of agent architecture.



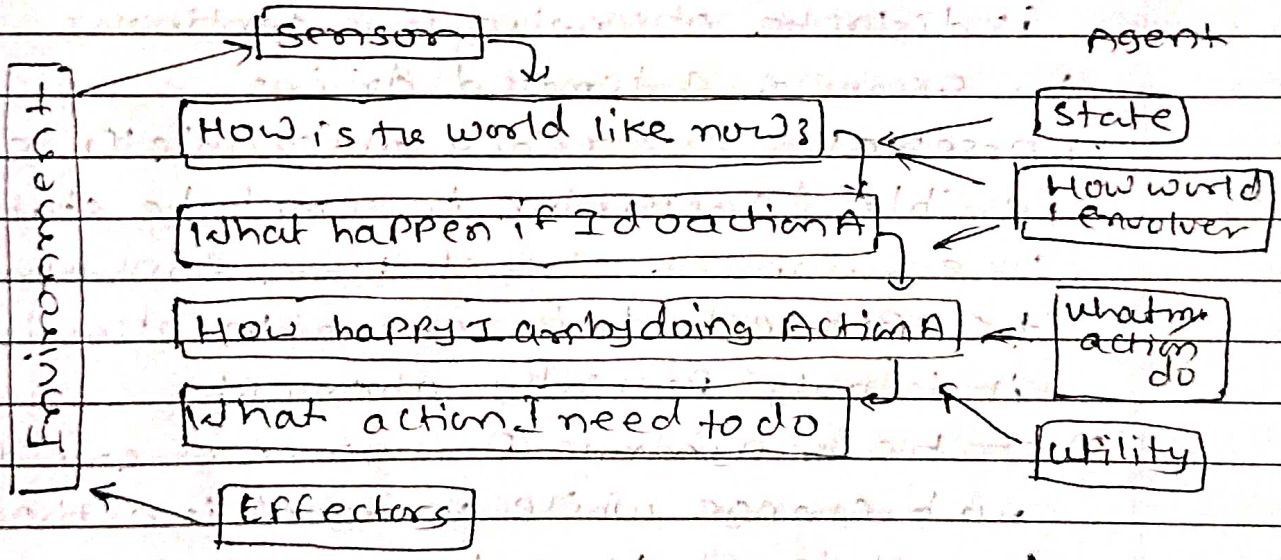
(a) single Reflex agent



(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 agent above actions only based on the current percept only they are rational only if a correct decision made only on basic of current percept Agent environment for such agent is fully model Based reflex agent is fully observable model of the world to choose their actions

An as 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 not successful in given percept sequence.

Another important piece of the information is task environment properties.

1) Discrete or continuous If there are a limited number of distinct clearly defined state of the environment the environment is discrete otherwise it is continous for example automated driving.

2) observable or Partially observable If is possible to determine the complete state of the environment at each time point from the precepts it is observable otherwise it is only Partially observable.

3) static or Dynamic If is environment does not change while an agent is acting then it is static, otherwise it is dynamic.

4) Deterministic or nondeterministic: If the next state of the environment is completely determined by the current state and the

actions of the agent then the environment is deterministic, otherwise it is non-deterministic.

5) Episodic or sequential: In an episodic environment each episode of event consist of the agent perceiving and then acting. The quality of its action depends on he just on the episode itself. subsequent episodes do not depend on the action in the previous episodes. Episodic environment are much simpler because the agent does not need to think ahead. e.g. Part picking robots. Complementary to this is sequential environment where current action decrates the future action.

6) Single agent and multiple agent: The environment may contain single agent or other agent which may be of the same or different kind of that the agent. These agent may be co operating or competing with each other.

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

Working: Search internet for AI based application in following scenarios and identify who is agent for the

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that application. Further list out PEAS descriptors for agent 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) 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) Alphago is a computer program that plays the board game Go. It was developed by alphabet Inc. Deepmind lab in London.
7) Apples virual assistance siri
8) Endurance : A companion for Dementia Patients
9) Casper : Helping Insomniac get through the night
10) Marvel : Guarding the galaxy with comic Books crossovers
11) Automated cross word solver

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answer

2)

Deep blue chess playing computer Program
performance measure :- win/lose/draw, safety of chess piece safety of king piece No. of moves time for each move
environment :- chess board / chess piece.
Actuators : desktop source, CPU
sensor : chess board
Task environment Properties : Discrete fully observable Static, Deterministic, sequential, single agent accessible.

3)

Eliza the natural language processing computer Program created from 1964 to 1966 at MIT.

performance measure : understanding user maintaining
environment : user, Program, Keyboard, user text input, Eliza texts, output window
Actuators : Text
sensors : user texts inputs
Task environment Properties : continous Fully observable

5) Sophia is social humanoid robot developed by Hong Kong based company Hason robotics
performance measure : understanding user, maintaining converversation, facial expression
environment : Humans object.

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Actuators : Arms, face, legs, speaker
sensor : Eyes, ears, mic, audio sensor
Task Environment Properties : Continous fully observable
Dynamic Deterministics, sequential single agent

9) Apple virtual Assistant siri
Performance measure : understanding user text & speech response speed
environment : user, speech text
Actuator : mobile screen, speaker
sensor : mobile screen, mic, button
Task environment properties : Continous, fully observable, static Deterministic single agent
Accesible

11) Automated crossword solver

Performance measure : understanding hints, analysis hidden & visible letter time to solve
environment : Hints, visible letter, crossword board
Actutors : Desktop screen, Program
Sensor : cross board
Task environment properties : Discrete, fully observable, static, Deterministics single agent.