Project Report

Course: CSE440

Section: 1

Group Number: 2

Project Topic: AI-Based Logic Puzzle Solver Using Constraint Satisfaction

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The AI project on developing a logic puzzle solver using constraint satisfaction techniques has significantly progressed. The project focuses on implementing algorithms that can effectively solve various logic puzzles, such as Sudoku and logic grid puzzles, by applying constraint satisfaction principles.

Project Overview

The primary goal of the project is to create a robust framework that can handle different logic puzzles through a systematic approach. This involves defining the variables, constraints, and domains associated with each puzzle type. The project leverages existing research, including frameworks for step-wise explanations of solving constraint satisfaction problems, which enhances user understanding of the solution process.

Key Developments

Algorithm Implementation: The core algorithms for solving constraint satisfaction problems (CSPs) have been implemented. These include backtracking, constraint propagation, and heuristic-based approaches. The algorithms have been tested on various puzzles, demonstrating their effectiveness in finding solutions efficiently.

User Interface

A user-friendly interface has been developed, allowing users to input puzzles easily and visualize the solving process. The interface provides step-by-step explanations of how the solver arrives at a solution, which is crucial for educational purposes.

Performance Evaluation

Initial performance evaluations indicate that the solver can handle standard logic puzzles within acceptable time limits. Further testing is planned to assess scalability and performance on more complex puzzles.

Research Integration

The project has incorporated insights from recent studies on constraint satisfaction techniques, including the use of optimization methods and local search strategies. This integration aims to enhance the solver's capabilities and efficiency.

Future Directions

Moving forward, the project will focus on:

Expanding the range of puzzles supported by the solver, including more complex variations.

Enhancing the explanation framework to provide deeper insights into the solving process.

Conducting user testing to gather feedback and improve the interface and functionality.

Conclusion

The logic puzzle solver project is on track to achieve its objectives, with a solid foundation in constraint satisfaction techniques. Continued development and refinement will ensure that the solver is both powerful and accessible, making it a valuable tool for puzzle enthusiasts and educators alike.