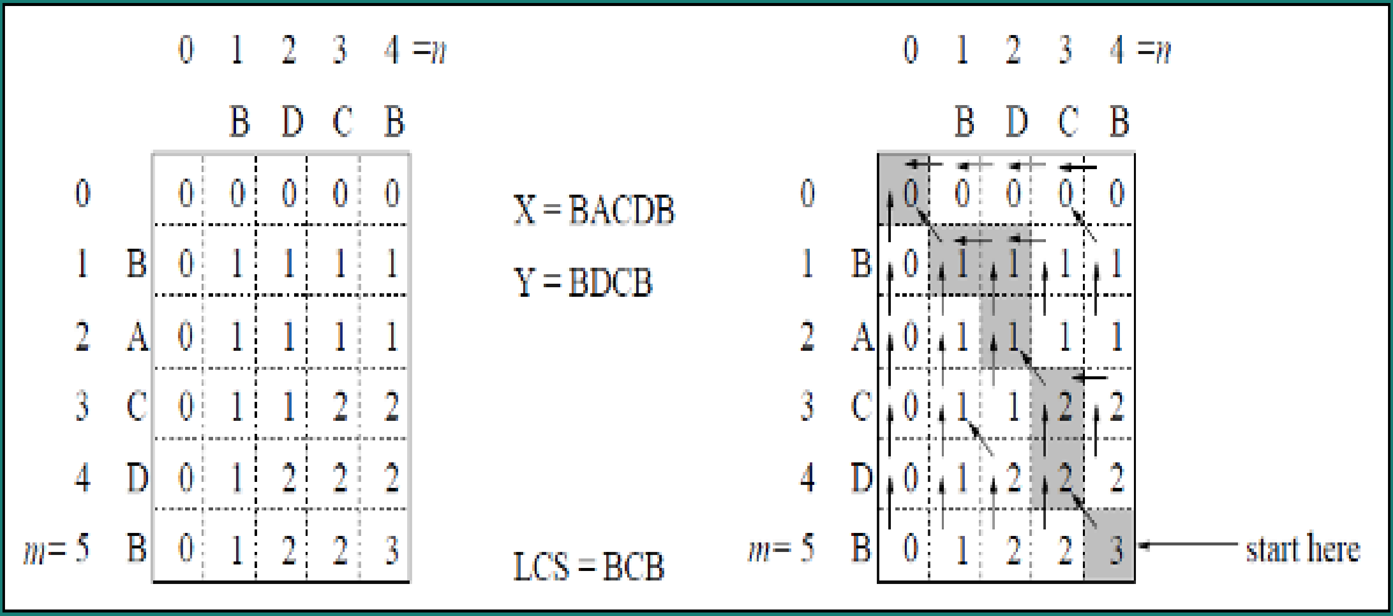


		0	1	2	3	4 = n
			B	D	C	B
0		0	0	0	0	0
1	B	0	1	1	1	1
2	A	0	1	1	1	1
3	C	0	1	1	2	2
4	D	0	1	2	2	2
m = 5	B	0	1	2	2	3

CTA PRACTICAL 9

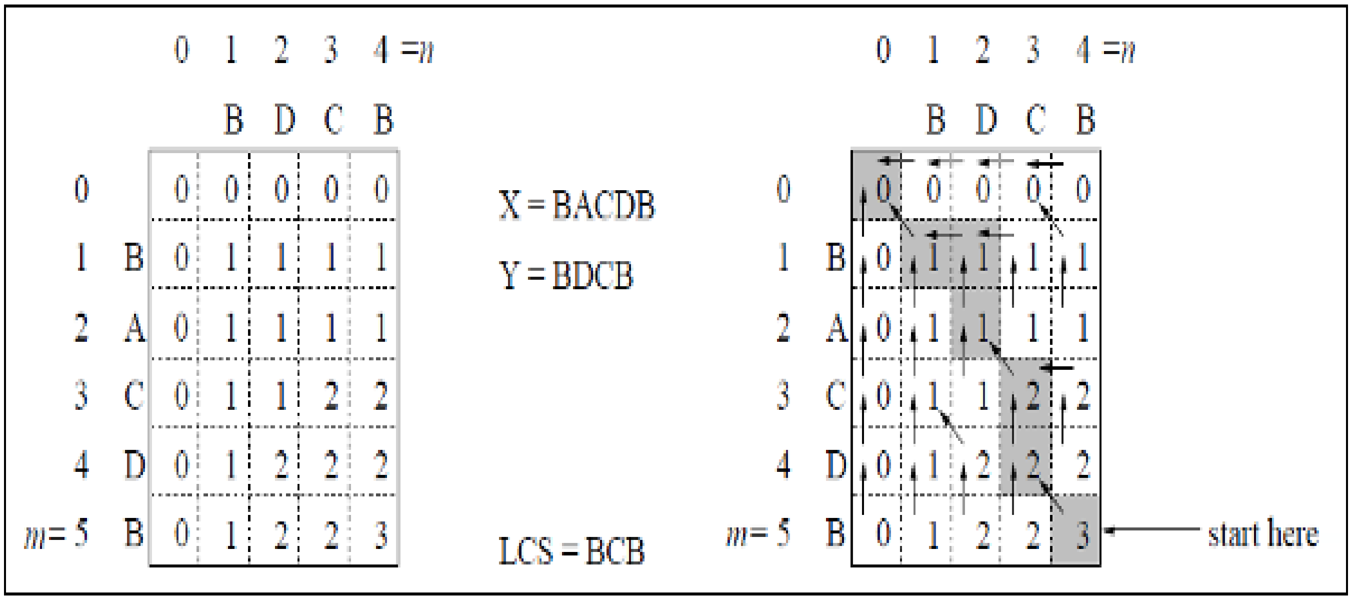
20MCED08

Practical 9

Given two sequences X and Y, find the longest common sub-sequence (LCS) of X and Y using dynamic programming.

Introduction

The longest common subsequence problem is finding the longest sequence which exists in both the given strings.

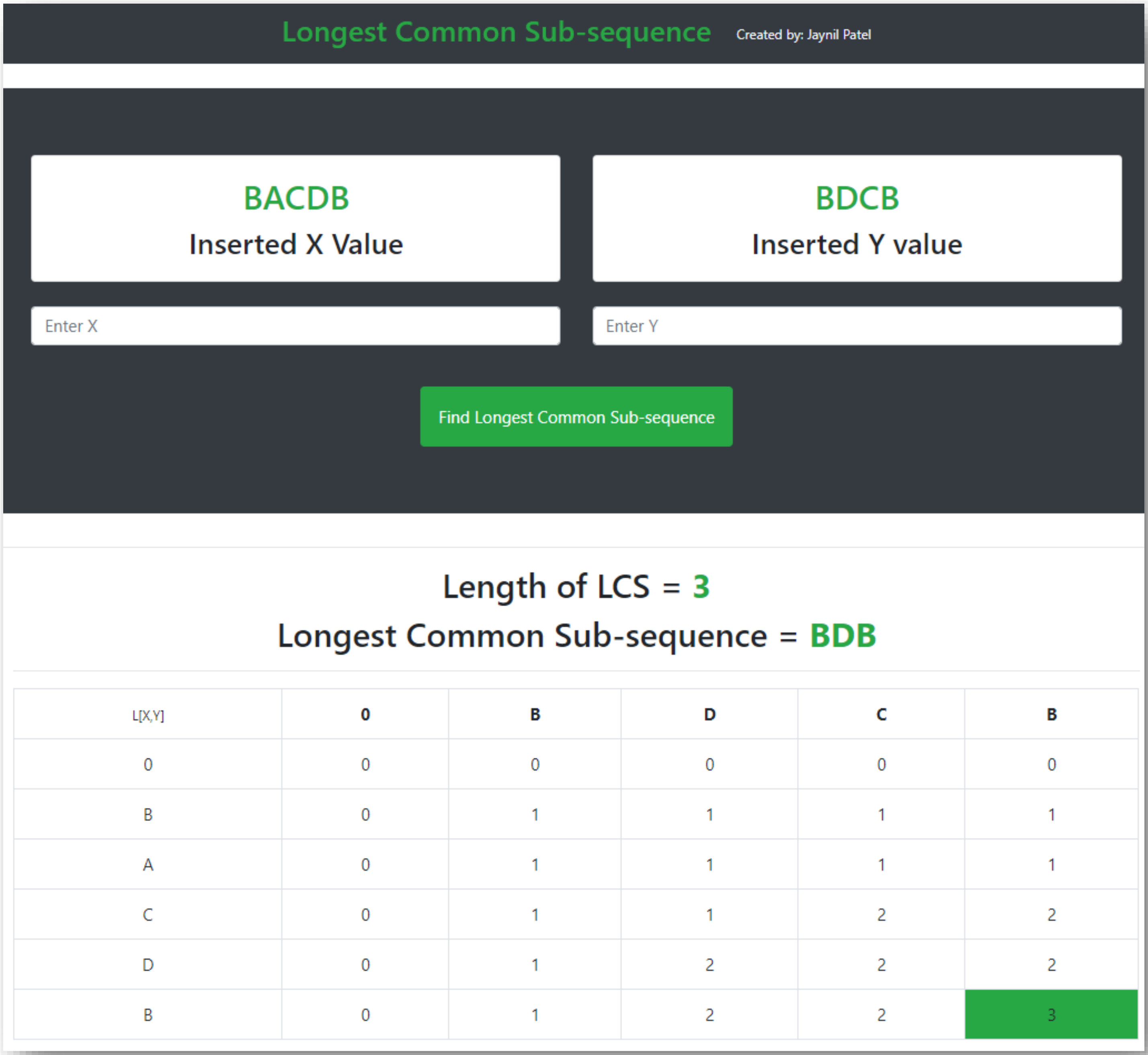


In this example, we have two strings ***X = BACDB*** and ***Y = BDCB*** to find the longest common subsequence.

Following the algorithm LCS-Length-Table-Formulation (as stated above), we have calculated table C (shown on the left hand side) and table B (shown on the right hand side).

In table B, instead of 'D', 'L' and 'U', we are using the diagonal arrow, left arrow and up arrow, respectively. After generating table B, the LCS is determined by function LCS-Print. The result is BDB.

Printing Longest Common Subsequence Simulation using (Python+ Flask)



Longest Common Sub-sequence Created by: Jaynil Patel

BACDB
Inserted X Value

BDCB
Inserted Y value

Length of LCS = 3
Longest Common Sub-sequence = BDB

L[X,Y]	**0**	**B**	**D**	**C**	**B**
0	0	0	0	0	0
B	0	1	1	1	1
A	0	1	1	1	1
C	0	1	1	2	2
D	0	1	2	2	2
B	0	1	2	2	3

Printing Longest Common Subsequence

```python
 # Dynamic programming implementation of LCS problem


def lcs(X, Y, m, n):
    L = [[0 for x in range(n+1)] for x in range(m+1)]
    for i in range(m+1):
        for j in range(n+1):
            if i == 0 or j == 0:
                L[i][j] = 0
            elif X[i-1] == Y[j-1]:
                L[i][j] = L[i-1][j-1] + 1
            else:
                L[i][j] = max(L[i-1][j], L[i][j-1])

    index = L[m][n]
    print("Length of LCS =",index)

    lcs = [""] * (index+1)
    lcs[index] = ""
#     print(lcs)



    i = m
    j = n
    while i > 0 and j > 0:
        if X[i-1] == Y[j-1]:
            lcs[index-1] = X[i-1]
#             print(lcs)
            i-=1
            j-=1
            index-=1
        elif L[i-1][j] > L[i][j-1]:
            i-=1
        else:
            j-=1

    print ("LCS of " + X + " and " + Y + " is " +"".join(lcs))

X = "BACDB"
Y = "BDCB"
m = len(X)
n = len(Y)
lcs(X, Y, m, n)
```

Output :

```
Length of LCS = 3
LCS of BACDB and BDCB is BDB
```

Observation:

To fill the table, the outer **for** loop iterates ***m*** times and the inner **for** loop iterates ***n*** tim es. Hence, the complexity of the algorithm is *O(m, n)*, where ***m*** and ***n*** are the length of t wo strings.