Project Proposal

Data Structure And Algorithm

BS-CS(D)

M. Hashim Khan (CU-4196-2023)

Safeer Ahmad Awan (CU-4322-2023)

Jawad Ahmad Sajid (CU-4676-2023)

Project Proposal: Sudoku Solver using Data Structures and Algorithms

1. Project Title:

Sudoku Solver: A Smart Way to Solve Sudoku Using Algorithms

2. Problem Statement:

Sudoku is a popular number puzzle that can be difficult and time-consuming to solve manually, especially for harder puzzles. Some existing methods are slow and inefficient. This project aims to create a fast and efficient Sudoku Solver using smart algorithms and data structures.

3. Introduction:

Sudoku is a 9×9 grid-based puzzle where each row, column, and 3×3 box must contain the numbers 1 to 9 without repetition. This project will use programming techniques to develop a solver that quickly and correctly completes Sudoku puzzles. The solver will use backtracking, logical rules, and data structures to improve efficiency.

4. Objective:

- Build a program that can solve Sudoku puzzles automatically.
- Use smart techniques to make the solver fast and efficient.
- Store and manage the Sudoku board using appropriate data structures.
- Test different methods to find the best approach.

- Analyze how long different solving methods take to complete a puzzle.

5. Methodology:

1. **Understanding the Game:** Learn the rules and logic of Sudoku.
2. **Choosing the Algorithm:** Use a **backtracking algorithm** to try different numbers and find the correct solution.
3. **Using Data Structures:** Store and check numbers using **grids, lists, and hash maps** to speed up the process.
4. **Writing the Program:** Implement the solver using C++.
5. **Making it Faster:** Add improvements like constraint checking to reduce unnecessary steps.
6. **Testing the Solver:** Check how well the solver works with different Sudoku puzzles.

6. Expected Outcome:

- A working Sudoku Solver that can quickly complete puzzles.
- Faster solving time compared to basic methods.
- Better use of memory and storage with optimized data structures.
- A report comparing different solving methods.

7. Conclusion:

This project will show how data structures and algorithms can solve real-world problems. By using a smart approach, the Sudoku Solver will work efficiently and quickly. In the future, it can be improved with artificial intelligence for even better results.