

SUDOKU SOLVER

using Constraint satisfaction problem

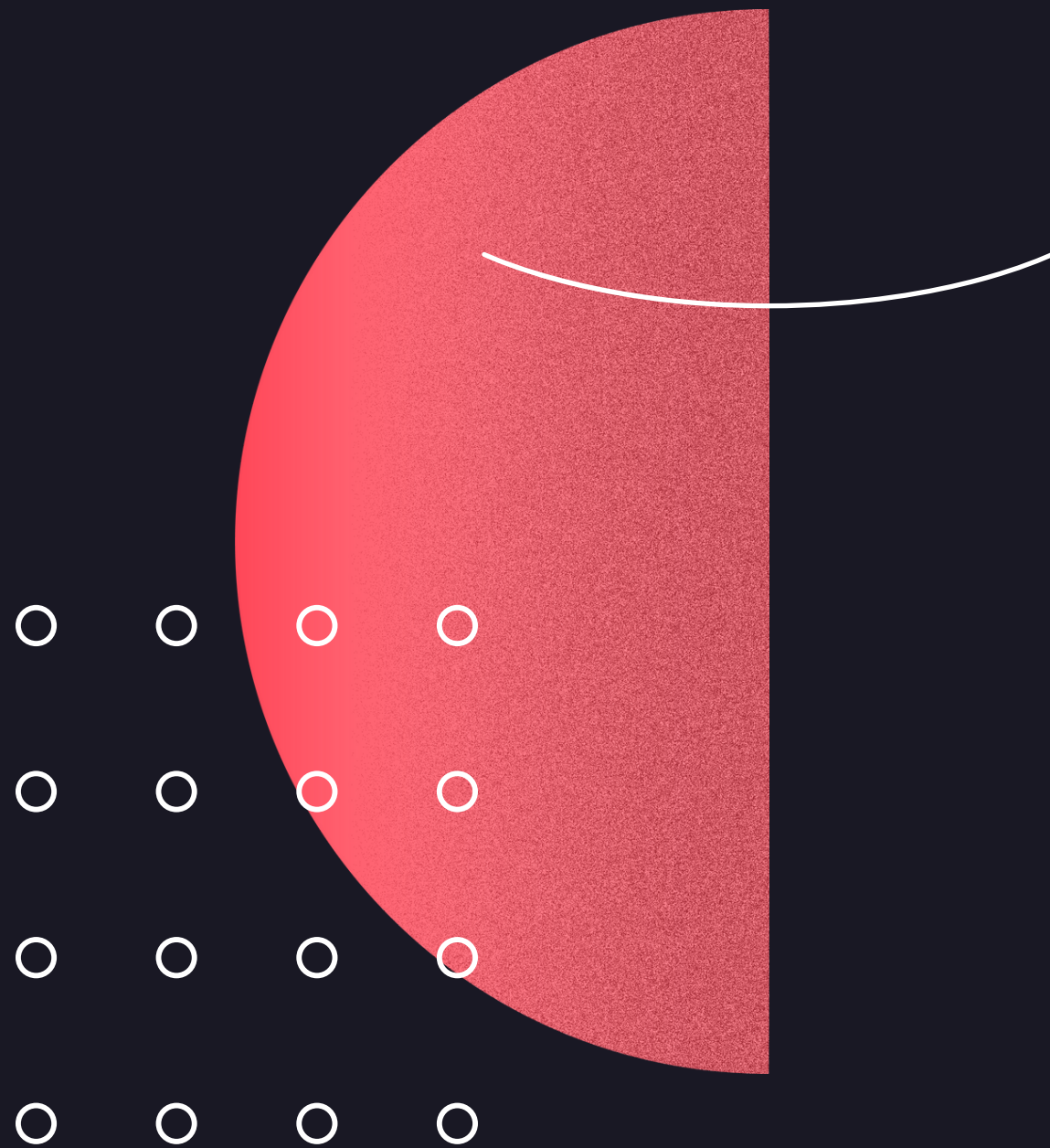
Team members :

1.KIRAN PATIL (211070904)

2.MAYURESH MURUDKAR (211070903)

3.SHRISHAIL GOURAGOND (211070906)

4.SANKALP VASAVE (211070909)



SUDOKU SOLVER GAME

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

- sudoku, also known as Su Doku, popular form of number game.
- sudoku consists of a 9×9 grid with numbers appearing in some of the squares. The object of the puzzle is to fill the remaining squares, using all the numbers 1–9 exactly once in each row, column, and the nine 3×3 subgrids.
- the level of difficulty is determined by the quantity and positions of the original numbers.
- The puzzle, however, raised interesting combinatorial problems for mathematicians, two of whom proved in 2005 that there are 6,670,903,752,021,072,936,960 possible sudoku grids.

PROJECT DESCRIPTION

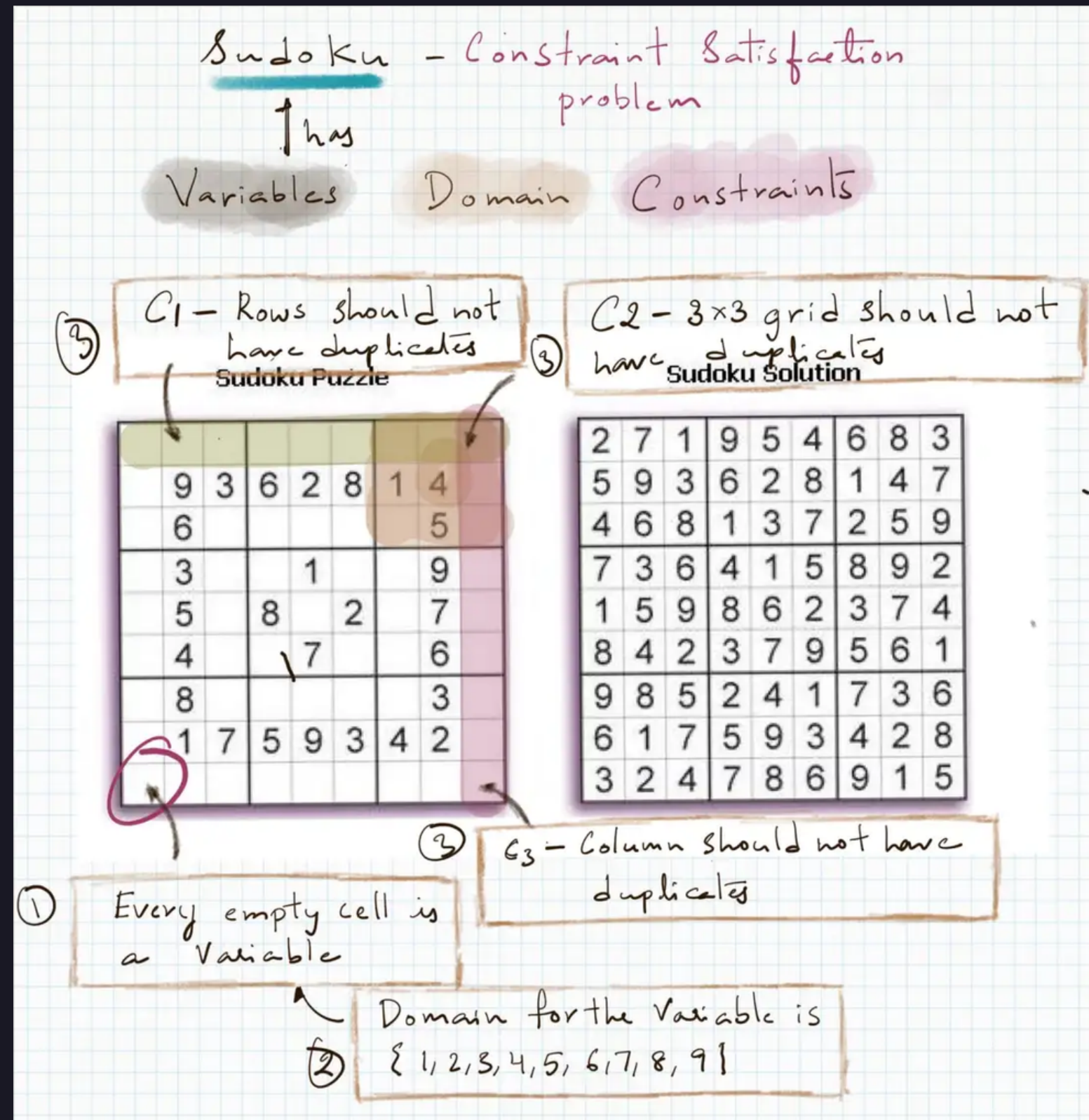
8	2	7	1	5	4	3	9	6
9	6	5	3	2	7	1	4	8
3	4	1	6	8	9	7	5	2
5	9	3	4	6	8	2	7	1
4	7	2	5	1	3	6	8	9
6	1	8	9	7	2	4	3	5
7	8	6	2	3	5	9	1	4
1	5	4	7	9	6	8	2	3
2	3	9	8	4	1	5	6	7

- Sudoku Solving with brute force approach to try every possible combination is very inefficient in worse case it takes over 600 million steps to solve a 9 x 9 puzzle.
- Here in this project we aim to reduce the reduce the search space and find optimal solution as follows
- we will use Constraint satisfaction with pure Backtracking (without inference), BT with Forward checking and BT with MAC (Maintaining Arc Consistency).
- Then we will compare their application on different instances of Sudoku.

CONSTRAINT SATISFACTION PROBLEM

CSP stands for Constraint Satisfaction Problem. Therefore, our main goal to design such an algorithm is to satisfy all the well-defined constraints which the problem introduces. In order to create a CSP algorithm, we need to indicate three properties of our problem. Variables, Domains, and Constraints. Each variable is a piece of the problem which needs to be assigned to an appropriate value in order to solve the problem. Domain indicates which values can be assigned to a specific variable. And finally, constraints indicate which of the values existing in the domain could be used in the moment

OVERVIEW



The three properties of the problem are defined as follow:

- Variables: Each empty cell on the board
- Domains: For each cell, a domain is defined as a set of numbers between 1 and 9 except the numbers which are already used in the current row, column or 3 x 3 squares.
- Constraints: No redundant numbers in rows, columns and the 3 x 3 squares.