8-Puzzle Solver using AI

Project Report

Introduction / Problem Statement:

The 8-Puzzle is a sliding puzzle consisting of a 3x3 grid with tiles numbered 1 to 8 and one empty space. The objective is to move the tiles to reach the goal state.

Implemented Algorithms:

- BFS (Breadth-First Search): Explores the puzzle level by level to find the shortest path to the goal.
- DFS (Depth-First Search): Explores as deep as possible in each path, may not find the shortest path.
- UCS (Uniform Cost Search): Finds the least cost path considering each move costs the same.
- Greedy Best-First Search: Uses heuristic (Manhattan Distance) to choose the next move closer to the goal.
- A* Search: Combines cost so far and heuristic to efficiently find the optimal path.

Team Contribution:

- Moneep Shpel: BFS implementation
- Ziad Medhat: DFS implementation
- Karim Arafat: UCS implementation
- Ziad Magdy: Greedy implementation
- Doaa Ahmed: A* implementation

Conclusion:

All algorithms were implemented successfully, demonstrating different search strategies for solving the 8-Puzzle problem.