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Karjat - Raigad

Tutorial No 1

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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.

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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 Intelligent (AI) system is composed of an agent & its environment. The agent act in their environment. An agent is anything that can perceive its environment through sensors and acts upon that environment through effectors. This can be clearly seen in fig 1. An agent in particular can be.

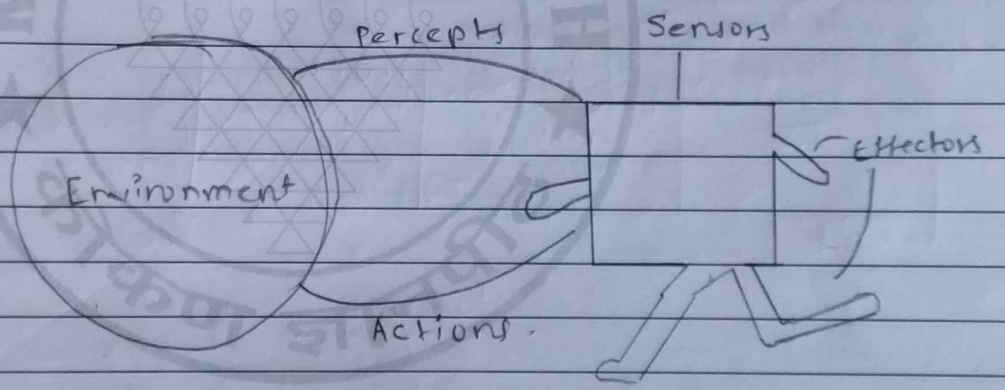
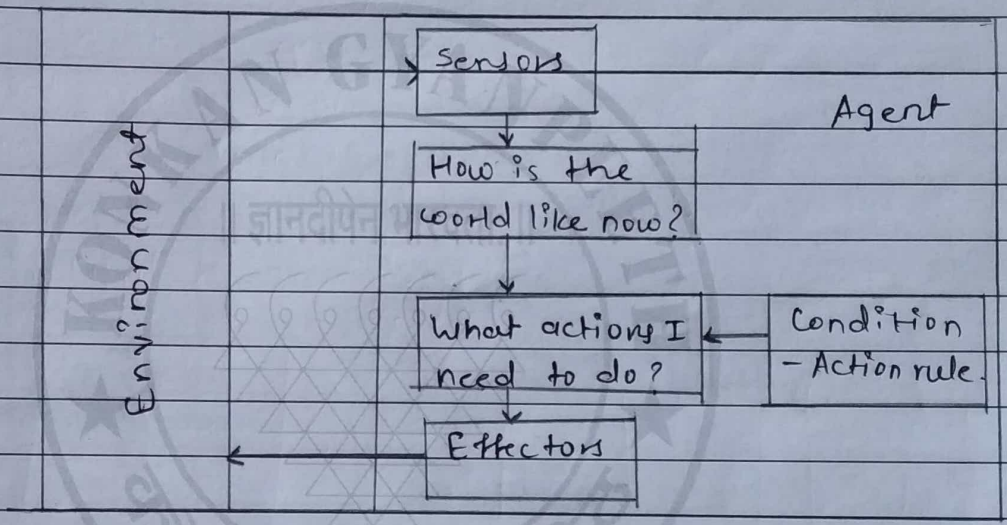


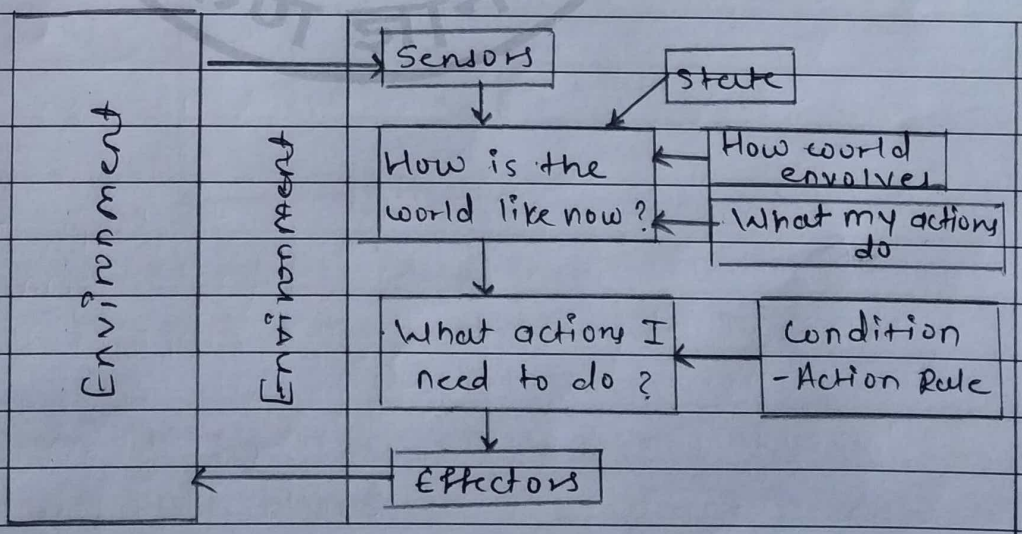
Fig 1 AI Agent with Environment.

Human agents has sensory organs such as eyes, ears, nose, tongue and skin parallel to the sensors and other organs such as hands, lengs, mouth for effortors. Robotic agent replaces camera & infrared range finders for the sensors, & various motors & actutors for effectors.
Software agents has encoded bit strings as its programs & actions.

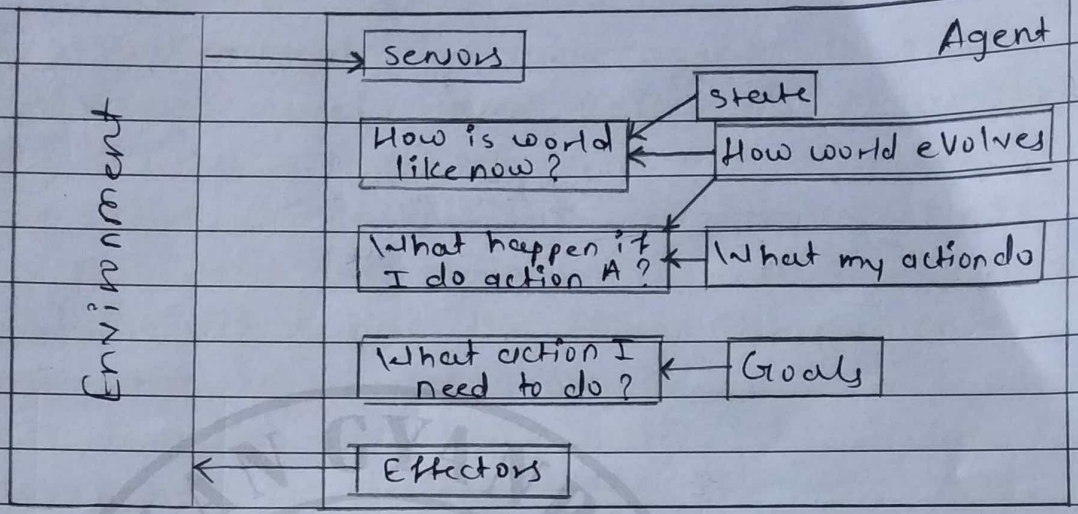
Agent structure can be viewed as a combination of agent architecture & agent programn Agent Architecture refers to the machinery that an agent executes on whereas Agent Program is an implementation of an agent function. figure 2 shows four important types of agent Architectures.



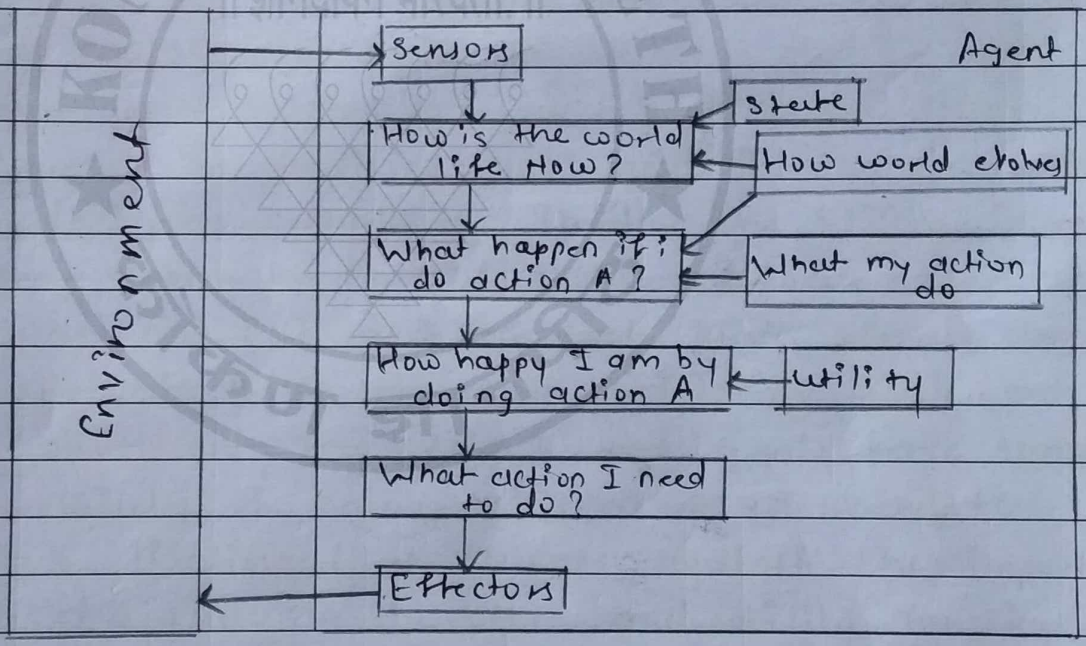
(a) simple Reflex Agent.



(b) model Based Reflex Agent.



(c) Goal Based Agent



(d) Utility Based Agent.

Figure 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 the 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. They maintain an internal state as a persistent information. Here the model means knowledge about how the things happen in the world that happens of unobserved aspects of current state depending on percept history. Agent take into account how its actions affect the world. Goal based Agents shown in fig. 2c, choose their actions in order to achieve goals. Goal-based approach is more flexible than reflex agent since the knowledge supporting a decision is explicitly modeled, thereby allowing for modifications. Goal is the description of desirable situation. Finally, the utility Based agent shown in fig 2d choose actions based on a preference (utility) for each state. Goals are inadequate when there are conflicting goals, out of which only few can achieved. goals have some uncertainly of being achieved & you need to weigh likelihood of success against the importance of a goal. On the 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 actions where the right action means the action that causes the agent to be most successful in the given percept sequence. The problem the agent solves is

characterized by performance measure, Environment, Actuators & sensors (PEAs). These are collectively referred to as PEAs descriptors for the agent task environment it operates. in these insights are very useful in agent design.

Another important piece of information is task environment properties while analyzing task environment the agent architect needs to consider following properties.

1. Discrete or continous : If there are a limited number of distinct, clearly defined, state of the environment, the environment is discrete (for exe. chess) ; other wise it is continus (to eg. automated driving).
2. Observable or partically observable: If it is possible to determine the complete state of the envir at each time point from the precepts it is observables ; 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 the next state of the envir is determined by the current state & the actions of the agent, then the determined environment is otherwise it is non-determinstic.
5. Episodic or Sequential : In an episodic environment each episode of events consists of the agent, then acting. The quality of its action depends

just on the episode itself. Subsequent episodes do not depend on the actions in the previous episodes. Episodic environments 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 detates the future action.

6. Single agent or multiple agents: The environment many contain single agent or other agent which may be so operating or competing with each other.

Working Search internet for AI based application in following scenarios & identify who is agent for that application. Further list out PEAs description 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 1946 to 1966 at the MIT Artificial Intelligence laboratory by Joseph Weizenbaum
4. Automatic portfolio management.
5. Sophia is a social hymanoid robot developed by Hong kon based company Hanson Robotics

6. AlphaGo is a computer Program that plays the boad game Go. It was developed by Alphabet Inc Deepmind lab in london.
7. Apples virtual assistance Siri.
8. Endurance : A companion for Dementia Patient
9. Casper : Helping Insomniacs Get through the night.
10. Marvel : Guarding the Galaxy with Comic-Book Crossover.
11. Automated Cross word Solver.

Resources : The above diagrams are taken from online tutorial available at Tutorials points on topic AI - agents & environment.