ASSIGNMENT: LCS ALGORITHM

Implementation of the LCS algorithm:

CODE –

#include <stdio.h>

#include <string.h>

#define MAX 100

*int* c[MAX][MAX]**;**

*char* b[MAX][MAX]**;**

*void* LCS(*char* **\*X,** *char* **\*Y,** *int* **m,** *int* **n**) {

**for** (*int* i **=** 0**;** i **<=** **m;** i**++**)

c[i][0] **=** 0**;**

**for** (*int* j **=** 0**;** j **<=** **n;** j**++**)

c[0][j] **=** 0**;**

**for** (*int* i **=** 1**;** i **<=** **m;** i**++**) {

**for** (*int* j **=** 1**;** j **<=** **n;** j**++**) {

**if** (**X**[i **-** 1] **==** **Y**[j **-** 1]) {

                c[i][j] **=** c[i **-** 1][j **-** 1] **+** 1**;**

                b[i][j] **=** '\\'**;**

            } **else** **if** (c[i **-** 1][j] **>=** c[i][j **-** 1]) {

                c[i][j] **=** c[i **-** 1][j]**;**

                b[i][j] **=** '^'**;**

            } **else** {

                c[i][j] **=** c[i][j **-** 1]**;**

                b[i][j] **=** '<'**;**

            }

        }

    }

}

//recursive approach to print the LCS

*void* printLCS(*char* **\*X,** *int* **i,** *int* **j**) {

**if** (**i** **==** 0 **||** **j** **==** 0) **return;**

**if** (b[**i**][**j**] **==** '\\') {

        printLCS(**X,** **i** **-** 1**,** **j** **-** 1)**;**

        printf("*%c*"**,** **X**[**i** **-** 1])**;**

    }

**else** **if** (b[**i**][**j**] **==** '^') {

        printLCS(**X,** **i** **-** 1**,** **j**)**;**

    }

**else** {

        printLCS(**X,** **i,** **j** **-** 1)**;**

    }

}

*int* main() {

*int* test**;**

    printf("Enter number of test cases: ")**;**

    scanf("*%d*"**,** **&**test)**;**

**while** (test**--**) {

*char* X[MAX]**,** Y[MAX]**;**

        printf("\nEnter first string: ")**;**

        scanf("*%s*"**,** X)**;**

        printf("Enter second string: ")**;**

        scanf("*%s*"**,** Y)**;**

*int* m **=** strlen(X)**;**

*int* n **=** strlen(Y)**;**

        LCS(X**,** Y**,** m**,** n)**;**

        printf("Longest Common Subsequence: ")**;**

        printLCS(X**,** m**,** n)**;**

        printf("\n")**;**

    }

**return** 0**;**

}

OUTPUT –

Enter number of test cases: 6

*// general case*

Enter first string: BADCXYDA

Enter second string: BXDCADA

Longest Common Subsequence: BDCDA

*//same string (LCS -> whole string)*

Enter first string: BADCXY

Enter second string: BADCXY

Longest Common Subsequence: BADCXY

*// reverse string with no repetitions (LCS -> one character)*

Enter first string: BXCDYA

Enter second string: AYDCXB

Longest Common Subsequence: B

*//no match (LCS -> not found)*

Enter first string: AXC

Enter second string: BYD

Longest Common Subsequence:

*// single character no match (LCS -> not found)*

Enter first string: A

Enter second string: C

Longest Common Subsequence:

*//single character match (LCS -> the character)*

Enter first string: C

Enter second string: C

Longest Common Subsequence: C