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Tutorial NO 1 Design of intelligent agent

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CLASS : BE IT

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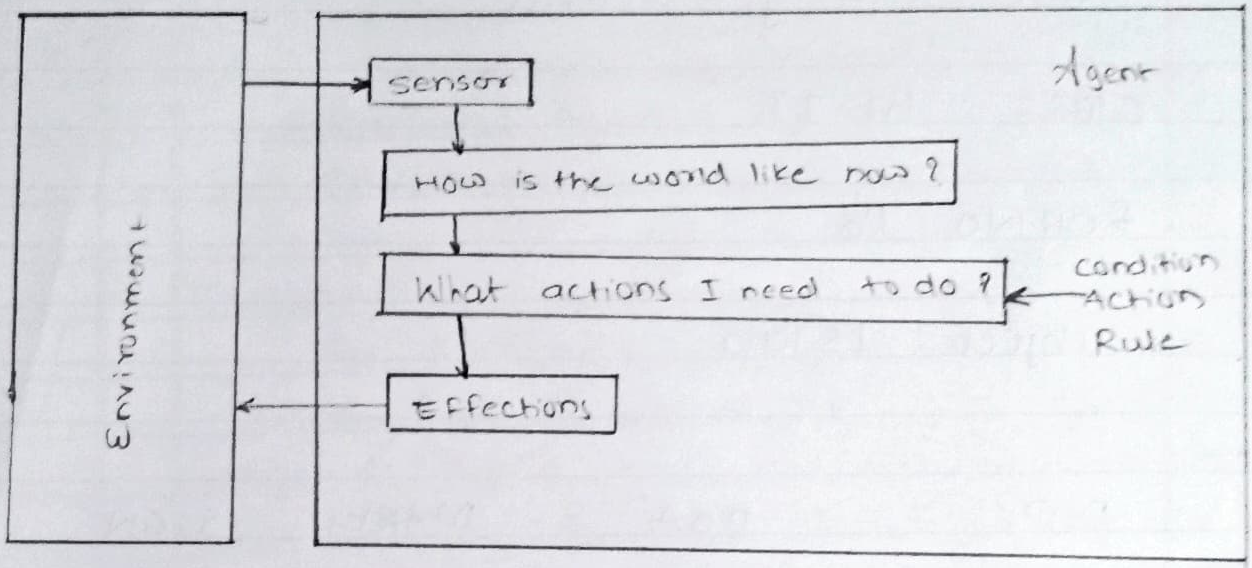
Subject : Is lab

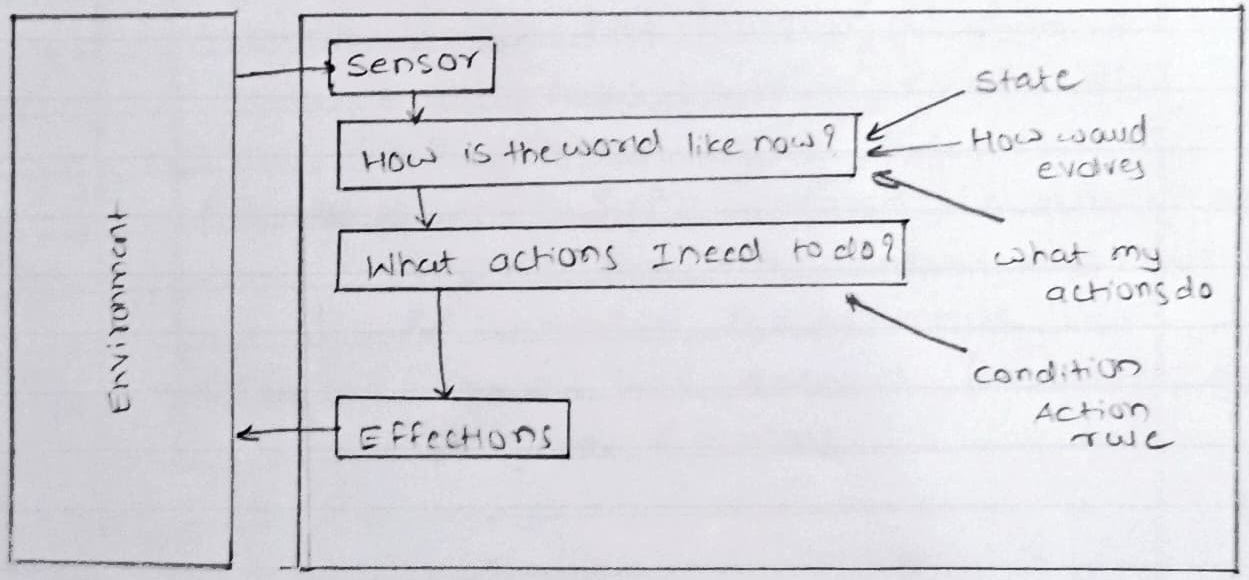
DOP DOA MARKS SIGN

Agent Architecture types

Simple Reflex agent



Model based Reflex Agent



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.

An agent in particular can be:

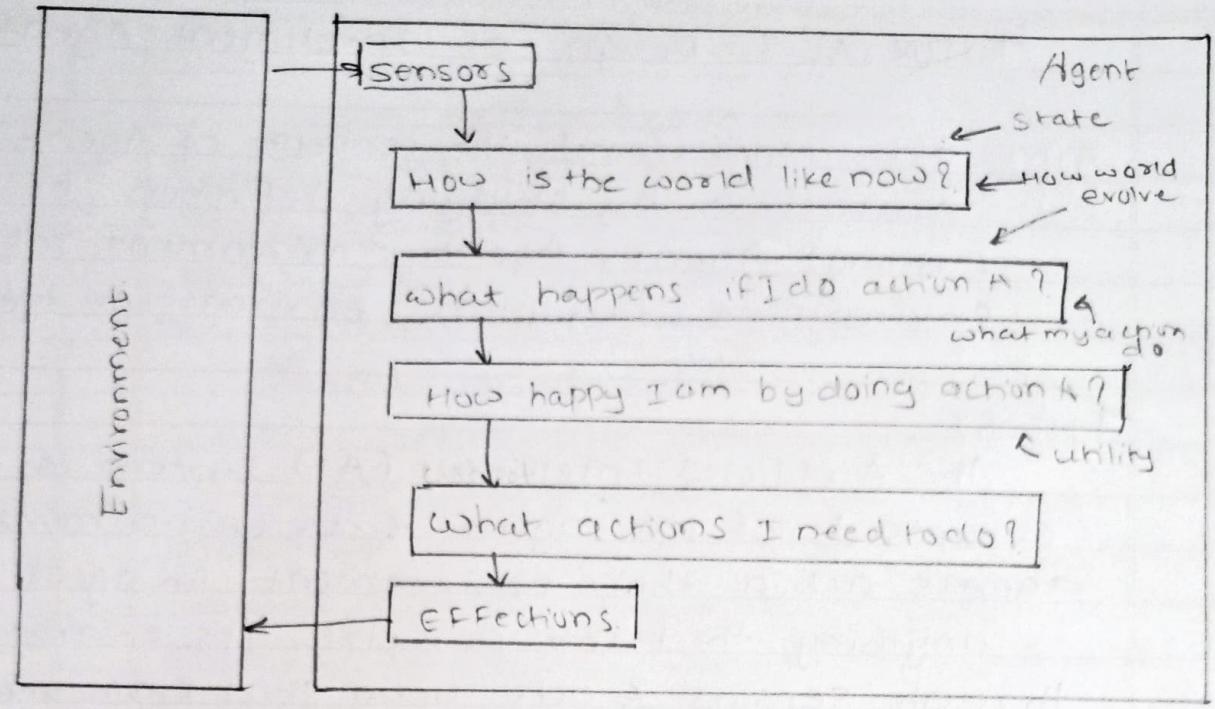
Human agent has sensory organ like eyes, ears & others organ like hands legs for effectors

Robotic agent : Replace camera & infared range finders for the sensors & various motor & actuates for effectors

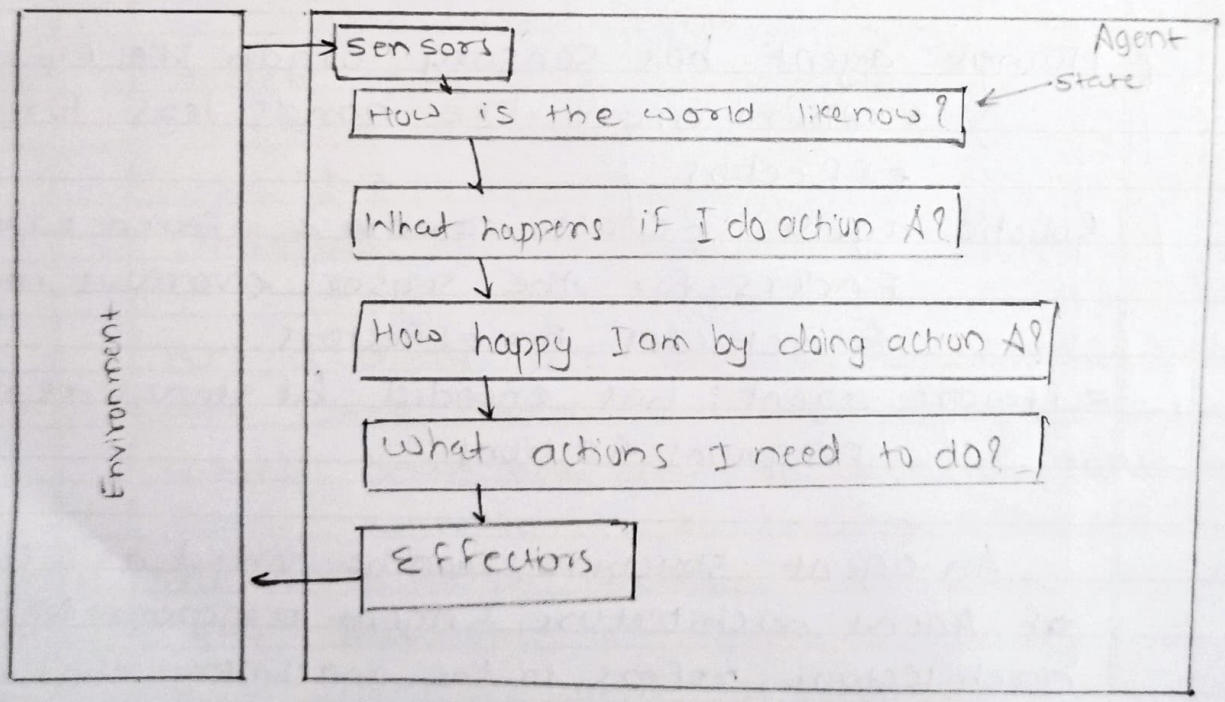
Software agent : has encoded bit strings as its programs & actions

An agent structure can be viwed as a combination of Agent architecture & Agent program. Agent architecture refers to the machinery that an agent executes on whereas Agent program is an implementation of an agent function

Goal based Agent



Utility based Agent



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 agent is fully ~~observ~~ observable.

Model based Reflex agents use a model of the world to choose their actions. They maintain an internal state as a persistent information. Hence the model means knowledge about how the ~~thig~~ things happens in the world that is representation of unobserved aspects of current state depending on percept history. Agent takes into account how its action affect the world.

Goal based Agents choose their actions in order to achieve goals. Goal based approch in more flexiable than the reflex agent since the knowledge supporting a decision is explicity modeled thereby allowing for modification.

Utility based Agent choose action based on a utility for each state. Goals are indequate when there are confficting goals out of which only few can be achieved goals have some uncertainty of seeing achieved & your need to weigh likelihood of success against the importance of a goal.

An AI agent is referred to as Rational Agent. A rational agent performs right action always where the right action means the action

that Causes the agent to be most sucessful in the given percent sequence. The problem that agent solves is characterized by performance measure, Environment, Actinatius & Sensors (PEAS). These are Collectively reffered to as PEAS descriptors. While analysing task environment the agent architecture needs to consider following properties

1. Discrete on Continous: If there are a limited ~~you mo~~ number of discrit, clearly defined, States of the environment in discrete; otherwise it is continous
2. observable or partially observable: If it is possible to determine the complete state of the environment at each time point from the percepts it is observable; other atwise it is partially observable
3. Static or Dynamic: If the environment doesn't change which an agent is acting, then it static otherwise it is dynamic
4. Determine on non-determine: If the next vote of the environment is deterministic otherwise it is non-determinate
5. Episodic or sequential: In an episodic environment each episode of event consists of the agent perceiving & then acting. The quality of its action depends on just on the episode itself. Sub sequent episode do not depends on the actions in the problem episodes. Episodic

environment is where current action decides the future option.

* 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 in each of the case. Finally try to classify task environment properties. like a list of attributes from above list of attributes from above list of 7 task environment properties

1. Deep Blue chess playing computer program.

performance Measure : Win/lose/draw, safety of chess pieces safty of king piece, no of moves time for each move
Environment : chess board, chess pieces
Action : desktop screen, CPU
Sensors : chess board
Task environment properties : Discrete, fully observable, static, Deterministic, Sequential Single agent, Accessible

2. ELIZA, the NLP computes program created from 1964 to 1966 at MIT Artificial intelligence Labaratory by Joseph weizenbaum.

Performance Measure: Understanding user maintaining conversation environment user program, keyboard / user text input eliza text output window
Actuators: Text
Sensors : User texts input
Task environment properties: continous, fully Observable static, Deterministic, sequential single agent Accessible

3 Sophia is a social ~~ta~~ humanoid robort developed by Hong kong based company Hansan Robotics

Performance measure: understanding user maintaining conversation, social expressions response time
Environment: Human, objects....
Actuators: Arms, mouth legs speaker
Sensors : Eyes, ears; mic Audio Sensors

Task environment properties: Continuous, fully observable Dynamic, Determine, sequential single Agent, Accessible.

4 Apple's virtual assistant siri

Performance Measure : understanding user text & speech producing best results, summoning (trigger) response speed

Environment : User, speech text

Actuators : Mobile screen / speaker

sensors : Mobile screen, mic button

task environment properties:

continous, fully observable, static, Deterministic.

Episodic sigsingle agent, Accessible

5 Automated Crossword Solver

Performace Measure : Understanding hints, analyzing hiddlen & visible letter, Crossword beard.

Activators: Desktop screen, program

Sensors : Cross board.

Task environment properties

Discrete, fully observable, static, Deterministic

Episodic, sigsingle agent, Accessible