

Week 4: Individual Progress Report

GitHub URL: <https://github.com/Akhil-Patil-Bagili/magic-square-puzzle-solver>

1. Similar Online Puzzle/Game URL

A similar online puzzle to our Magic Square Puzzle Solver is the traditional Magic Square game available at https://www.transum.org/software/SW/magic_square/magic_square.asp. This game challenges players to arrange numbers in a square grid so the sums of each row, column, and main diagonals are the same.

2. Solution Availability in the Similar Game

The mentioned game does not provide program-generated solutions to users. Players must solve the puzzles on their own or restart if they get stuck, lacking an automated solution verification or hint system.

3. Approach/Algorithm

Our Magic Square Puzzle Solver initially generates a complete magic square using a mathematical algorithm based on the Lo Shu Square pattern for odd-sized squares and a specialized method for even-sized squares. The solution space is dynamically generated by removing numbers from the complete square to create puzzles, ensuring a unique challenge for each user. The solution verification process involves a real-time feedback mechanism that validates the user's input against the correct sum for rows, columns, and diagonals.

4. Algorithm Optimality

The algorithm used for generating and solving magic squares is efficient but not necessarily optimal for all possible square sizes, especially as the square size increases. The initial generation method is optimal for creating a valid magic square. However, the dynamic puzzle generation and solution validation process may not scale optimally for very large squares due to the increased complexity and possible combinations.

5. Time Complexity

- The time complexity for generating a magic square is $O(n^2)$.
- The dynamic puzzle generation and solution validation complexity are also $O(n^2)$, as it involves iterating through the square's rows, columns, and diagonals.

Submission of Product Design Specification

Please note that the product_design_spec.pdf has been submitted to the GitHub repository as /pub/product_design_spec.pdf.