GR-461

SUDOKU SOLVER USING BRUTEFROCE ALGORITHM WITH BACKTRACKING APPROCH

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Abstract

Sudoku is a fun game that challenges our brain to think logically. It only has numbers from 1 to 9 in a 9x9 matrix network where the nine numbers should not be repeated in the same column, row or each 3x3 submatrix. Although there are numerous methods to solve this problem, the most common method is the backtracking algorithm. So, we are using brute force algorithm to solve sudoku and then compare it with backtracking to ensure which algorithm gives best results.

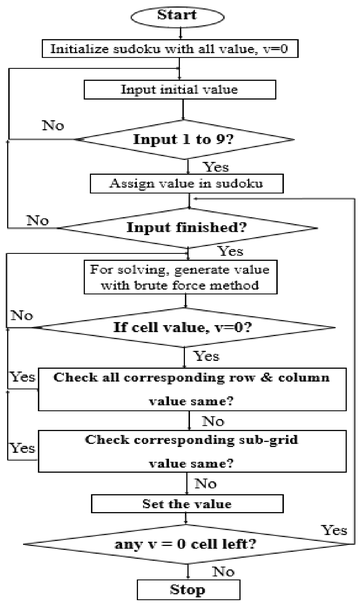
Motivation

- It captivate everyone in both intellectually and creatively, tackling this challenge allows to deepen the understanding of algorithms and real life problem-solving.
- It's like a battle between smart thinking and exploring everything, turning Sudoku into a fun mental challenge.

Objective

- Developing an optimized Sudoku solver using BruteFroce algorithm with Backtracking approach.
- Achieving the best time efficiency to reducing the number of comparisons in columns and rows.

Methodology



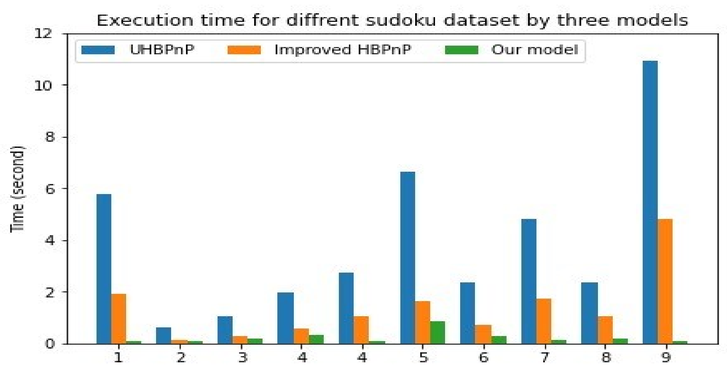
Results

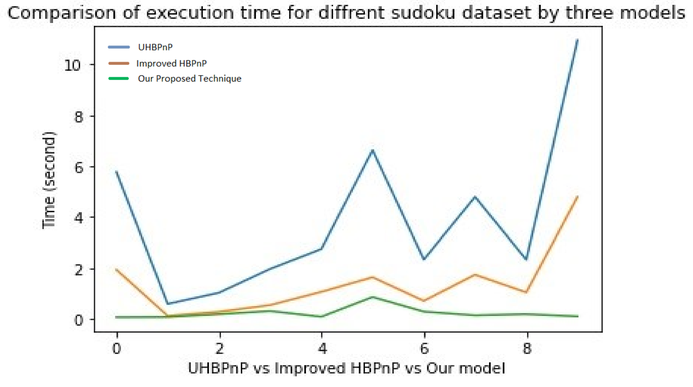
Taken time of each method to solve the Sudoku puzzles

Puzzle Name	HBPnP	UHBPnP	Improved HBPnP	OUR PROPOSED Technique
AI_Broken_Brick	-	5.773	1.938	0.072
AI_Tweezers	-	0.595	0.127	0.080
AI_Honeypot	2.627	1.034	0.285	0.192
AI_Squadron	3.083	1.971	0.549	0.315
AI_Circles	-	2.752	1.07	0.091
AI_Labyrinth	-	6.634	1.645	0.866
AI_Lucky_Diamond	-	2.337	0.715	0.292
AI_Killer	-	4.797	1.745	0.146
AI_Worm_Hole	-	2.332	1.048	0.193
AI_Escargot	-	10.941	4.800	0.105

AI broken brick

4				6			7	
						6		
	3				2			1
7					8	5		
	1		4					
	2		9	5				
						7		5
		9	1				3	
		3		4			8	





Conclusion

In conclusion, our Sudoku-solving approach, using brute-force and backtracking, effectively tackles the puzzle. We got an efficiency of 70 percent more than the already researched methods. We initialize a matrix, consider possible values for each box, and adapt to unique rules. We aim to enhance our Sudoku-solving methodology by incorporating the concept of Subset Elimination. This involves identifying sets of cells within a row, column, or sub grid that can only contain a specific subset of numbers. By eliminating these numbers from the possibilities of other cells in the same row, column, or sub grid, we anticipate a more refined and efficient approach to solving Sudoku puzzles in the future.

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