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AI/ML Tutorial 2

Ans 1: An agent is anything that can be viewed as perceiving its environment through sensors and acting upon that environment through effectors.

Ans 2: A rational agent is one that does the right things. We assume that a right action is the one that will cause the agent to be most successful.

For each possible percept sequence, an ideal rational agent should do whatever action is expected to maximise its performance measure on the basis of the evidence provided by the percept sequence and whatever built-in technology the agent has.

Ans 3: For example, let us assume a car trying to climb a cliff on the right. There is also a cliff to the left. It is rational that at first the car tries to move forward to attain the height. Only after several episodic trainings, the agent finds it useful to take some steps back to the left cliff and then climb the right cliff. This is how a rational agent is formed.

Ans 3: PEAS stands for Performance Measure, Environment, Actuators and Sensors.

Performance Measure is the objective function to measure the performance of the agent.

Environment is the space where the agent is provided input in terms of changes the agent needs to take actions.

Activators are the tools, equipments or organs using which agent performs actions in the environment.

Sensors are the tools, organs through which agents capture the environment state & acts as input for the agent.

For a taxi driver agent,

Performance Measure:-

Safety

Optimum speed

Comfortable journey

Sensors:-

Cameras

Proximity Sensors

Environment:-

Roads

Traffic conditions

Activators:-

Steering wheel

Accelerator

Brakes

Gearbox

Ans 4:

a) Simple Reflex Agents:-

Simple Reflex Agents ignore the rest of the percept history and act only on the basis of the current percept. Percept history is the history of all that an agent has perceived till date.

The agent function is based on the condition action rule.

This agent is only successful if the environment is fully observable.

Problems with simple reflex agents are:-

- Very limited knowledge
- No knowledge of non perceptible parts of state.
- Usually too big to generate and store.
- If there occurs any change in the environment, the collection of rules need to be updated.

b) Model based reflex agents:-

It works by finding a rule whose condition matches the current situation. A model based agent can handle partially observable environments by the use of model about the world.

The agent that has to keep the internal state which is adjusted by each percept and that depends on the percept history.

Updating the state requires information about:-

- how the world evolves independently from the agent.
- how the agent action affects the world.

c) Goal based agents :-
These agents take decision based on how far they are from the goal.
Their every action is to intend to reduce its distance from the goal.
This allows the agent a way to choose among multiple possibilities, selecting the one that reaches a goal state.
They usually require search and planning.

d) Utility-based agents :-
These agents which are developed having their end user as building blocks are called utility based agents.
When there are possible alternatives, then to decide which one is best, utility based agents are used.
They choose actions based on preference for each state.
Utility describes how happy the agent is.

Ans 5:- Some properties of task environment are as follows:-

- Fully observable Vs Partially observable :- If agent sensors give it access to the complete state of the environment at each point in time, then we say that task environment is fully observable.
- An environment might be partially observable because of noisy and inaccurate sensors missing from the sensor data.

Example - A vacuum agent with only a local dirt

sensor cannot tell whether there is or isn't in other figures.

- Deterministic vs Stochastic:-

If the next state of environment is completely determined by the current state and the action executed by the agent then we say that environment is deterministic otherwise it is stochastic.

- Episodic vs Sequential:-

In an episodic task environment, the agent experience is divided into atomic episodes; each episode consists of the agent perceiving and then performing a single action. Crucially, the next episode does not depend on the actions it has taken in previous episodes.

- Static vs Dynamic:-

If the environment can change while an agent is deliberating then we say the environment is dynamic for the agent otherwise, it is static.

Static environments are easy to deal with because the agent need not keep looking at the world while it is deciding on an action, nor need it worry about the passage of time.

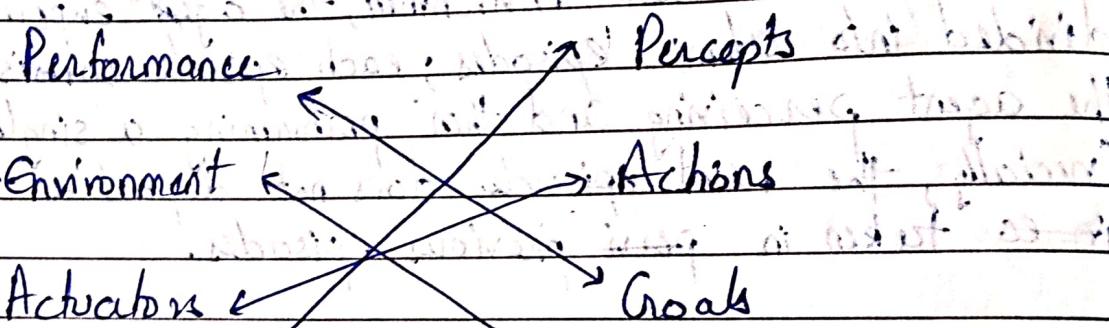
- Discrete vs Continuous:-

The discrete/continuous distinction can be applied to the state of the environment, to the way time is handled and to the percepts and actions of the agents.

- Single Agent vs Multiagent.

Ans 6: PAGE & descriptons are not the unique ways of describing intelligent systems.
One popular alternative involves PEAS descriptors.

We can see that there is a clear and simple mapping between PAGE and PEAS!



Sensors → Environment

Environment → Sensors

Actuators → Environment

Environment → Actuators

Environment → Sensors

Sensors → Environment

Ans 7: Programming agents by hand can be very tedious.
Four conceptual components of learning agents are:-

- Learning elements:- It is responsible for making improvements.
- Performance elements:- It is responsible for selecting external actions.
- Critic:- How well the agent is doing with respect to fix performance standard.
- Problem generators:- Allows the agent to explore.

Ans 8: Some of the different types of AIs are:-

- Simple Reflex Agents:-
Simple Reflex Agents ignore the rest of percept. history and act. on the basis of the current percept.
Its limitations are:-
 - Very limited intelligence
 - No knowledge of perceptual parts of state

• Model based reflex agents:-

It works by finding a rule whose condition matches the current situation. It overcomes the previous agent's limitations by maintaining a state that is updated from the information about how agent affects the world and how world evolves independently from ~~current~~ agent.
However it is not goal aligned.

- Goal based agents:
This agent takes decision based on how close the agent gets to its goal. The goal parameters are also recorded by the agent. Its parameters can be easily modified. However, the agent does not care about the utility/preference on how he reaches the goal.

- Utility based agents:

This agent are developed having their end uses as building blocks.

They choose actions based on preference or utility. Hence, they overcome the limitations of goal based agent.

The agent chooses to maximise the expected utility.

and additional info.

and additional info.