5-Jan-2021

05 January 2022 21:05

Sudoku Solver :-

	0	1	2	3	4	5	6	7	8
0	5	3			7				
1	6			1	9	5			
2		9	8					6	
3	8				6				3
4	4			8		3			1
5	7				2				6
6		6					2	8	
7				4	1	9			5
8					8			7	9

=) 9 x 9 matrix

=) 9 blocks, 1 block contains 9 cells

=) Every cell has a number which is a unique number in that block, the whole row and column

3x3

3, 7

3, 6 7, 1

5, 8

```
isValid (board, r, c, k) {
    for row
        for (i=0; i<9; i++)
            if (board[r][i] == k) return false;
    for col.
        for (i=0; i<9; i++)
            if (board[i][c] == k) return false;
    sr = r - (r%3)
    sc = c - (c%3)
    for (i = sr to sr+2) {
        for (j = sc to sc+2) {
            if (board[i][j] == k)
                return false
        }
    }
    return true;
}
```

$7-(7\%3) = 6$

$1-(1\%3) =$

$1-1=0$

$sr = row - (row\%3) = 3-(3\%3) = 3$

$sc = col - (col\%3) = 7-(7\%3) = 6$

	0	1	2	3	4	5	6	7	8
0	5	3			7				
1	6			1	9	5			
2		9	8					6	
3	8				6				3
4	4			8		3			1
5	7				2				6
6		6					2	8	
7				4	1	9			5
8					8			7	9

$28\%9 = 1$ 3, 1

total cells = 81 = 9x9

Possibility = 9/each cell

```
solveSudoku (board, total) {
    if (total == 81) return;
    r = total / 9;
    c = total % 9;
    if (board[r][c] == '.')
```

28%9 = 1 3,1

28/9 = 3

48%9 = 3 5,3

48/9 = 5

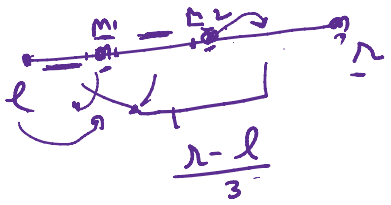
```
c = total%9;
if(board[r][c] != '.')
    solveSudoku(board, total+1)

for(1 to 9){
if(isValid(board, r, c, i)){
    board[r][c] = i
    solveSudoku(board, total+1);
    board[r][c] = '.';
}
}
```

Ternary Search :-

[1, 2, 3, 4, 5, 6, 7]

l r



$l = 0$

$r = a.length - 1 = 6$

$midDivider = \frac{r-l}{3} = \frac{6-0}{3} = 2$

$m1 = l + midDivider$

$m2 \quad r - midDivider$

```
if(k < arr[m1]) r = m1 - 1
else if (k > arr[m2]) l = m2 + 1
else {
    r = m2 - 1
    l = m1 + 1
}
```

k

$l \le r$

BS

$\log_2(n)$

$1 \times \log_2(10)$ $n = 10$

$1 \times 3 \ldots$

$= 3$

TS

$\log_3(n)$

$2 \times \log_3(10)$ $3^2 = 9$

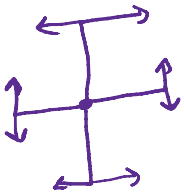
$= 2 \times 2 \ldots$

$= 4 \ldots$

Knights Tour :-

$n \times n$ $n = 4$ find one solution

Knights Tour



$n \times n$ | $n = 4$

	0	1	2	3
0	0	5	2	
1	3		9	6
2	8	1	4	
3			7	

=> find one solution and return matrix

=> Print all solutions