Longest Common Subsequence

ZPRAC-16-17-Lab11

Longest Common Subsequence

[40 Marks]

ANNOUNCEMENT:

Up to 20% marks will be allotted for good programming practice. These include
- Comments for non trivial code
- Indentation: align your code properly

A sub-sequence is a sequence that can be derived from another sequence by deleting some elements without changing the order of the remaining elements. For example [A,C] is a sub-sequence of [A,B,C,D]. Note that the order of A and C remained same.

Two strings of only uppercase letters are given.The length of the two strings are N1 and N2 respectively. Find and print the length of the longest common sub-sequence present in both of them.

Input Format::
First line contains 2 space separated integers N1 and N2
Second line contains the 1st string
Third line contains the 2nd string

Output Format::
print the length of the longest common sub-sequence present in both of the strings.

Example::

Input:
6 6
ABCDGH
AEDFHR

Output:

3

Explanation:
Longest common sub-sequence present in input Sequences “ABCDGH” and “AEDFHR” is “ADH” of length 3.

Hint: Let's say that L(i,j) is the function that gives the longest common sub-sequence (LCS) of s1[0...i] and s2[0...j]. Can you find recursive formula for L(i,j)? Let's say you know the answer for L(i-1,j), L(i,j-1) and L(i-1,j-1). Then, if s1[i] is same as s2[j] then this character probably extend the answer for L(i-1,j-1). When s[i] is not same as s[j], you can choose L(i,j) to be same as L(i-1,j) or L(i,j-1). You should choose the one which gives maximum length of L(i,j).

Can you write the above recursive observation in terms of length of subsequence? You can see that answer for L(i,j) depends on values of $i' \leq i$ and $j' \leq j$. Hence, you can start with L(0,0) and use for loop to find each row corresponding to L.