PROJECT REPORT: CROSSWORD SOLVER

-18BCE1041

-18BCE1207

-18BCE1274

MOTIVATION BEHIND DOING THIS PROJECT:

As the classes proceeded, we got really fascinated by the subject Data Structures and Algorithms. Meanwhile, we got this project as an opportunity so we thought of making full use of it and searched for something that included use of Data Structures and Algorithms, especially the algorithmic part because Computer is a dumb machine and if we can provide it with step by step procedure a.k.a. algorithm it can become a very fabulous one. Automated Crossword Solver came out just right because it includes so many constraints and conditions, it is a good choice if you really want to dive deep into the subject. Also, most of the newspaper have this section of crossword. So, we might use this program to find its solution and also it could be used to create a crossword.

PROBLEM STATEMENT:

Given a crossword of any size, synonyms of the words that are to be filled, it's corresponding word length, we have to device an efficient algorithm using data structures in an optimum way so that the program searches for the synonyms of given hints in the dictionary and fills them in the crossword in a way so that all the conditions of crossword are perfectly satisfied.

A crossword is a word puzzle that usually takes the form of a square or a rectangular grid of white- and black-shaded squares. The game's goal is to fill the white squares with letters, forming words or phrases, by solving clues, which lead to the answers. For us, the clues will be synonyms.

ALGORITHM:

Step 1- Taking input of the size of crossword and the actual crossword including the empty spaces to fill in the answers from the user.

Step 2- Taking input of the words and lengths of their corresponding synonyms to be fill in the empty spaces using ';' as splitter in between words from the user.

Step 3- Finding the synonyms of the words of the corresponding length from the wordnet library of python and storing it in an array.

Step 4- Now we will find the direction, length of spaces and their starting point of all suchwords and also will sort all object of Variable Spaces by length property using generateSpaces function.

Step 5- Now after verifying the directions of all the words using verifySpaces function, we will fill the crossword in that particular direction (horizontal or vertical based on its direction to be filled as given by the generateSpaces function) using fillHorizontal and fillVertical functions inside the solveCrossword function using the algorithm "Recursive Backtracking".

Step 6- When all the words have been filled in the crossword using the above functions we will display the filled crossword with corresponding answers using the function printCross.

DATA STRUCTURE USED/ALGORITHM STRATEGY USED:

We have used 2D-arrays, classes, sets, lists as data structures and we have used recursive backtracking as major algorithm.

FUTURE WORK PROPOSED:

This project i.e. Automated crossword solver can be used by major newspaper, magazines, educational institutions or we could integrate and make a game out of it to help people improve their grasp of English language, better their logic skills and to improve their aptitude and critical thinking. It can be widely use anywhere for educational purposes. If proved to be of high value, we could integrate more features in the crossword to make it of more value.