IIS Answers (Only 2 Mark QnA)

Mod 1

1:- Resourse Book se padhlo mujhe nhi pta answer

2:- List types of Artificial Intelligence.

ANS:- Resource Book Page 13

3. Describe the need of Artificial Intelligence?

Ans:- The need for Artificial Intelligence (AI) arises from its ability to enhance efficiency, productivity, and decision-making in various fields. Here are some key reasons for the need for AI:

1. **Automation of Repetitive Tasks**: AI can automate routine and repetitive tasks, freeing up human workers for more complex and creative tasks. This increases efficiency and reduces human error.
2. **Handling Complex Data**: AI can analyze vast amounts of data quickly and accurately, uncovering patterns, trends, and insights that might be missed by humans. This is essential in fields like finance, healthcare, and marketing.
3. **Improved Decision-Making**: AI can assist in making more informed decisions by providing data-driven insights. It can process and analyze information faster than humans, leading to better outcomes in areas like business strategy and medical diagnosis.
4. **Personalization**: AI enables personalized experiences in various applications, such as recommendations on streaming platforms, tailored marketing, and customized healthcare treatments, improving user satisfaction.
5. **Solving Complex Problems**: AI can tackle complex problems that are beyond human capabilities, such as predicting climate change patterns, optimizing logistics, or diagnosing diseases at an early stage.
6. **Advancing Innovation**: AI drives innovation in various fields by enabling the development of new products, services, and solutions, such as autonomous vehicles, smart cities, and intelligent virtual assistants.

4. Justify that how AI Will increase the dependency of humans?

Ans:- Artificial Intelligence increases human dependency by automating routine tasks, thus reducing the need for manual effort. It also provides data-driven insights and personalized recommendations, leading people to rely more on AI for decision-making and convenience in various aspects of daily life and work.

5:- Define Artificial Intelligence?

Ans:- Artificial Intelligence is a branch of computer science that focuses on creating systems or machines that can perform tasks typically requiring human intelligence. These tasks include learning from experience, understanding language, recognizing patterns, solving problems, and making decisions. AI systems can be designed to perform specific tasks (Narrow AI) or, in theory, to perform any intellectual task a human can do (General AI).

6. Differential between Week AI and Strong AI?

	Strong artificial intelligence	Weak artificial intelligence
Definition	• the form of artificial intelligence, which has the same intellectual abilities as human, or even surpasses him in it	• Weak AI is generally developed or used for specific application domains. • In a standard work on artificial intelligence, this is formulated as follows: "The assertion that machines could possibly act intelligently (called, weakness, act as if they are intelligent) is called the, weak AI 'hypothesis ..."
Capabilities and Domains	• Logical thinking • Making decisions in case of uncertainty • To plan • To learn • Communication in natural language • Use all these abilities to achieve a common goal	• Expert systems • Navigation systems • Voice recognition • Character recognition • Suggestions for corrections in searches

7. Determine how artificial intelligence can assist farmers?

Ans:- Artificial Intelligence (AI) can assist farmers in several ways, enhancing productivity and efficiency in agriculture:

1. **Precision Farming**: AI-powered systems can analyze data from sensors, drones, and satellites to optimize planting, watering, and harvesting. This helps in precise application of water, fertilizers, and pesticides, reducing waste and improving crop yields.
2. **Predictive Analytics**: AI can predict weather patterns, crop diseases, and pest infestations by analyzing historical data and current conditions. This enables farmers to take preventive measures and make informed decisions to protect their crops.
3. **Automated Machinery**: AI-driven machinery, such as autonomous tractors and harvesters, can perform tasks with minimal human intervention. This reduces labor costs and increases operational efficiency.
4. **Soil Health Monitoring**: AI can analyze soil conditions and recommend appropriate treatments to improve soil health. This includes detecting nutrient deficiencies and recommending suitable fertilizers.
5. **Crop Management**: AI algorithms can monitor crop growth and detect issues early, such as diseases or nutrient deficiencies. This allows farmers to address problems before they impact overall yield.
6. **Supply Chain Optimization**: AI can streamline the supply chain by predicting demand, optimizing inventory, and improving logistics. This helps farmers get their products to market more efficiently and reduce waste.

Mod 2

1. correlate intelligent agent and rational agent?

Ans:-

Intelligent Agent:

- **Definition**: An intelligent agent perceives its environment through sensors and acts upon it using actuators. It operates based on predefined rules or learning algorithms to achieve specific goals.
- **Function**: It can be reactive or proactive, responding to environmental stimuli or taking actions based on its knowledge and experience.

 Rational Agent:

- **Definition**: A rational agent is an intelligent agent that makes decisions to maximize its performance measure based on its goals and knowledge. It acts to achieve the best outcome or the best possible result in its given context.
- **Function**: It evaluates the outcomes of its actions to ensure that they align with its goals and preferences, aiming for optimal performance.

2. Discover In case of parts picking robot, what is percept?

Ans:- In the context of a parts-picking robot, the **percept** refers to the sensory information or data that the robot receives from its environment. This includes any input it gathers from its sensors to identify, locate, and handle parts.

For example:

- **Visual Percepts**: Images or video feeds from cameras that help the robot identify the parts, their locations, and orientations.
- **Tactile Percepts**: Data from touch sensors or grippers that provide feedback about the part's texture, shape, and whether it has been successfully picked up.
- **Proximity Percepts**: Information from distance sensors that help the robot gauge how close it is to the parts and avoid obstacles.

3. Differentiate between agent function and agent program?

Ans:- **Agent Function** and **Agent Program** are fundamental concepts in the study of intelligent agents in artificial intelligence. Here's how they differ:

1. **Agent Function**:
    - **Definition**: An agent function is a theoretical mapping from the set of percepts (inputs) to the set of actions (outputs). It describes the ideal behavior of an agent given any possible perceptual input.
    - **Role**: It provides a specification of what actions an agent should take in response to various percepts. It is a conceptual representation of the agent's decision-making process.

- **Example**: If the percept is "there is an object in front," the agent function might specify the action "pick up the object."

2. **Agent Program**:
    - **Definition**: An agent program is a concrete implementation that runs on a physical or virtual agent. It executes the logic and algorithms necessary to produce actions based on percepts, effectively implementing the agent function in practice.
    - **Role**: It is the actual code or software that performs the actions described by the agent function. It takes perceptual inputs, processes them according to its design, and produces appropriate outputs.
    - **Example**: The code that processes sensor data, decides whether to pick up an object, and controls the robot's actuators to perform the action.

4. What is deterministic and stochastics type of environment?

Ans:- **Deterministic** and **Stochastic** are types of environments that describe the predictability and certainty of the outcomes in which an agent operates. Here's how they differ:

1. **Deterministic Environment**:
    - **Definition**: In a deterministic environment, the outcome of any action is predictable and certain. Given a specific state and action, the result will always be the same.
    - **Characteristics**:
        - **Predictability**: The effect of actions is known with certainty.
        - **Consistency**: Repeated actions in the same state produce the same result.
        - **Example**: A chess game where each move by a player leads to a predictable board state based on the rules of the game. The consequences of each move are clear and consistent.

2. **Stochastic Environment**:
    - **Definition**: In a stochastic environment, the outcome of actions is probabilistic and uncertain. There is a degree of randomness or unpredictability in the results of actions.
    - **Characteristics**:
        - **Unpredictability**: The effects of actions are not guaranteed and can vary due to chance or external factors.
        - **Variability**: The same action in the same state may lead to different outcomes.
        - **Example**: Weather forecasting, where actions taken to prepare for a weather event may have varying outcomes due to the inherent unpredictability of weather patterns.

5. State example of fully observable and partially observable

Ans:- **Fully Observable** and **Partially Observable** refer to the extent to which an agent can perceive and gather information about its environment. Here are examples of each:

1. **Fully Observable**:
    - **Example**: **Chess**. In a chess game, the entire state of the board is visible to both players at all times. Each player can see all the pieces and their positions, which means the environment is fully observable. There is no hidden information about the state of the game.
2. **Partially Observable**:
    - **Example**: **Poker**. In poker, players have limited information about the game state. Each player can only see their own cards and some communal cards, but not the cards held by other players. This makes the environment partially observable because crucial information is hidden from the players, and they must make decisions based on incomplete data.

6. In case of robot, identify agent, environment, sensor?

Ans:- n the context of a robot, the following components can be identified:

1. **Agent**: The robot itself is the agent. It is the entity that perceives its environment through sensors and takes actions using actuators to achieve specific goals.
2. **Environment**: The environment is everything that the robot interacts with and operates within. This includes the physical surroundings, such as obstacles, objects, terrain, and any external factors that affect the robot's performance and decision-making.
3. **Sensor**: Sensors are devices or systems that allow the robot to gather information about its environment. Examples include:
    - **Cameras**: Capture visual data to recognize objects, navigate, or monitor surroundings.
    - **Proximity Sensors**: Detect the presence of nearby objects and measure distances.
    - **LIDAR (Light Detection and Ranging)**: Provides detailed distance measurements by measuring the time it takes for a laser beam to bounce back.
    - **Ultrasonic Sensors**: Use sound waves to measure distances and detect obstacles.

7. Describe the concept of PEAS?

Ans:- **PEAS** stands for **Performance measure, Environment, Actuators, and Sensors**. It is a framework used to describe the components of an intelligent agent's operation. Here's a breakdown of each component:

1. **Performance Measure**:
    - **Definition**: The criterion used to evaluate how well an agent is achieving its goals. It quantifies the success of the agent's actions in terms of the desired outcomes.

- **Example**: In a robot vacuum cleaner, the performance measure could be the amount of dirt collected and the area cleaned.

2. **Environment**:
    - **Definition**: The external context or world in which the agent operates. It includes everything the agent interacts with and has an impact on its performance.
    - **Example**: For the robot vacuum cleaner, the environment would be the rooms and surfaces it cleans, including furniture, obstacles, and the layout of the floor.
3. **Actuators**:
    - **Definition**: The mechanisms or devices through which the agent acts upon the environment. Actuators execute the actions that the agent decides to perform.
    - **Example**: In the robot vacuum cleaner, actuators include the motors that drive the wheels and the brush mechanism that sweeps the floor.
4. **Sensors**:
    - **Definition**: The devices or systems that gather data from the environment and provide the agent with information about its surroundings. Sensors help the agent perceive the environment and make informed decisions.
    - **Example**: For the robot vacuum cleaner, sensors include cameras or infrared sensors that detect obstacles, dirt sensors that identify areas needing cleaning, and boundary sensors that prevent it from falling off edges.

Mod 3

1. Differentiate between informed and uninformed search?

Ans:- **Uninformed Search**:

- **Definition**: Also known as **blind search**, uninformed search algorithms explore the search space without any additional information beyond the initial state and goal. They do not use domain-specific knowledge to guide the search.
- **Characteristics**:
    - **Lack of Heuristics**: These algorithms do not use heuristics (problem-specific knowledge) to estimate the cost or distance to the goal.
    - **Examples**:
        - **Breadth-First Search (BFS)**: Explores all nodes at the present depth level before moving on to nodes at the next depth level.
        - **Depth-First Search (DFS)**: Explores as far as possible along a branch before backtracking.
        - **Uniform Cost Search**: Expands the least-cost node first, where cost is accumulated from the start node.

Informed Search:

- **Definition**: Also known as **heuristic search**, informed search algorithms use additional information or heuristics to guide the search process more efficiently towards the goal. This information helps prioritize which paths to explore.
- **Characteristics**:
    - **Use of Heuristics**: These algorithms utilize heuristic functions to estimate the cost or distance to the goal, allowing for more informed and efficient search.
    - **Examples**:
        - *A Search**: Combines the cost to reach a node (g(n)) and the estimated cost from the node to the goal (h(n)) to prioritize nodes.
        - **Greedy Best-First Search**: Expands nodes based on the heuristic function alone, focusing on nodes that appear closest to the goal.
        - **Hill Climbing**: Continuously moves towards the direction that appears to improve the situation, based on the heuristic evaluation.

2. Analyse and determine the drawbacks of depth first?

Ans:- **Depth-First Search (DFS)** is a common search algorithm used for exploring nodes in a graph or tree structure. While DFS has its advantages, it also has several drawbacks:

1. **Risk of Getting Stuck in Infinite Loops**:
    - **Description**: In an infinite or very large graph with cycles, DFS may get stuck exploring a single branch indefinitely if it revisits the same nodes repeatedly.
    - **Impact**: This can lead to an infinite loop if there are no mechanisms to detect and prevent revisiting nodes.
2. **No Guarantee of Finding the Shortest Path**:
    - **Description**: DFS does not guarantee that the first solution it finds is the shortest path (or minimum cost) to the goal. It explores deep into one branch before moving to the next.
    - **Impact**: In problems where the shortest or most cost-effective solution is required, DFS may not be suitable because it does not consider path costs or lengths during its exploration.
3. **High Memory Consumption in Large Trees**:
    - **Description**: DFS requires only linear space relative to the depth of the search tree. However, if the depth of the tree is large, it can still require significant memory to maintain the stack of nodes.
    - **Impact**: For very deep trees, DFS can lead to high memory usage, which might not be efficient for systems with limited resources.
4. **Difficulty in Handling Large or Complex Graphs**:
    - **Description**: In large graphs, DFS may explore many nodes before finding a solution, especially if the solution is located far from the starting point.

- **Impact**: This can result in longer search times and inefficiencies, particularly in graphs with many branches or where the goal node is near the bottom of a deep branch.

5. **No Optimality Guarantees**:
    - **Description**: DFS does not guarantee that it will find the optimal solution if multiple solutions exist, as it might find a solution that is deep but not optimal.
    - **Impact**: In scenarios where the quality of the solution matters, DFS might not be the best choice due to its lack of consideration for solution optimality.

(Answer kud se chota karlena)

3. Justify the time complexity of BFS?

Ans:- **Time Complexity Justification:**

1. **Graph Representation**:
    - **Adjacency List**: If the graph is represented using an adjacency list, each vertex maintains a list of its neighbors.
    - **Adjacency Matrix**: If the graph is represented using an adjacency matrix, the matrix indicates the presence of edges between vertices.
2. **Vertices Exploration**:
    - **Each Vertex**: BFS visits each vertex exactly once. Therefore, the time complexity contribution due to vertices is O(V)O(V)O(V), where VVV is the number of vertices.
3. **Edges Exploration**:
    - **Each Edge**: In BFS, each edge is considered exactly once. If the graph is undirected, each edge will be encountered twice (once from each end). For directed graphs, each edge is encountered once. Therefore, the time complexity contribution due to edges is O(E)O(E)O(E), where EEE is the number of edges.

BFS Time Complexity:

- **Adjacency List**: O(V+E)O(V + E)O(V+E)
- **Adjacency Matrix**: O(V2)O(V^2)O(V2)

4. What are examples of informed search methods used in?

1. Ans:- *A Search**:
    - **Description**: A* Search uses both the cost to reach the current node (g(n)) and a heuristic estimate of the cost to reach the goal (h(n)) to determine the priority of nodes. It combines these to form f(n)=g(n)+h(n)f(n) = g(n) + h(n)f(n)=g(n)+h(n), guiding the search efficiently.
    - **Use Case**: Pathfinding in navigation systems and games.
2. **Greedy Best-First Search**:

- **Description**: Greedy Best-First Search prioritizes nodes based solely on a heuristic function (h(n)) that estimates the cost to reach the goal. It selects the node that appears closest to the goal.
- **Use Case**: Solving puzzles where quick, approximate solutions are acceptable.

These methods use heuristic information to make search more efficient compared to uninformed search methods.

5. What are examples of local search methods used in Al?

Ans:- **Hill Climbing**:

- **Description**: A local search algorithm that iteratively moves towards the direction of increasing value based on a heuristic. It selects the neighboring state that appears to be the best improvement.
- **Use Case**: Solving optimization problems like scheduling.

Simulated Annealing:

- **Description**: A probabilistic local search method that explores the solution space by occasionally accepting worse solutions. The probability of accepting worse solutions decreases over time, simulating a cooling process.
- **Use Case**: Complex optimization problems such as job scheduling and layout design.

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ALL THE BEST