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Experiment No.	4

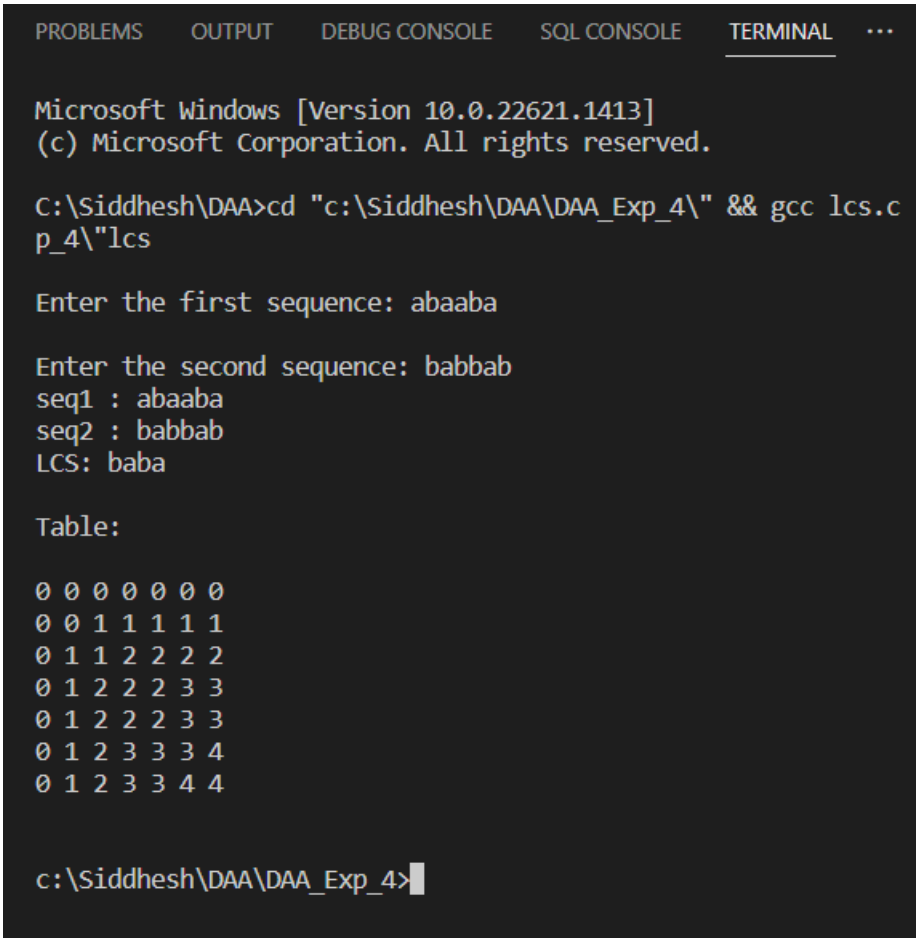
AIM:	To implement Longest Common Subsequence
Program	
PROBLEM STATEMENT :	To implement Longest Common Subsequence
ALGORITHM/ THEORY:	X and Y be two given sequences Initialize a table LCS of dimension X.length * Y.length X.label = X Y.label = Y LCS[0][] = 0 LCS[][0] = 0 Start from LCS[1][1] Compare X[i] and Y[j] If X[i] = Y[j] LCS[i][j] = 1 + LCS[i-1, j-1] Point an arrow to LCS[i][j] Else LCS[i][j] = max(LCS[i-1][j], LCS[i][j-1]) Point an arrow to max(LCS[i-1][j], LCS[i][j-1])

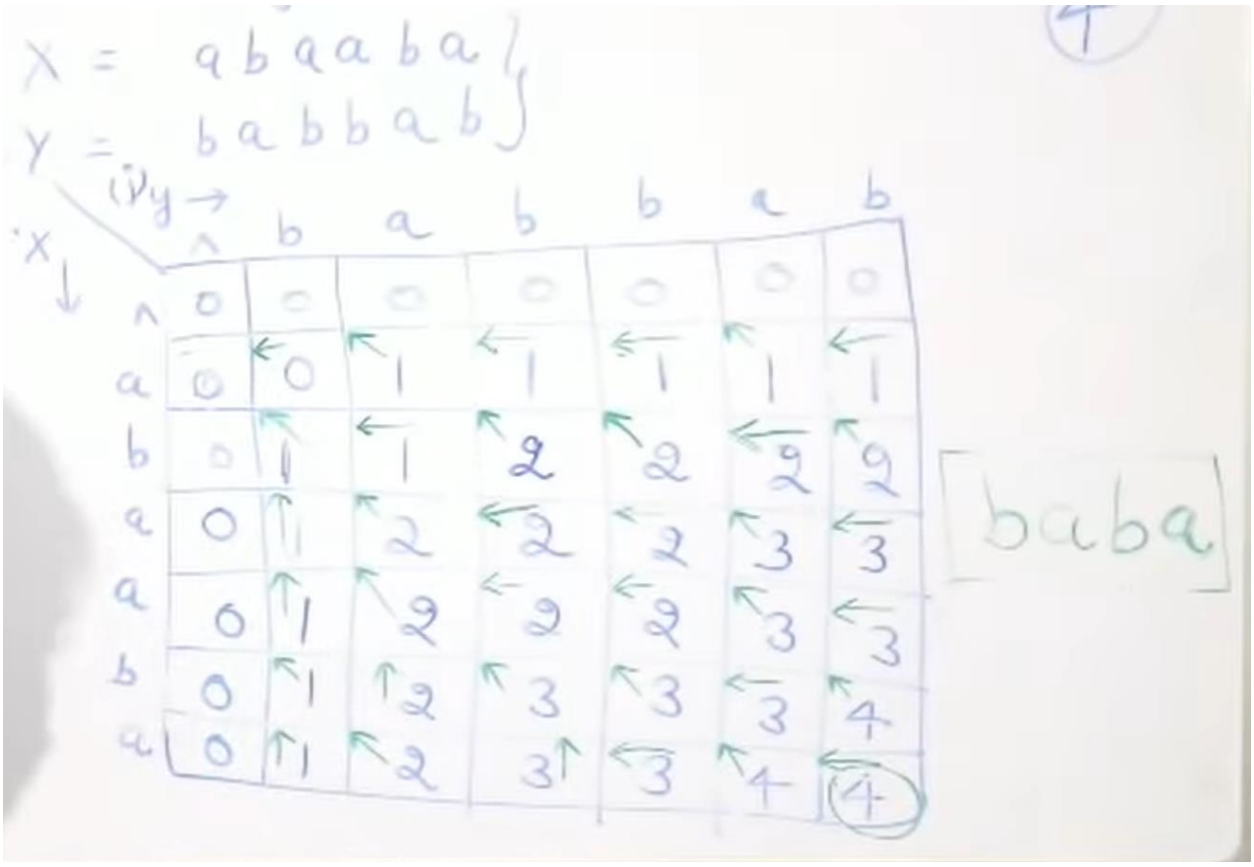
PROGRAM:

```c
#include <stdio.h>
#include <string.h>

void printTable(int arr[][20], int len1, int len2)
{
    printf("\n");
    for(int i = 0 ; i < len1+1 ; i++) {
        for(int j = 0 ; j < len2+1 ; j++) {
            printf("%d ",arr[i][j]);
        }
        printf("\n");
    }
}

void findLCS(char seq1[], char seq2[])
{
    int table[20][20];
    int len1 = strlen(seq1);
    int len2 = strlen(seq2);

    for (int i = 0; i <= len1; i++)
    {
        table[i][0] = 0;
    }

    for (int i = 0; i <= len2; i++)
    {
        table[0][i] = 0;
    }

    for (int i = 1; i <= len1; i++)
        for (int j = 1; j <= len2; j++)
        {
            if (seq1[i - 1] == seq2[j - 1])
            {
                table[i][j] = table[i - 1][j - 1] + 1;
            }
            else if (table[i - 1][j] >= table[i][j - 1])
            {
                table[i][j] = table[i - 1][j];
            }
            else
            {
                table[i][j] = table[i][j - 1];
```

```
            }
        }

    int index = table[len1][len2];
    char LCS[index + 1];
    LCS[index] = '\0';

    int i = len1, j = len2;
    while (i > 0 && j > 0)
    {
        if (seq1[i - 1] == seq2[j - 1])
        {
            LCS[index - 1] = seq1[i - 1];
            i--;
            j--;
            index--;
        }

        else if (table[i - 1][j] > table[i][j - 1])
            i--;
        else
            j--;
    }

    printf("seq1 : %s \nseq2 : %s \n", seq1, seq2);
    printf("LCS: %s", LCS);
    printf("\n\nTable: \n");
    printTable(table, len1, len2);
}

int main()
{
    char seq1[20], seq2[20];
    printf("\nEnter the first sequence: ");
    scanf("%s",seq1);
    printf("\nEnter the second sequence: ");
    scanf("%s",seq2);
    // char seq1[20] = "abaaba";
    // char seq2[20] = "babbab";
    findLCS(seq1,seq2);
    printf("\n");
    return 0;
}
```

RESULT:


PROBLEMS
OUTPUT
DEBUG CONSOLE
SQL CONSOLE
TERMINAL
Microsoft Windows [Version 10.0.22621.1413]
(c) Microsoft Corporation. All rights reserved.
C:\Siddhesh\DAA>cd "c:\Siddhesh\DAA\DAA_Exp_4\" && gcc lcs.c
p_4\"lcs
Enter the first sequence: abaaba
Enter the second sequence: babbab
seq1 : abaaba
seq2 : babbab
LCS: baba
Table:
0 0 0 0 0 0 0
0 0 1 1 1 1 1
0 1 1 2 2 2 2
0 1 2 2 2 3 3
0 1 2 2 2 3 3
0 1 2 3 3 3 4
0 1 2 3 3 4 4
c:\Siddhesh\DAA\DAA_Exp_4>



CONCLUSION:	Successfully understood Longest Common Subsequence algorithm and implemented it in C program