



# DP Concepts

video  
19

&

## Questions



हाइवू  
(Motivation)

"If you really want to  
achieve something in life,  
You will never be distracted  
and keep your eyes on  
the target all the time"

[ cswithMIK → Twitter  
Facebook  
Instagram ] → code story with MIK  
whatsapp → code story with MIK ]

• 1-D based DP ]

we'll do:-

RECURSION

- 2-D based DP
- String based DP
- Grid based DP
- Game Strategy

(\*) RECURSION  
+  
MEMOIZATION  
(Top Down)

(\*) Bottom UP .

(\*) Time & Space

## 1-D Based D.P.

(Done → Qns, LIS variants etc.)

## DP on Strings :-

✓ → Longest Common Subsequence (LCS)

✓ → Print LCS → Bottom UP.

→ Edit Distance

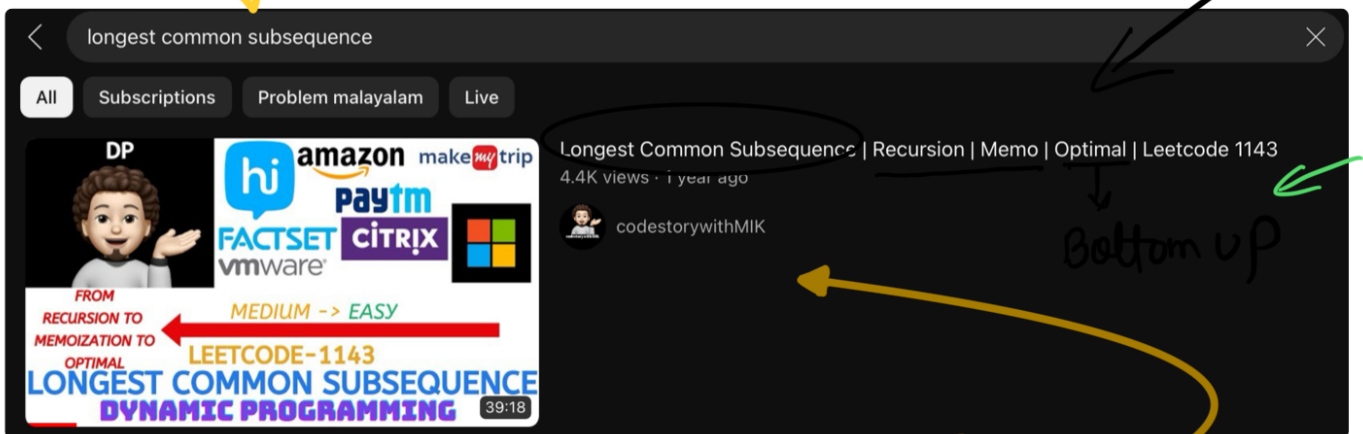
→ Shortest common Supersequence. (SCS)

→ Print SCS

→ Longest Palindromic Subsequence

→ More coming ..... 😊  
(Hard Qns → Easy) many more...

Already uploaded in DP Playlist ...



Please watch it first

Print Longest  
Common Subsequence:

(LCS)  $\rightarrow$   $\text{return}(i, j)$

State Def'n

$t[i][j]$  = LCS of  $S_1$  of length  $i$  &  $S_2$  of length  $j$

$\text{return } t[m][n];$

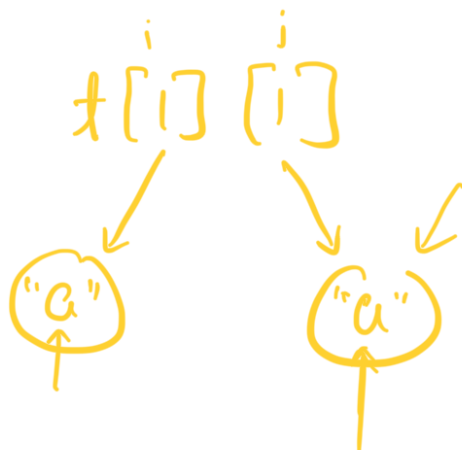
$S_1 = \text{"abcde"}$   
 $S_2 = \text{"ace"}$

ace

	0	1	2	3
0	0	0	0	0
1	0	1	1	1
2	0	1	1	1
3	0	1	2	2
4	0	1	2	2
5	0	1	2	3

$t[5][3]$   
 $\text{"abcde"}$   $\text{"ace"}$   
 $\uparrow$   $\uparrow$   
 $\text{"abcd"}$   $\text{"ac"}$   
 $i=5, j=3$   
 $4, 2$   
 $(n+1)*(n+1)$

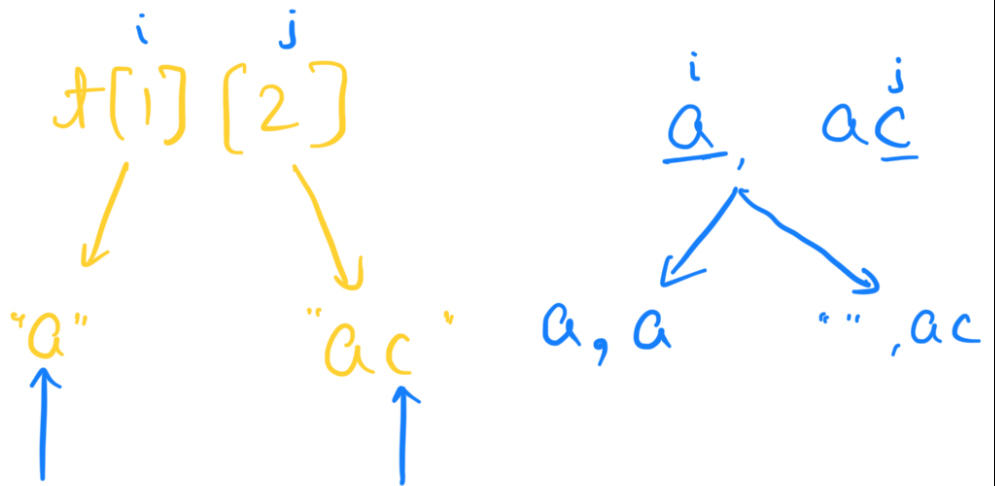


$1 + t[i-1][j-1]$

$$if (s1[i-1] == s2[j-1])$$

$$t[i][j] = 1 + t[i-1][j-1];$$

$$1 + t[0][0];$$



$$if (\underline{s1[i-1]} == \underline{s2[j-1]})$$

else {

$$t[i][j] = \max(t[i-1][j], t[i][j-1]);$$

}

Story

To

Code:-

$$i = m, \quad j = n$$

String lcs = "";

while ( $i > 0$  &  $j > 0$ ) {

```

if (s1[i-1] == s2[j-1]) {
    LCS.push-back(s1[i-1]);
    i--; j--; // diagonally up
} else {
    if (f[i-1][j] > f[i][j-1]) {
        i--;
    } else {
        j--;
    }
}
}
}

```

LCS = "e c a"

reverse(begin(LCS), end(LCS)).  
 return LCS.

the 1990s, the number of people in the UK who are employed in the public sector has increased by 1.5 million (1990–1999) (Department of Health 2000).

There is a growing emphasis on the need to improve the efficiency of the public sector, and to ensure that the public sector is able to deliver the best possible value for money. This has led to a number of initiatives, including the introduction of the Health Service Act 1999, which introduced a new framework for the NHS, and the introduction of the NHS Plan, which sets out the government's vision for the NHS. The NHS Plan also sets out a number of targets for the NHS, including the need to improve the quality of care, to reduce waiting times, and to improve the efficiency of the NHS.

One of the key challenges facing the NHS is the need to improve the efficiency of the public sector. This is a complex task, and one that requires a number of different approaches. One of the most important approaches is the need to improve the quality of care, and to reduce waiting times. This can be achieved by a number of different measures, including the need to improve the training of staff, and the need to improve the infrastructure of the NHS.

Another key challenge is the need to improve the efficiency of the NHS. This can be achieved by a number of different measures, including the need to improve the management of the NHS, and the need to improve the financial management of the NHS. The NHS Plan also sets out a number of targets for the NHS, including the need to improve the quality of care, to reduce waiting times, and to improve the efficiency of the NHS.

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