

DP Session 5

with maximum sum

We are given 2 arrays we need to make a subset such that no 2 adjacent elements are chosen and we cannot take both elements from same column i.e.

A	2	4	3	2
B	8	7	6	5
	C_1	C_2	C_3	C_4

$\{8, 3\}$ is valid subset but $\{7, 3\}$ is not valid as they are consecutive, $\{3, 6\}$ is not valid as it's same column.

n_1	n_2	n_3	n_4
n_5	n_6	n_7	n_8

For n_8 we cannot select n_3, n_7, n_4 but we can select from

n_1, n_2, n_5, n_6

	C_1	C_2	C_3	C_4	C_5
a →	2	3	4	8	2
b →	-5	8	3	1	-4

$dp[1] =$ best ans if both arrays are till C_1 only
 $= \max(2 \text{ or } -5) = 2$

$dp[2] \rightarrow$ can be $dp[1] = 2$

$\rightarrow 3$

$\rightarrow 8$

$\max(2, 3, 8) = 8$

$dp[3] \Rightarrow dp[2]$ (we do not include 4/3)
 3 answers are possible

- $\rightarrow 4 + dp[1]$ (we include 4 then cannot include 3, 8, 3)
- $\rightarrow 3 + dp[1]$ (we include 3 then can't include 3, 8, 4)

$$dp[3] = \max(dp[2], 4 + dp[1], 3 + dp[1]) = 8$$

$$dp[3] = \max(8, 8, 5) = 8$$

$$dp[4] \Rightarrow dp[3]$$

- $\rightarrow -8 + dp[2]$
- $\rightarrow 1 + dp[2]$

$$dp[4] = \max(dp[3], -8 + 8, 1 + 8) = 9$$

$$dp[i] \Rightarrow dp[i-1]$$

- $\rightarrow a[i] + dp[i-2]$
- $\rightarrow b[i] + dp[i-2]$

$$o/p = \max(dp[i-1], a[i] + dp[i-2], b[i] + dp[i-2]);$$

In formula we are using $dp[i-2]$ so we need to calculate $dp[1], dp[2]$ by ourself.