**Multiple Choice Questions for Lecture 4: Searching Algorithm in AI**

**Types of Search Algorithms**

1. What are the two main types of search algorithms in AI?
   * A) Fast search and slow search
   * B) Easy search and hard search
   * C) Uninformed search and informed search
   * D) Manual search and automatic search

Answer: C) Uninformed search and informed search

1. What is another name for uninformed search?
   * A) Smart search
   * B) Blind algorithm
   * C) Quick search
   * D) Directed search

Answer: B) Blind algorithm

1. In uninformed search, what information does the agent have?
   * A) Path cost and number of steps
   * B) Only when it reaches a goal
   * C) Distance to the goal
   * D) Background information about the problem

Answer: B) Only when it reaches a goal

1. What information does informed search use?
   * A) Only the path cost
   * B) The exact steps to reach the goal
   * C) Background information about the problem
   * D) Only the branching factor

Answer: C) Background information about the problem

**Uninformed Search Strategies**

1. Breadth-First Search (BFS) explores:
   * A) The deepest nodes first
   * B) The lowest cost nodes first
   * C) All nodes at the current depth before moving to the next level
   * D) Nodes randomly

Answer: C) All nodes at the current depth before moving to the next level

1. What data structure does Breadth-First Search use?
   * A) FIFO queue
   * B) LIFO stack
   * C) Priority queue
   * D) Hashtable

Answer: A) FIFO queue

1. What does Uniform-Cost Search (UCS) prioritize?
   * A) The closest node to the goal
   * B) The lowest-cost path when multiple paths exist
   * C) The deepest node in the tree
   * D) Random nodes

Answer: B) The lowest-cost path when multiple paths exist

1. When does Uniform-Cost Search (UCS) act like Breadth-First Search (BFS)?
   * A) When the goal is very far
   * B) When paths have different costs
   * C) When all transitions have equal costs
   * D) When using a priority queue

Answer: C) When all transitions have equal costs

1. What data structure is used in Depth-First Search (DFS)?
   * A) FIFO queue
   * B) LIFO stack
   * C) Priority queue
   * D) Set

Answer: B) LIFO stack

1. Depth-First Search (DFS) explores:
   * A) All nodes at the current level before moving deeper
   * B) Branch nodes deeply before backtracking
   * C) Random nodes
   * D) Only the shortest paths

Answer: B) Branch nodes deeply before backtracking

1. What is Bidirectional Search?
   * A) A search that goes in multiple random directions
   * B) A search that runs from both start and goal states until they meet
   * C) A search that only goes left and right
   * D) A search that changes direction based on costs

Answer: B) A search that runs from both start and goal states until they meet

1. What is the main advantage of Bidirectional Search?
   * A) It always finds the optimal solution
   * B) It only needs to explore half the path compared to traditional methods
   * C) It never gets stuck in loops
   * D) It doesn't need any memory

Answer: B) It only needs to explore half the path compared to traditional methods

**Informed Search Strategies**

1. What function does Greedy Best-First Search use to evaluate nodes?
   * A) f(n) = g(n) + h(n)
   * B) f(n) = g(n)
   * C) f(n) = h(n)
   * D) f(n) = 1/g(n)

Answer: C) f(n) = h(n)

1. What does h(n) represent in search algorithms?
   * A) The height of the node
   * B) The estimated cost from node n to the goal
   * C) The path cost from the start to node n
   * D) The number of children of node n

Answer: B) The estimated cost from node n to the goal

1. What is a limitation of Greedy Best-First Search?
   * A) It's too slow
   * B) It can get stuck in loops or dead ends
   * C) It uses too much memory
   * D) It's too complicated to implement

Answer: B) It can get stuck in loops or dead ends

1. What function does A\* search use to evaluate nodes?
   * A) f(n) = g(n) + h(n)
   * B) f(n) = g(n)
   * C) f(n) = h(n)
   * D) f(n) = g(n) - h(n)

Answer: A) f(n) = g(n) + h(n)

1. In A\* search, what does g(n) represent?
   * A) The goal state
   * B) The path cost from the start to node n
   * C) The estimated cost from node n to the goal
   * D) The total search cost

Answer: B) The path cost from the start to node n

1. How does A\* search combine UCS and Greedy Best-First Search?
   * A) It alternates between using each algorithm
   * B) UCS keeps solution cost low, Greedy Best-First helps find solutions quickly
   * C) It runs both and takes the best result
   * D) It only uses parts of each algorithm

Answer: B) UCS keeps solution cost low, Greedy Best-First helps find solutions quickly

**Important Concepts**

1. What is a "complete algorithm" in search?
   * A) An algorithm that finds any solution
   * B) An algorithm that guarantees finding a solution if one exists
   * C) An algorithm that works in all situations
   * D) An algorithm that is fully implemented

Answer: B) An algorithm that guarantees finding a solution if one exists

1. What is an "optimal solution" in search problems?
   * A) The fastest solution
   * B) The solution with the fewest steps
   * C) The solution with the lowest cost
   * D) The most recently found solution

Answer: C) The solution with the lowest cost