Multiple Choice Questions for Lecture 3: Solving Problems by Searching Algorithm

Types of Search Algorithms

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

Answer: B) Uninformed search and informed search

2. What is another name for uninformed search?
    - A) Smart search
    - B) Blind search
    - C) Quick search
    - D) Easy search

Answer: B) Blind search

3. In uninformed search, what does the agent know?
    - A) The number of steps needed to reach the goal
    - B) The path cost to reach the goal
    - C) Only when it reaches a goal
    - D) How far away the goal is

Answer: C) Only when it reaches a goal.

4. 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

5. What is the main advantage of informed search over uninformed search?
    - A) It's always faster
    - B) It always finds a solution
    - C) It uses background information about the problem
    - D) It never gets stuck

Answer: C) It uses background information about the problem

Uninformed Search Strategies

5. What is Breadth-First Search (BFS)?
    - A) A search method that explores the deepest nodes first
    - B) A search method that explores all nodes at the current depth before moving to the next level
    - C) A search method that only looks at the first few nodes
    - D) A search method that starts at the goal

Answer: B) A search method that explores all nodes at the current depth before moving to the next level

6. What data structure is used in Breadth-First Search?
    - A) FIFO queue
    - B) LIFO stack
    - C) Tree
    - D) Array

Answer: A) FIFO queue

7. 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

8. What happens in Uniform-Cost Search (UCS)?
    - A) It always chooses random paths
    - B) It prioritizes the lowest-cost path when multiple paths exist
    - C) It always explores the deepest paths first
    - D) It avoids paths with any cost

Answer: B) It prioritizes the lowest-cost path when multiple paths exist

9. 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

10. When does Uniform-Cost Search (UCS) behave like Breadth-First Search (BFS)?
    - A) When the goal is very far away
    - B) When there are multiple goals
    - C) When all transitions have equal costs
    - D) When there are no solutions

Answer: C) When all transitions have equal costs

11. What is Depth-First Search (DFS)?
    - A) A search method that explores all nodes at the current depth before moving deeper
    - B) A search method that starts at the goal and works backward
    - C) A search method that explores branch nodes deeply before backtracking
    - D) A search method that only uses costs

Answer: C) A search method that explores branch nodes deeply before backtracking

12. What data structure is used in Depth-First Search?
    - A) Queue
    - B) FIFO
    - C) LIFO stack
    - D) Tree

Answer: C) LIFO stack

13. What is Bidirectional Search?
    - A) A search method that only works in two dimensions
    - B) A search that runs two searches simultaneously—one from start and one from goal
    - C) A search that always goes left and right
    - D) A search that uses two different algorithms

Answer: B) A search that runs two searches simultaneously—one from start and one from goal

14. 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

15. What does Greedy Best-First Search use to decide which node to explore next?
    - A) Random selection
    - B) The lowest cost from the start
    - C) A heuristic function that estimates distance to goal
    - D) The shortest path

Answer: C) A heuristic function that estimates distance to goal

16. 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) $f(n) = h(n)$

17. 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

18. What is a limitation of Greedy Best-First Search?
    - A) It is too slow
    - B) It can get stuck in loops or dead ends
    - C) It never works
    - D) It uses too much memory

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

19. In A* search, what does the evaluation function $f(n) = g(n) + h(n)$ represent?
    - A) $f(n)$ is the total estimated cost, $g(n)$ is the path cost from start, $h(n)$ is the estimated cost to goal
    - B) $f(n)$ is the total time, $g(n)$ is the speed, $h(n)$ is the distance
    - C) $f(n)$ is the number of steps, $g(n)$ is steps taken, $h(n)$ is steps remaining
    - D) $f(n)$ is the solution, $g(n)$ is the problem, $h(n)$ is the method

Answer: A) $f(n)$ is the total estimated cost, $g(n)$ is the path cost from start, $h(n)$ is the estimated cost to goal

20. How does A* search combine UCS and Greedy Best-First Search?
    - A) It runs them one after another
    - B) UCS keeps solution cost low, Best-first helps find solution quickly
    - C) It chooses the better of the two
    - D) It alternates between them

Answer: B) UCS keeps solution cost low, Best-first helps find solution quickly

Important Concepts

21. What is the difference between traversal and search?
    - A) Traversal visits each node once, search finds a path between two nodes
    - B) Traversal is faster, search is more accurate
    - C) Traversal is for trees, search is for graphs
    - D) Traversal goes forward, search goes backward

Answer: A) Traversal visits each node once, search finds a path between two nodes

22. What does it mean when an algorithm is "complete"?
    - A) The algorithm is finished
    - B) The algorithm is perfect
    - C) The algorithm guarantees finding a solution if one exists
    - D) The algorithm has no errors

Answer: C) The algorithm guarantees finding a solution if one exists

23. What is a heuristic function in search algorithms?
    - A) A function that counts the number of steps
    - B) A function that estimates the cost to reach the goal
    - C) A function that measures algorithm speed
    - D) A function that creates the search tree

Answer: B) A function that estimates the cost to reach the goal