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Grade	10.00 out of 10.00 (100%)

Question 1

Correct

Mark 1.00 out of 1.00

How does the A-star (A*) algorithm ensure completeness and optimality in finding solutions?

- a. A* uses a priority queue to expand the most promising nodes first, ensuring completeness by exhaustively searching the entire state space and optimality by considering both the path cost and heuristic estimate.
- b. A* always explores all possible states to ensure completeness and selects the most promising path based on heuristic estimates to ensure optimality.
- c. A* relies on random exploration to ensure completeness and backtracking to guarantee optimality by revisiting nodes with lower heuristic estimates.
- d. A* employs a depth-first search approach to ensure completeness and a breadth-first search approach to guarantee optimality by exploring all possible paths simultaneously.

The correct answer is: A* uses a priority queue to expand the most promising nodes first, ensuring completeness by exhaustively searching the entire state space and optimality by considering both the path cost and heuristic estimate.**Question 2**

Correct

Mark 1.00 out of 1.00

Which of the following statements best describes the characteristic of uninformed search in Artificial Intelligence?

- a. It utilizes available problem-specific knowledge for efficient exploration.
- b. It relies heavily on external sources of information.
- c. It primarily utilizes heuristics to determine the best path.
- d. It navigates through potential solutions without considering their optimality. ✓

The correct answer is: It navigates through potential solutions without considering their optimality.

Question 3

Correct

Mark 1.00 out of 1.00

When would Genetic Algorithms (GAs) outperform other search techniques, such as Hill Climbing or Simulated Annealing?

- a. When the search space is continuous, and gradient-based methods are not applicable.
- b. When the problem space is well-defined, and the optimal solution is easily identifiable.
- c. When the problem involves finding the shortest path between two points in a graph with known edge weights.
- d. When the search space is complex, and there are multiple optimal solutions or a single global optimum. ✓

The correct answer is: When the search space is complex, and there are multiple optimal solutions or a single global optimum.

Question 4

Correct

Mark 1.00 out of 1.00

When considering the A* algorithm for pathfinding, what effect does choosing a heuristic function with only high accuracy have on the search process?

- a. Speeds up the search process but might only sometimes guarantee the shortest path. ✓
- b. Ensures the algorithm explores all possible paths before reaching the goal.
- c. Increases the computational complexity but guarantees the shortest path.
- d. Reduces the accuracy of the path found but lowers the computational overhead.

The correct answer is: Speeds up the search process but might only sometimes guarantee the shortest path.

Question 5

Correct

Mark 1.00 out of 1.00

How does Simulated Annealing avoid being trapped in local optima?

- a. By intensifying the search toward the most promising areas based on a static schedule
- b. By frequently restarting the search from different initial points
- c. By decreasing the probability of accepting worse solutions as the search progresses ✓
- d. By avoiding exploration of regions with high heuristic values

The correct answer is: By decreasing the probability of accepting worse solutions as the search progresses

Question 6

Correct

Mark 1.00 out of 1.00

What does an admissible heuristic guarantee in the context of search algorithms?

- a. It never overestimates the cost of reaching the goal. ✓
- b. It always returns the optimal solution.
- c. It explores all possible states.
- d. It guarantees the shortest path.

The correct answer is: It never overestimates the cost of reaching the goal.

Question 7

Correct

Mark 1.00 out of 1.00

Explain the concepts of "exploitation" and "exploration" in the context of search algorithms. Which search technique primarily focuses on exploitation, and which one emphasizes exploration?

- a. Exploitation involves discovering new possibilities, while exploration maximizes the current knowledge. Breadth-First Search (BFS) primarily focuses on exploitation, whereas Hill Climbing emphasizes exploration.
- b. Exploitation refers to maximizing the current knowledge, while exploration involves discovering new possibilities. Depth-First Search (DFS) primarily focuses on exploitation, whereas A-star (A*) emphasizes exploration.
- c. Exploitation involves selecting the most promising options based on current information, while exploration involves investigating less promising alternatives. Hill Climbing primarily focuses on exploitation, whereas the Genetic Algorithm emphasizes exploration. ✓
- d. Exploitation refers to investigating less promising alternatives, while exploration involves selecting the most promising options based on current information. Simulated Annealing primarily focuses on exploitation, whereas A-star (A*) emphasizes exploration.

The correct answers are:

Exploitation refers to maximizing the current knowledge, while exploration involves discovering new possibilities. Depth-First Search (DFS) primarily focuses on exploitation, whereas A-star (A*) emphasizes exploration.

, Exploitation involves selecting the most promising options based on current information, while exploration involves investigating less promising alternatives. Hill Climbing primarily focuses on exploitation, whereas the Genetic Algorithm emphasizes exploration.

Question 8

Correct

Mark 1.00 out of 1.00

What is the time complexity of Breadth-First Search (BFS) when applied to a search problem with a branching factor 'b' and a maximum depth 'd'?

- a. $O(b^d)$ ✓
- b. $O(b + d)$
- c. $O(b * \log d)$
- d. $O(d * \log b)$

The correct answer is: $O(b^d)$

Question 9

Correct

Mark 1.00 out of 1.00

Is the concept of Local Beam Search equivalent to running k random restarts in parallel?

- a. No, as Local Beam Search keeps track of the k best states at each step and focuses on successors of those states, unlike k random restarts operating independently. ✓
- b. Yes, as both methods involve selecting k random states and determining successors iteratively until the goal state is achieved.
- c. No, since k random restarts in parallel involve restarting the search process k times independently, whereas Local Beam Search continuously tracks k states without restarts.
- d. Yes, because both techniques aim to simultaneously explore k states and select the best successors in each iteration.

The correct answer is: No, as Local Beam Search keeps track of the k best states at each step and focuses on successors of those states, unlike k random restarts operating independently.

Question 10

Correct

Mark 1.00 out of 1.00

In what scenario would Depth-First Search (DFS) be more suitable than Breadth-First Search (BFS) for solving a problem?

- a. When the problem requires finding the shortest path between two nodes in a graph.
- b. When the solution space is small and the goal state is likely to be found near the root. ✓
- c. When the problem involves searching a tree or graph with a large branching factor.
- d. When memory usage is a concern and the solution depth is shallow.

The correct answers are: When memory usage is a concern and the solution depth is shallow., When the solution space is small and the goal state is likely to be found near the root., When the problem involves searching a tree or graph with a large branching factor.

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