

**PROJECT REPORT**

**ON COURSES**

**SUBMITTED TO**

**DEPARTMENT OF COMPUTER SCIENCE**

**UNDER THE SUPERVISION OF**

**DR. ANUPRIYA AND DR. NABANITA**

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**DECLARATION**

I hereby declare that the course submitted as part of Bachelor’s degree in CSE, at Chitkara University, Punjab, is an authentic record of our own work carried out under the supervision of Dr. Anupriya and Dr. Nabanita.

**Signature(s):**

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**ABOUT PROJECT**

INTRODUCTION

Basically, Sudoku is a logic-based, combinatorial number-placement puzzle which requires no calculation or arithmetic skills.

PROBLEM STATEMENT

Every sudoku games begins with a number of squares already filled in and the difficulty of each game is largely a function of how many squares are filled in.

Our job is to place a number into every empty box so that each row across, each column down, and each small 3x3 square within the large square (there are 9 such boxes) will contain each number from 1 to 9.

Remember that no number may appear more than once in any row across, any column down, or within any small 3x3 square

CODE:

***Library used****:* **Numpy:** The project starts with reading the sudoku input as a matrix with the help of numpy which is a python library for working with arrays

We initialize an array which would be the problem puzzle and will print this array as a 9x9 matrix

***Two Functions are used ie. Possible and Solve***

We define the function **“possible”** in which we check if the number we want to insert in cell is appearing in the row across, or column down or in the small 3x3 box.

If the number is appearing, it means it can’t be the valid answer to that particular cell

Defining the function **“solve”** which will help in the **backtracking process** by looping through rows, columns and numbers and in case the number is a valid answer to the cell it will assign the value to the cell, and if it doesn’t lead to the solution then we come back and try next number in the cell





BACKTRACKING

Backtracking is a technique to solve problems where multiple choices are there and we don’t know the correct choice and hence we solve the problem with trial and error that is trying each option until the goal is achieved

We basically check that the same number is not present in current row, current column and current 3x3 subgrid. After checking for safety we assign the number , and recursively check whether this assignment leads to a solution or not. If the assignment doesn’t lead to a solution, then we try next number for current empty cell. And if none number(1 to 9) lead to solution, we return false

ADVANTAGES

* Sudoku improves logical thinking.
* It helps to improve concentration.
* It enhances memory
* The sudoku solver makes you understand the concept and logic behind the game and provides you with the solution in no time.

**CONCLUSION**

Although the sudoku problem is a difficult constraint satisfaction problem, it is not completely invulnerable to search methods. Puzzles of size three as given can be solved very quickly and consistently by the backtracking search method.