

A Report on Project (*Dynamic Program Solver*)

To fulfill the requirement of Course
Design & Analysis of Algorithm (CS302)- 2021

Course Instructor:

Dr. Fahad Sherwani

Submitted By:

1: Muhammad Haris Khan (18K-1190)

2: Yassa Fareed (18K-0211)

BS-V (Computer Science)

FAST National University of Computing & Emerging Sciences

Abstract

The project is a group of algorithms that can be solved using dynamic programming and provides a Graphical User Interface for selecting any input and used any possible algorithms on that input, Inputs are generated using '*Generate Input*' Button and 10 files for each algorithm are generated in .txt format, Software Input Commands use that input to show its content by '*Show File Content*' Button and show possible algorithms by '*Apply Possible Algorithm*' Button, select any one algorithm to apply on input and to show its output.

Contents

Abstract.....	2
1.Introduction	3
2.Proposed System	4
2.1 Discussion:	4
3.Experimental Setup.....	5
4.Results & Discussion	7
5.Conclusion.....	7
6.References	8

1.Introduction

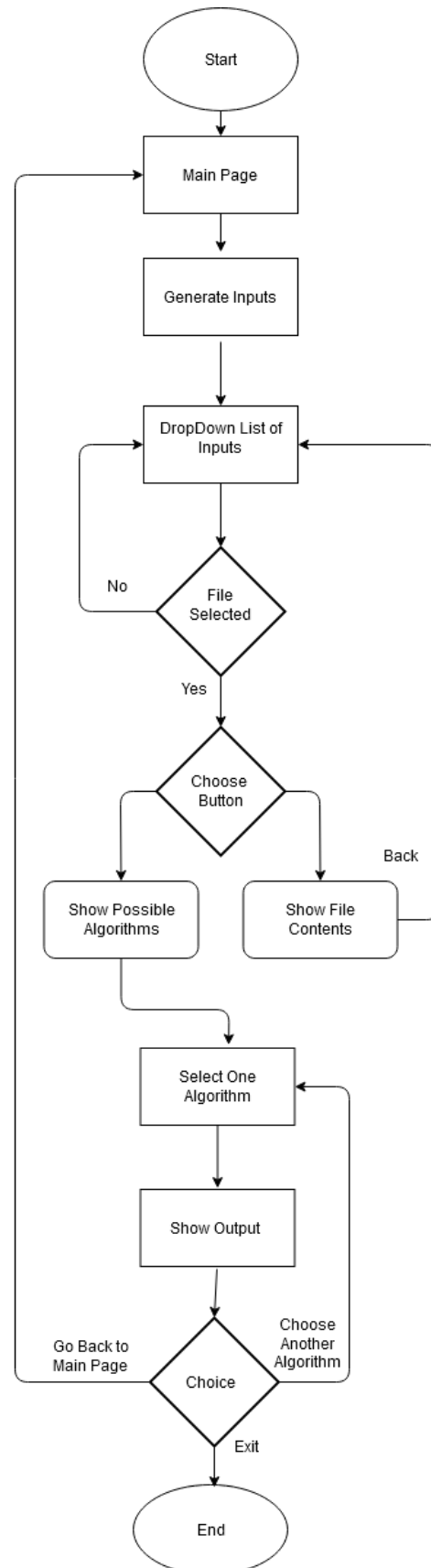
Dynamic Program Solver is a Desktop Application which is made on C#, it provides user to generate inputs i.e. (10) for each Algorithm (10), a user then views content of each file and select any file to show possible algorithms and select any one algorithm to apply on input then program shows output on that input then user can go back to main menu or exit the program.

All problems are solved using Dynamic Programming.

2. Proposed System

2.1 Discussion:

At first main page shows , it have three buttons ‘Show File Content’ , ‘Show Possible Algorithms’ & ‘Generate Inputs’ , show file content and show possible algorithms cannot work before Generate Inputs then it generate input files in .txt format in respective path it provides user to generate inputs i.e. (10) for each Algorithm (10), a user then views content of each file and select any file to show possible algorithms and select any one algorithm to apply on input then program shows output on that input then user and user can choose more algorithms by going back after all this user can go back to main menu or exit the program.



3.Experimental Setup

1. Longest Common Subsequence

Two sequences of string using only alphabets which can derived from your name in random order and repetition with the random length from 30 to 100 characters. for ex: name: AHMAD ALI (AIIIMHHMMAALLLAAAIIDAHHHAAAIILL) name is generated randomly.

2. Shortest Common Subsequence

Two sequences of string using only alphabets which can derived from your name in random order and repetition with the random length from 30 to 100 characters. for ex: name: YASSA (SAASSASSASSAAAYASAASSSSAYSYSAAAYAYASAASY) name is generated randomly.

3. Levenshtein Distance (edit-distance)

Two sequences of string using only alphabets which can derived from your name in random order and repetition with the random length from 30 to 100 characters. for ex: name: HARIS (RIASSASIIRHSAASISARISARSIRIASI) name is generated randomly.

4. Longest Increasing Subsequence

A sequence of n random numbers from 0 to 100 (n varies from 30 to 100). Sample input:

46

37,66,86,31,2,16,62,68,33,98,3,48,95,50,90,22,86,48,33,44,71,66,45,0,0,33,23,62,65,
71,57,58,96,13,54,94,80,40,80,48,21,86,86,50,90,11

5. Matrix Chain Multiplication (Order finding /paranthesization)

A sequence of n random numbers from 0 to 100 (n varies from 30 to 100).

Sample input:

39

40,72,39,51,27,42,64,66,61,6,71,59,91,5,56,66,93,53,46,92,74,97,58,8,98,85,93,19,7,
7,70,55,15,11,83,11,52,38,8

6. 0-1-knapsack-problem

A set of n points (n is a random number varying from 10 to 100) with weights and values ranging from 1 to 100. The capital W is the last three digits of your roll number. e.g., for roll number 18K-1123, the W will be 123. Sample input:

78,15,53,79,62,39,39,32,17,15,55,19,52,27,12,3,26,88

50,99,89,92,29,82,56,78,86,97,75,95,30,6,98,88,26,41

211

7. Partition-problem

A sequence of n random numbers from 0 to 100 (n varies from 30 to 100).

Sample input:

39

40,72,39,51,27,42,64,66,61,6,71,59,91,5,56,66,93,53,46,92,74,97,58,8,98,85,93,19,7,
7,70,55,15,11,83,11,52,38,8

8. Rod Cutting Problem

A set of n points (n is a random number varying from 10 to 100) with weights and values ranging from 1 to 100. The capital W is the last three digits of your roll number. e.g., for roll number 18K-1123, the W will be 123. W as rod length, weights as lengths and values as price. Sample input:

78,15,53,79,62,39,39,32,17,15,55,19,52,27,12,3,26,88

50,99,89,92,29,82,56,78,86,97,75,95,30,6,98,88,26,41

211

9. Coin-change-making-problem

A sequence of n random numbers from 0 to 100 (n varies from 30 to 100) with desired change as the last three digits of your roll number. Sample input:

39

40,72,39,51,27,42,64,66,61,6,71,59,91,5,56,66,93,53,46,92,74,97,58,8,98,85,93,19,7,
7,70,55,15,11,83,11,52,38,8

10. Word Break

A set of randomly generated strings from alphabets a to z as S and your full name, in small letters and without space, as Input for word break. Sample input:

ruqzjpdptylyhxxkqozosnckmw

yassafareed

4.Results & Discussion

Longest Common Subsequence = Length of LCS

Shortest common Subsequence = length of shortest Subsequence

Longest increasing subsequence = Length of LIS

edit distance = minimum distance

partition problem = can or cannot be divided into two subsets of equal sum

matrix multiplication = "minimum number of multiplications"

coin change problem = number of ways it can be done

0/1 knapsack = maximum profit

rod cutting problem = maximum value

word break problem = it is possible or not

5.Conclusion

Dynamic Programming is often used to solve optimization problems,

It is a tabular method in which we break down the problem into subproblems and place the solution to the subproblems in a matrix.

Dynamic Programming helps us understand the problems and give us a generic solution for the problem, Dynamic Programming can solve given problem in polynomial time.

6.References

<https://www.codeproject.com/Articles/73856/C-4-0-Dynamic-Programming>

<https://www.geeksforgeeks.org/dynamic-programming/>

<https://stackoverflow.com/>