Sumary:

This project focuses on developing an automated solver for sliding puzzles, such as the 8-puzzle and 15-puzzle. These puzzles involve arranging a grid of numbered tiles into a specified goal configuration by sliding them into an empty space. The project will implement and compare three algorithms: Depth-First Search (DFS), Breadth-First Search (BFS), and the A* search algorithm. Each method will be evaluated on its efficiency in solving puzzles of varying sizes. The system will provide the user with the minimum number of moves required for a solution and display the moves step-by-step. The comparison metrics include time complexity, number of moves, and memory usage. This project serves as a practical demonstration of algorithmic design and analysis in AI and search problems.

Modules:

Input Module

- Functionality: Takes user input for the selecting what type of algorithm to be used by entering the number of algorithm, validates it, and identifies the goal configuration.

DFS Solver Module

- Functionality: Implements Depth-First Search to find a solution to the puzzle. Tracks the number of moves and time taken.

BFS Solver Module

- Functionality: Implements Breadth-First Search for finding the shortest path solution. Tracks the number of moves and execution time.

A Solver Module*

- Functionality: Implements the A* search algorithm using a heuristic such as Manhattan distance. Tracks time and memory usage for solving.

Testing and Validation Module

- Functionality: Verifies that each algorithm produces correct solutions across multiple test cases.