Jabin Kabir

PAGE NO.
DATE

Exp 7

Q) What are advantages & disadvantages of state space search?

→ Advantages
1. Systematic Exploration
2. Problem Exploration
3. Problem Representation
4. Versatility
5. Adaptability
6. Informed Decision making

Disadvantages
1. Exponential growth
2. Memory intensive
3. Time Consuming

Q2) What are advantages & disadvantages of hill climbing approach?

→ Advantages
- Simple & intuitive algorithm, that is easy to understand & implement
- Used in optimization problems including large search space & complex constraints
- Very efficient in finding local optima
- Can be easily modified & extend to include heuristic/ constraint

Disadvantages
- Can get stuck in local optima, not find global optimum of problem

- Does not explore search space thoroughly
- May be less than other optimization algorithm

Q3 Describe Variation of Hill climbing approach

→ a) Simple Hill climbing
Examining the neighbor nodes one by one select the first node which optimize current cost as next node.
b) Steepest - Ascent Hill climbing
first examine all neighbor nodes to select node closest to the solution state of next node.
c) Stochastic Hill climbing
- Does not examine all neighboring nodes before deciding which node to select. It just select a neighboring node at random & decides whether to move that neighbor

Q4. Solve the Block World problem by using STRIPS method

→ The BLOCK World problem is a classic planning problem where the task is to move blocks from one configuration to another using robot arm. It is in context of STRIPS (Stanford Research Institute Problem Solver)

3 Heuristic Dependency: The quality of heuristic heavily influences A* efficiency & optimality
4. Optimality Assurance: While optimal under certain conditions it may not always find optimal solution
5 Pathological cases: A* may encounter scenarios where it explores large portion of search spaces unnecessarily

Q3 Discuss A* BFS, DFS and Dijkstras algorithm in detail with example.

→ A* algorithm:
BFS algorithm that combines strength of Dijkstra's algorithm and greedy its search
Eg: When moving each cell in order to find the shortest path. The cost of move is h(n) could be manhattan distance from current to goal.

Broad first Search (BFS)
BFS is an uninformed search algorithm that systematically explores all neighbor nodes at present depth before moving on the node at next depth level. It guarantee finding shortest path in unweighted graph
Eg: Exploring all possible path in maze to find shortest path

Depth-first Search (DFS)
DFS is uninformed search algorithm that explores as far as possible along each branch before backtracking
Example: Searching for a specific in directory structure by each subdirectly recursively