

115. Sudoku Solve

Code:

```
def solve_sudoku(board):  
    def is_valid(board, row, col, num):  
        for i in range(9):  
            if board[row][i] == num or board[i][col] == num:  
                return False  
            if board[3 * (row // 3) + i // 3][3 * (col // 3) + i % 3] == num:  
                return False  
        return True  
  
    def solve():  
        for row in range(9):  
            for col in range(9):  
                if board[row][col] == '.':  
                    for num in map(str, range(1, 10)):  
                        if is_valid(board, row, col, num):  
                            board[row][col] = num  
                            if solve():  
                                return True  
                            board[row][col] = '.'  
                    return False  
        return True  
  
    solve()  
  
board = [  
    ['5', '3', '.', '.', '7', '.', '.', '.', '.'],  
    ['6', '.', '.', '1', '9', '5', '.', '.', '.'],  
    [ '.', '9', '8', '.', '.', '.', '.', '6', '.'],  
    ['8', '.', '.', '.', '6', '.', '.', '.', '3'],
```

```

['4', '.', '.', '8', '.', '3', '.', '.', '1'],
['7', '.', '.', '.', '2', '.', '.', '.', '6'],
['.', '6', '.', '.', '.', '.', '2', '8', '.'],
['.', '.', '.', '4', '1', '9', '.', '.', '5'],
['.', '.', '.', '.', '8', '.', '.', '7', '9']
]

```

solve_sudoku(board)

for row in board:

 print(row)

output:

```

PS C:\Users\karth>
PS C:\Users\karth> & c:/Users/karth/AppData/Local/Programs/Python/Python312/python.exe c:/Users/karth/OneDrive/Documents/OriginLab/problem.py
['5', '3', '4', '6', '7', '8', '9', '1', '2']
['6', '7', '2', '1', '9', '5', '3', '4', '8']
['1', '9', '8', '3', '4', '2', '5', '6', '7']
['8', '5', '9', '7', '6', '1', '4', '2', '3']
['4', '2', '6', '8', '5', '3', '7', '9', '1']
['7', '1', '3', '9', '2', '4', '8', '5', '6']
['9', '6', '1', '5', '3', '7', '2', '8', '4']
['2', '8', '7', '4', '1', '9', '6', '3', '5']
['3', '4', '5', '2', '8', '6', '1', '7', '9']
PS C:\Users\karth>

```

Time complexity: $f(n) = o(n!)$