

## 221: Maximal Square

Largest square in a binary matrix that contain all '1's.

Tip:- When the problem already contains a 2D array, start with the DP approach directly.

1	0	1	0	0
1	0	1	1	1
1	1	1	1	1
1	0	0	0	0

Answer = 4 (of  $2 \times 2$ )

Using DP:

1	0	1	0	0
1	0	1	1	1
1	1	1	2	2
1	0	0	0	0

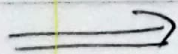
→ return maximum

- ⇒ It can be done in-place
- ⇒ Don't change the shaded region in yellow
- ⇒ Start with  $DP[1,1]$
- ⇒ Only check those elements that are "1"
- ⇒

$$\text{if } DP[i-1, j] \geq DP[i-1, j-1]$$

$$\text{and } DP[i, j-1] \geq DP[i-1, j-1]:$$

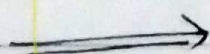
shaded in red



$$DP[i][j] = DP[i-1][j-1] + 1$$

else:

shaded in black



$$DP[i][j] = \min(DP[i-1][j], DP[i][j-1]) + 1$$