Nimish . Ravindra . Patil
9565
TE COMPS A

AI

~~Ext~~ Assign 1

Q1 ① Rationality refer to the ability of an agent to make decisions that maximize its expected utility achieve its goal given the available in information and resources.

② Rationality is about making the best possible decision given to on the circumstances even if those decisions are not always perfect.

③ Rationality relates to the behaviour of agents in the environment by guiding them to select actions that lead to desirable outcomes or goals.

④ An agent is considered rational if it consistency chooses actions that are expected to maximize its ~~utility~~ utility or achieve its objectives.

⑤ Examples :- A chess - playing agent.
A rational chess playing agent would choose moves that are expected to lead to victory or at least avoid defeat. It evaluates potential moves based on its understanding of the game state and selects the one that maximizes its chances of winning.

② In a self - driving car rationality involves making decisions that prioritize safety and efficiency. The car must navigate through traffic, obey traffic laws and avoid accidents all while reaching its destination in a timely manner. A rational self - driving car would choose routes and driving behaviours that minimize the risk of accidents and optimize travel time.

Q.2

→ The native of environment in which intelligent agents operation is a diverse and can vary greatly depending on factors such as complexity, dynamics, observability determinicism and episodicity

① Complexity :- Environments a can range from simple, deterministic environments with a few states and actions to complex stochastic environments with countless possible states and actions.

② Dynamics - Environments may be static where the agents actions do not change the state or dynamic, where the environment evolves even without the agents intervention.

③ Observability :- Environments can be fully observable where the agent has access to complete information about the current state or parti Partially observable where the agent has limited or incomplete information.

④ Determinism :- Environment may be deterministic, where the outcome of an action is fully determined by current state and the action takes or stochastic where theres uncertainty in outcome.

⑤ Episodicity :- Environment may be episodic where each action leads to an immediate reward and resets the environment to an initial state or sequential where actions taken now can affect future states and rewards.

Examples :- Stock Market :-

A stochastic partially observable sequential environment with high complexity. Agents may analyze historical data, predict future market movements and adapt their strategies in real-time to changing conditions.

② Robot Navigation :- A dynamic observable sequential environment with moderate complexity. Agents needs to perceive their surroundings through sensors, plan trajectories to navigate obstacles and updates their plans as new information becomes available.

Q3

→ Intelligent agents in artificial intelligence typically consist of five main components.

① Perception - This component involves sensing the environment using sensors to gather information. It's about how an agent perceives its surroundings.

② Reasoning :- Agents use reasoning mechanism to make decisions and plan actions based on information they have gathered. This involves processing and analyzing the data to come up with solutions or responses.

③ Actuation :- Once a decision is made, the agent must act upon it. Actuators are mechanisms through which the agent interacts with environment to carry out actions.

④ Knowledge :- Agents possess knowledge or information about the environment, themselves and the tasks they need to perform. This knowledge can be pre-defined, learned or inferred from past experiences.

⑤ Learning :- Intelligent agents can improve their performance over time through learning mechanisms. This could involve acquiring good knowledge adapting strategies or optimize behaviour based on feedback.

Types of intelligent agents include

① Simple reflex agents: These agents take actions based solely on a current percept without considering the history of past percepts. An example is a thermostat that adjusts the temperature based on current reading.

② Model based reflex Agents - They may maintain an internal model of an environment and use it to make decisions for example, a vacuum cleaning robot that uses a map of room to decide where to clean next.

③ Goal based Agents:- These agents have goals or objectives that they aim to achieve and take actions to move towards these goals A example is a delivery drone that navigates to deliver packages to specific locations.

④ Utility Based agents:- They evaluate the desirability of various actions based on a utility function and choose the action that maximizes expected utility A personal assistant app that schedules tasks based on user preferences and priorities is an example.

⑤ Learning Agents:- These agents improve their performance over time through learning from experience. Examples include recommendation systems that learn user preferences from interactions and adapt their recommendations accordingly.

Q.4

⇒ A - Role of problem solving agent.

① Problem-solving agents operate independently, making decisions and taking actions to achieve desired goals without human intervention.

② These agents are designed to efficiently explore and navigate problem spaces to find optimal or satisfactory solutions.

③ Problem: solving agents can adapt to changes in their environment or problem domain adjusting their strategies to accomodate new information or new constraints.

④ They can handle a wide range of problem types and complexities from simple puzzles to complex real world scenarios.

(2) Formulation of problems

① Problem formulation involves abstracting real-world scenarios into a formal representation that can be understood and processed by problem-solving agents

② Problems are represented ~~by pro~~ in a way that captures essential elements such as initial states, goal states action and constraints.

(3) Methods used for searching solutions:

① Uninformed search: Agents explore the problem space systematically without consideration of domain specific knowledge. e.g Breadth first search, depth-first search.

② local search agents: Agents iteratively improve candidate solutions by making small modifications

(4) Examples

① Routing planning :- In navigation systems, problem-solving agents search for the shortest path between two to locations and they analyze the road network consider traffic conditions and employ algorithms like to find optional routes.