Constraint Satisfaction Problems

A SUDOKU SOLVER (100 Points)

Write a Sudoku puzzle solver using a Constraint Satisfaction Problems approach that can calculate the solution for the puzzle below.

Traditional Sudoku is a 9 X 9 puzzle grid of nine 3 X 3 regions. Each region, row, and column contain nine cells. The numbers shown on the board are **given** and cannot be changed.

The object of the puzzle is to place the numbers 1 to 9 in the empty cells so that each row, column, and 3 X 3 region contains the same number only once.

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

A puzzle that is much harder and can be used to test additional pruning strategies is:

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

SUBMISSION

Python or C++ is the preferred implementation language. For Python, provide a plain PY file (no Jupyter Notebook). If you are writing in C++, please include a `CMakeLists.txt` and any other compilation instructions. Your code should run immediately without any additional steps on our part.

Your solution may use any numerical libraries for pre-processing, fundamental calculations (e.g., linear algebra), and visualization. However, the core portion must be implemented from scratch. If you are unsure about a specific library, ask the teaching staff first.

Submit your solution as a ZIP file with all the files via Canvas. Include a `README.txt` file that clearly explains all its assumptions.