

Title: Search Algorithms - Maze Navigation

Academic Year: 2024/2025

Discipline: Computer Science

Assignment: Search Algorithms - Maze Navigation

Goal:

- Implement search algorithms to navigate a robot through a maze.
- Represent the maze as a graph and visualize the robot's path.

Steps:

1. Graph Representation:

- Model the maze as a graph.
- Nodes: Represent states (positions in the maze).
- Edges: Represent possible moves (left, right).

2. Problem Formulation:

- Define the search problem.
- Initial State: Starting position of the robot (e.g., state A).
- Goal State: Exit position of the maze (e.g., state B).
- Actions: Possible moves (left, right).
- Transition Model: How actions change the state.
- Path Cost: Cost of moving between states (e.g., 1 per move).

3. BFS and DFS Implementation:

- Implement Breadth-First Search (BFS) and Depth-First Search (DFS).
- For each:
 - i. Provide the explored path (node visit order).
 - ii. Provide the solution path (A to B).

4. A* Implementation:

- Implement the A* algorithm.
- Cost Function: 1 per move.
- Heuristic Function: Use the provided heuristic values.
- Heuristic table:
 - i. n(state) A 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 B
 - ii. h(heuristic) 8 6 6 6 7 4 1 2 7 1 5 1 8 6 8 6 5 4 8 6 3 5 5 2 1 0

5. Visualization:

- Develop a visual representation of the robot's path.

6. Submission:

- Submit implementation via Classroom (3/20 points).