ACCEP
Communication and Computer Engineering Program

MAZE

BENHA UNIVERSITY

Exploring Maze Solving Algorithms: A Journey through AI

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About the Problem

Maze solving is a fundamental problem in artificial intelligence, with applications ranging from robotics navigation to game development. This poster delves into various algorithms used to solve mazes efficiently.

Algorithms Used

- Depth-First Search (DFS) Algorithm
- Breadth-First Search (BFS) Algorithm
- A* Algorithm
- Dijkstra's Algorithm
- Wall Follower Algorithm
- Uniform Cost Search Algorithm

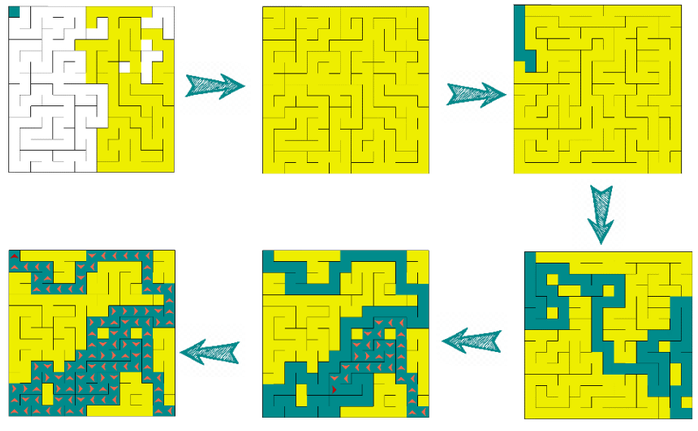
Project Goal

- Utilize AI searching algorithms to navigate the maze and find the shortest path from the start to the goal.
- Develop a solver that efficiently explores the maze space and returns the optimal path.

Problem Formulation

- States Representation: Representing the maze configuration and the current position of the agent within the maze.
- Initial State: Starting position of the agent within the maze.
- Actions: Movement directions (e.g., up, down, left, right) available to the agent.
- Transition Model: Determining the resulting state after applying an action in the current state.
- Goal Test: Checking if the agent has reached the goal state.
- Path Cost Function: Assigning a cost to each step taken by the agent.

Graphical Representation



Algorithmic Approach

- Implement various searching algorithms such as Depth-First Search (DFS), Breadth-First Search (BFS), A*, Dijkstra's Algorithm, Wall Follower, and Uniform Cost Search.
- Explore how each algorithm navigates the maze space and finds the optimal path.

Conclusion and Results

- Evaluate the performance of each algorithm in terms of finding the optimal solution and efficiency.
- Compare the results obtained by different algorithms in terms of path length, explored nodes, and computational resources utilized.
- Discuss the suitability of each algorithm for solving the maze problem based on the experimental findings.

Criteria	DFS	BFS	A*	Dij	WF	UCS
Time(ms)	1.02	4.05	1.01	5.55	1.002	1.982
Steps	53	49	49	48	56	57
Optimal?	No	No	No	Yes	No	No
Time complexity	$O(4^{600})$	$O(4^{600})$	$O(4^{600})$	O(600log600)	O(600)	$O(4^{601})$
Space complexity	$O(4^{600})$	$O(4^{600})$	$O(4^{600})$	O(600)	O(1)	$O(4^{600})$