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AI Assignment 1

1) Rationality refers to the ability of an agent to make decisions that maximize its expected utility or achieve its goals given the available information and resources.

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

3) Rationality relates to the behavior 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 consistently chooses actions that are expected to maximize its 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)

Ans), The nature of environments in which intelligent agents operate is diverse and can vary greatly depending on factors such as complexity, dynamics, observability, determinism and episodicity.

- 1) Complexity: Environments 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 agent's actions do not change the state or dynamic, where the environment evolves even without the agent's intervention.
- 3) Observability: Environments can be fully observable where the agent has access to complete information about the current state or 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 taken or stochastic where there is uncertainty in outcome.

(3)

Ans 3) Intelligent agents in artificial intelligence typically consist of five main components

1) Perception - This component involves sensing the environment using sensors to gather information its 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 its 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 behavior based on feedback.

Types of intelligent age

Types of intelligent agents include (4)

- 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 maintain an internal ~~of~~ 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. An example is a delivery drone that navigates to deliver packages to specific locations.

(5)

As 4) A - Role of problem-solving agents.

- 1) Problem-solving agents operate independently making decisions and ~~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 accommodate 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 in a way that captures essential elements such as initial states, goal states, action and constraints.