

# longest Common Subsequence

Q: 46

Given 2 sequences say "ABCD" & "ACF" LCS is a sequence that appears in the same relative order in both the given sequences but not necessarily in a continuous manner

ex1: ABACCD

ACDD

LCS is ACD of length 3

ex2: X = A B C F  
0 1 2 3

Y = A B E  
0 1 2

Xlen = 4

Ylen = 3

$L \leftarrow$  length of the longest common subsequence  
L is a 2D array having rows  $Xlen+1$  and columns  $Ylen+1$  i.e 5 & 4 resp.

		A	B	C	
L		0	1	2	3
	0	0	0	0	0
A	1	0	1	1	1
B	2	0	1	2	2
C	3	0	1	2	3
F	4	0	1	2	3

If  $X[r-1] = Y[c-1]$  then

$L[r][c] = L[r-1][c-1] + 1$

else

$L[r][c] = \max \begin{cases} L[r-1][c], \\ L[r][c-1] \end{cases}$

LCS of length 3  $\langle A, B, C \rangle$

Soln: X = A C B A E D  
0 1 2 3 4 5

Y = A B C A B E  
0 1 2 3 4 5

Create a matrix of size 6x6



Longest Common Subsequence

		A	B	C	A	B	E
		0	1	2	3	4	5
A	0	0					
C	1	0					
B	2						
A	3						
E	4						
D	5						

			A	B	C	A	B	E
		0	1	2	3	4	5	6
	0	0	0	0	0	0	0	0
A	1	0	1	1	1	1	1	1
E	2	0	1	1	2	2	2	2
B	3	0	1	2	2	2	3	3
A	4	0	1	2	2	3	3	3
E	5	0	1	2	2	3	3	4
D	6	0	1	2	2	3	3	4

LCS of length 4 < A, C, B, E >