Group 4   Section 1

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Project Update Report

Project Title: Puzzle Solver

Objective

CREATE A PUZZLE-SOLVER THAT EFFICIENTLY TACKLES DIVERSE PUZZLES USING MULTIPLE SEARCH ALGORITHMS, WITH CUSTOMIZED HEURISTICS FOR INFORMED SEARCHES. IT OFFERS USER-FRIENDLY INPUT, ALGORITHM SELECTION, AND PERFORMANCE COMPARISON.

1. Introduction

The objective of this project is to develop a puzzle solver that efficiently tackles multiple types of puzzles using various search algorithms. The system allows users to select a difficulty level and choose an algorithm for solving the puzzle. The performance of different algorithms is compared based on the execution time and the number of steps taken.

Currently, we are working on the **Sliding Puzzle with Numbers** using **Breadth-First Search (BFS)**, while the rest of the project components, including additional algorithms and the Sudoku solver, will be developed in the next phase.

- **State Representation:** The puzzle state is represented as a 2D list (grid) with empty spaces denoted by a 0 (zero)
- **Goal State:** The solver aims to arrange the numbers in ascending order with the blank tile at the bottom-right corner
- **Search Algorithm:** BFS is used to explore all possible moves level by level, ensuring the shortest path solution

3. Future Roadmap

Implementation of Additional Search Algorithms

- **A* Algorithm:** We plan to implement the A* search algorithm using heuristics like **Manhattan Distance** and **Misplaced Tiles** for informed searches
- **DFS:** Depth-First Search (DFS) is an alternative approach to BFS

2. Work in Progress

Sliding Puzzle with Numbers Implementation (BFS)

We are currently working on the sliding puzzle solver using the **Breadth-First Search (BFS)** algorithm. The key aspects of our implementation are:

Performance Comparison Module

- A framework to compare BFS/DFS, and A* based on execution time and the number of steps

User Interface Development

- We aim to develop a user-friendly interface where the user can choose difficulty level of the puzzles and algorithms as well

4. Challenges

- Currently we are trying to implement BFS to solve a 3 x 3 sliding puzzle. It is quite challenging for us to implement the functions of the sliding puzzle into the algorithm

5. Conclusion

The project is progressing as planned, with the **Sliding Puzzle BFS implementation** in development. The next phase involves integrating additional algorithms, developing the **Sudoku solver**, and refining the **user interface**. We remain committed to delivering an efficient puzzle solver.