Tutorial No 01

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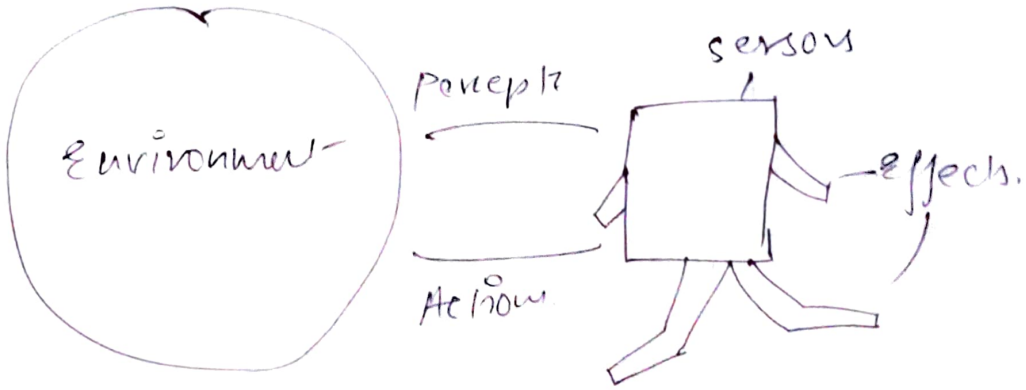
Module I

1.1 Tutorial 1: Design of Intelligent Agent

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

Theory An Artificial Intelligent (AI) system is composed of an agent & 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. This can be clearly seen in figure An

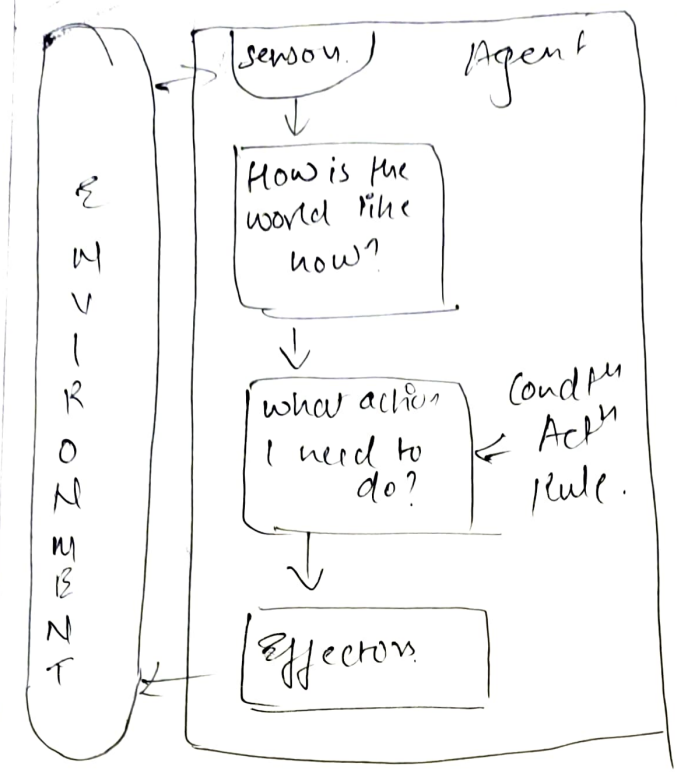


AI Agent with environment agent in particular can be.

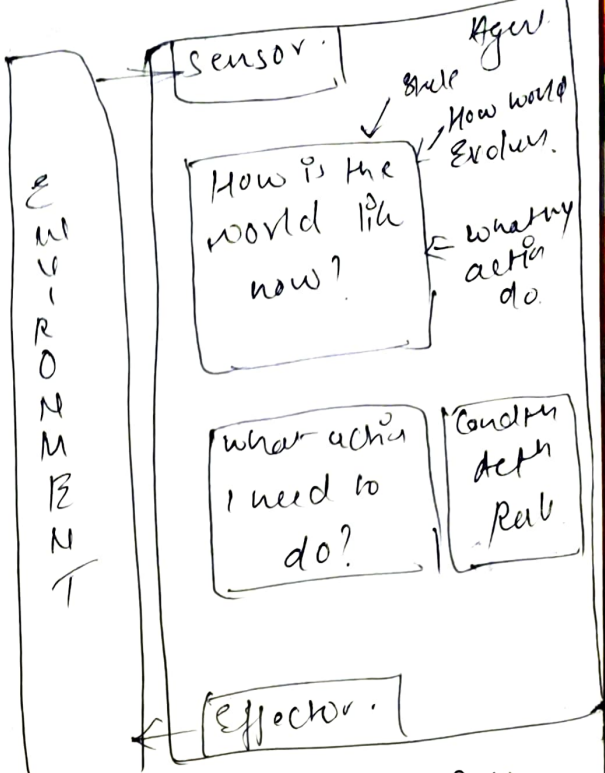
Human agents has sensory organs such as, eyes, ears, nose tounges & skin parallel to the sensors & other organs such as hands legs mouth for effectors.

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

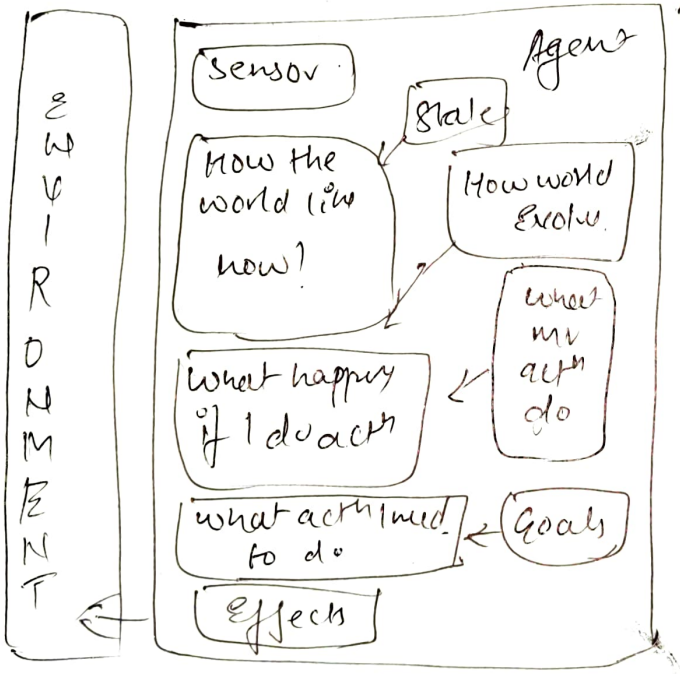
Agent structure can be viewed as a combination of agent architecture & Agent Program Agent architecture refers to machinery that an agent executes on whereas Agent Program is an implementation of an agent function shown in four important types of agent architecture.



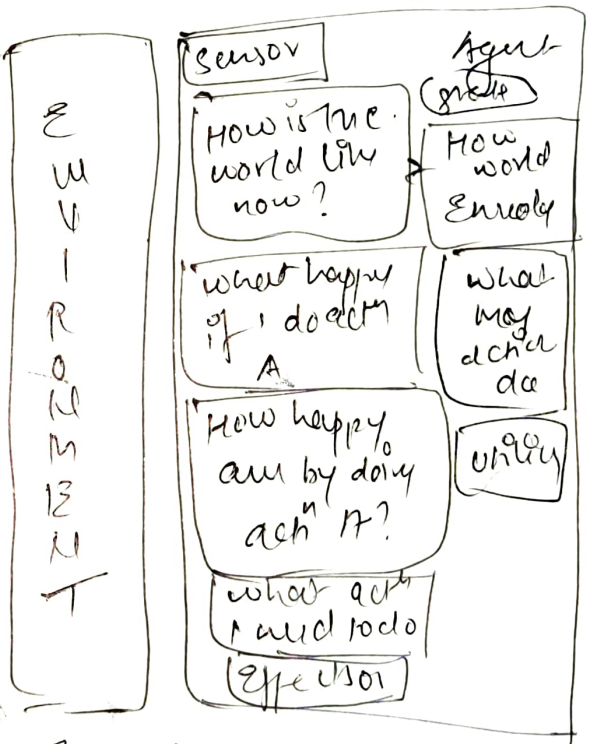
a) Simple Reflex Agent



b] Model Based Reflex Agent



c] Goal Based Agent



d] Utility Based Agent

As seen in fig. simple Reflex agents choose actn only Based on the current percept only. They are rational, only if a correct decision is made only on Basis of current % Agent environment for such agent is fully observable Model Based Reflex Agent as shown in fig. use a model of world to choose their actions they maintain an internal state as a present info. Here the model means knowledge about how the things happen in the world that is of current state dependency on percept Utility Agent Based approach is more flexible than reflex agent since the knowledge supporting a decision is explicitly modeled thereby allowing for modifications & good shown in fig 4d choose actions Based on a preference for each state Goal are inadequate when there are conflicting goal out of which only few can BE obtained goal have some uncertainty Goals out of which only few can achieved On the utility function objectively map how much Being in a particular state is described.

An AI agent is referred to as Rational Agent A rational agent always perform right action where the right action means the action that causes the agent to BE most successful in the given % segment. ~~the problem~~ these are collectively referred to as PEAS descriptor for the agent task Environment properly. In this insight are very useful in agent design.

(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 Eg auto. driving

(2) observable or partially observable If it is possible to determine the complete state of Environment at each item.

5. Static or Dynamic if 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 Environment is completely determined by current state & the action of the agent then the Environment is deterministic or it is non-deterministic.

(5) Episodic or Sequential in an episodic Environment, episodes of each consist of agent perceiving & then acting the quality of its action depends just on that episode. Subsequent episodes do not depend on the actions in previous episode. Episodic Environments are much simpler because the agent does not need to think ahead Eg pattern-recognizing Robots Complementary to this is Sequential Environment where current action decides the future action.

(6) Single agent or multiple agents The Environment may contain single agent or other agents which may be of same or diff. kind. This agent may be co-operating or competing with each other.

(7) Accessible or Inaccessible if the agents 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 applⁿ in following scenarios & identify what is agent for that applⁿ further list out PEAS of the same finally try to classify the Environment properties like a list of attributes from above list of 7 task Environment properties.

(1) Autonomous Linear Row

(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) Stutomatic Portfolio management

(5) sophia is a social humanoid robot

(6) develop By Hong Kong Based company Hanson Robotics

(7) AlphaGo is comp prgm that plays Board Game Go it was developed By Alphabet Inc Deepmind Lab London

(8) Apples virtual assistant Siri

Resource The above diagram a taken from online tutorial available at Tutorial's point on topic AI - Agents & Environment