Caperation of the second secon

The project is developing a Sudoku game in MATLAB. The program which is developed has some capabilities. These are:

Image: Constraint of the second state of the second sta

with saving and different deleting the game levels

With and and redoing the previous moves

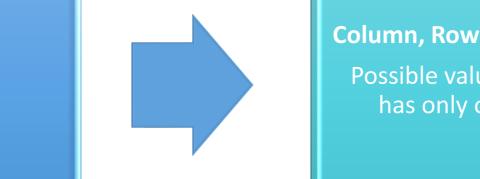
Showing all activities done by the user in activities part Showing the solution of the puzzle when the user wants Not allowing the placed entry that does not follow the Sudoku rules Resetting the puzzle

8

Giving hints when the user wants

g

PROGRAMMING SUDOKU GAME Merve Makbule Semizer - 21128526 Supervisor: Dr. Mücahit K. Üner Electrical and Electronics Engineering, Hacettepe University



Column, Row and Mini-grid Elimination (CRME): Possible values of all cells are scanned. If a cell has only one possible value, that value is assigned to that cell.

Lone Rangers Control:

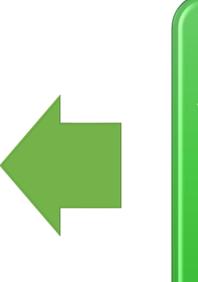
If there is only one place where a value can be written in a row, column or block, that value is written to that cell. This value is called 'Lone Rangers'.

SOLUTION TECHNIQUES



START

The Brute-Force Elimination technique is a trial and error technique. The program selects a cell which is had the least number of possible values. And it chooses one of the possible values for this cell and places it in its cell. Then, according to this selection, it tries to solve the puzzle. End of this operation, if an error occurs, the selection is changed. These processes are repeated until the puzzle is solved, recursively.



DIFFICULTY LEVELS

EXTREMELY DIFFICULT

EASY

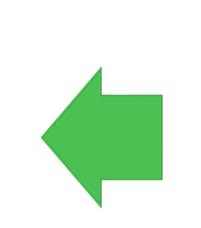
MEDIUM

DIFFICULT

Triplets Control:

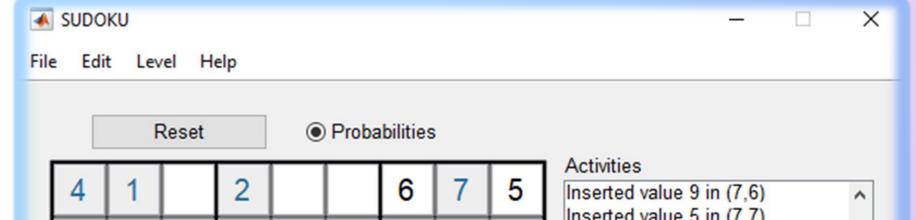
ACCEPTABLE RANGE

Triplets are used to describe three different cells, the probabilities of which are subsets of three different values. If a row, column or mini-grid contains triplets, these three probable values in triplets cannot be found in other cells of these row, column or mini-grid.



Twins Control:

The twins are used for specifying the two cells with the same two probable values. If a row, column or mini-grid contains twins, these two probable values in twins cannot be found in other cells of these row, column or mini-grid.





Determine the number of cells that will remain empty and score range depending on the difficulty level

Randomly fill the board, following the Sudoku rules

Clear the appropriate number of cells symmetrically

> Solve the puzzle by using explained solution techniques

If the score does not meet with the acceptable range, return and

SCORES ADDED FOR EACH TECHNIQUES	
TECHNIQUE	SCORE
CRME	1
Lone rangers control in row, column and mini-grid	2/2/2
Twins control in row, column and mini-grid	3/3/3
Triplets control in row, column and mini-grid	4/4/4
Brute-Force Elimination	5

NUMBER OF

40-45

46-49

50-53

54-58

EMPTY CELLS FOR SCORE

42-46

49-53

56-60

112-116

A PLACE DISPLAN

			-		-	-			-	Inserted value 5 in (7,7)
	6	7	2	4	3	5	1	8	9	Inserted value 2 in (7,8) Inserted value 3 in (9,7)
	5				7	1	2	4	3	Inserted value 3 in (4,8) Inserted value 6 in (6,8)
				8	5	7	9	3		Inserted value 8 in (5,7) Inserted value 7 in (6,7)
	7	3	14	9	2	6	8	5	14	Inserted value 2 in (6,9) Inserted value 9 in (6,1) Inserted value 5 in (6,2)
	9	5	8	1	4	3	7	6	2	Inserted value 2 in (3,7) Inserted value 6 in (1,7) Inserted value 9 in (2,9) Inserted value 5 in (1,9) Inserted value 3 in (2,5) Inserted value 2 in (2,3) Deleted value 2 in (2,3) - UNDO
	1	4	7	3	6	9	5	2	8	
	3	9	5	7	8	2	4	1	6	
	8	2	6	5	1	4	3	9	7	Inserted value 2 in (2,3) - REDO Inserted value 7 in (5,1) - HINT
	Hint					Solved Puzzle				

The hints are shown in red.

When 'Probabilities' button is selected , for empty cells, previously user entered probable values (multiple values) are shown in pink or new probable values for future use can be entered.

All activities shown in activities part (undo, redo, hint, etc.).

When the user clicks 'Solved Puzzle' button, the program returns the solution of the puzzle.



Thanks to Dr. Mücahit K. Üner for invaluable

contributions to the project.