

We have to maximize the no. of 1's -
atmost one operation of flipping any
one subarray \rightarrow continuous part of array

$$TC = \underline{\underline{O(N^3)}}$$

$\rightarrow \text{cnt} = 0;$
for ($i=0; i < N; i++$) α

}
 3

$\text{ans} += A[i];$

✓

→ ans = ans; // Initial no. of 1's

for ($i = 0$; $i < N$; $i++$) {
 count0 = 0; count1 = 0; ✓
 for ($j = i$; $j < N$; $j++$) {
 if ($A[j] == 1$) count1++;

// $i \rightarrow$ start
j \rightarrow end of sum

TC =

A handwritten set of numbers from 1 to 5. Above each number is a small orange arrow pointing upwards and to the right. Below the numbers is a horizontal black line. The numbers are written in blue ink. The first two digits, '1' and '2', are circled in blue. The digit '1' appears again at the end of the sequence.

Observations

- 1) Flip a 0 → $\begin{array}{c} +1 \\ \checkmark \end{array}$
- 2) Flip a 1 → $\begin{array}{c} -1 \\ \checkmark \end{array}$
- 3) Subarray will start & end at 0.

(Empty subarray is also possible).

The diagram illustrates the step-by-step process of finding the maximum sum subarray using Kadane's algorithm.

Step 1: The array is shown with indices 0 to 11 above it. The array values are 1, 0, 0, 1, 0, 0, 1, 1, 1, 1, 0, 1. Below the array, the prefix sums are listed as 1, -1, 1, 1, 1, -1, -1, -1, -1, 1, -1. A pink box highlights the subarray from index 4 to 7, which has a sum of 1.

Step 2: A bracket indicates the subarray from index 4 to 7, with a label "1" below it. A box labeled "Ans" contains the formula: $\# 1's \text{ in original array} + \text{Max sum subarray in new arr}$.

Step 3: A box labeled "more sum" contains a dashed line with a condition ≥ 0 . An arrow points from this box to the "Ans" formula.

Step 4: A box labeled "Ans" contains the formula: $\# 1's \text{ in original array} + \text{Max sum subarray in new arr}$.

Step 5: A box labeled "if prefix > 0 include it" is shown with an arrow pointing to the "Ans" formula.

Given a $2 \times n$ Matrix, rotate it by 90° on right.

The diagram shows two configurations of nodes labeled 1 through 8. The left configuration is a cycle: 1 → 2 → 3 → 1. The right configuration is a permutation: 1 → 7, 2 → 8, 3 → 5, 4 → 6, 5 → 4, 6 → 2, 7 → 1, 8 → 3.

Arrows indicate the mapping from the left state to the right state:

$$(2, 1) \rightarrow (2, n)$$

$$(i, j) \rightarrow (j, (n -$$

$N \times N$

$\text{Ans}[j, n-1-i]$

Transpose

1	5	9	13
2	6	10	14

The diagram illustrates the transpose of a 4x4 matrix. The original matrix (left) has elements 5, 6, 7, 8 in the first row, 9, 10, 11, 12 in the second, 13, 14, 15, 16 in the third, and 1, 2, 3, 4 in the fourth. A yellow box highlights the last three columns. An arrow points to the transpose matrix (right), which has elements 3, 7, 11, 15 in the first row, 4, 8, 12, 16 in the second, and 13, 9, 5, 1 in the third. A blue box highlights the first three rows. A pink box contains the transpose formula: $A[i][j] \rightarrow A[j][i]$ with $\forall i < j$. Below, a checkmark indicates the condition $i, j \rightarrow j, (n-1)-i$ for $i < j$. A checkmark also indicates the condition $i, j \rightarrow i, j$ for $i = j$. A pink circle labeled "Ans" points to the result matrix (bottom left), which shows the elements 13, 9, 5, 1, 14, 10, 6, 2, and 15, 11, 7, 3. A checkmark indicates the condition $i, j \rightarrow i, j$ for $i > j$.

$\begin{bmatrix} 16 & 12 & 8 & 4 \end{bmatrix}$ swap($j, n-1-j$)
 $i, j \rightarrow j, (n-1)-i \rightarrow (n-1)-i, (n-1)-j \rightarrow (n-1)-j, (n-1)-(n-i)$
 ↗ ↘

Q → Find sum of all submatrix of a given matrix.

submatrix of a matrix

$$\text{of size } N \times M = \frac{N \times (N+1)}{2} \times \frac{M \times (M+1)}{2} = O(N^4)$$

✓ ✓ ✓ ✓ ✓ ✓

(i, j) $i = N$
 $j = M$

Ans = \sum contribution of each element

submatrix
element is part of * $A[i][j]$

Top Right

The diagram shows a grid of rectangles with dimensions 3×2 and 2×1 . A green rectangle is highlighted at position (i, j) . The text "j+1" is written above the grid, and "i-1" is written to the left of the grid. The text "(n-1)" is at the bottom right, and "(m-1)" is at the bottom center. The text "j+1" is also written near the top of the grid. A box contains the text $(3+1) \times (2+1) \rightarrow \text{starting positions}$. Another box contains the text $1 \times 3 \rightarrow \text{ending positions}$, with arrows pointing to $(7-3)$ and $(5-2)$.

Top left

Bottom Right

Bottom Left

$(3+1) \times (2+1) \rightarrow \text{starting positions}$

$1 \times 3 \rightarrow \text{ending positions}$

$(7-3)$

$(5-2)$

The diagram illustrates the derivation of a formula for a specific contribution in a matrix multiplication. It starts with a point (i, j) on the left. Two red arrows point from this point to two different expressions. The top arrow points to the expression $(i+1) \times (j+1)$, which is enclosed in a black rectangular box. Inside this box, there is a smaller black rectangle containing a yellow asterisk (*). The bottom arrow points to the expression $(n-i) \times (m-j)$. Below these two parts, a large rectangular box contains the formula: "contribution of (i, j) \rightarrow $(i+1) \times (j+1) \times (n-i) \times (m-j) \times A[i] \cdot f[j]$ ". To the right of this box, there is a checkmark (✓).

$$\text{Ans} = \sum_{i,j} (i+1) * (j+1) * (n-i) * (m-j) * \text{arr}[j]$$

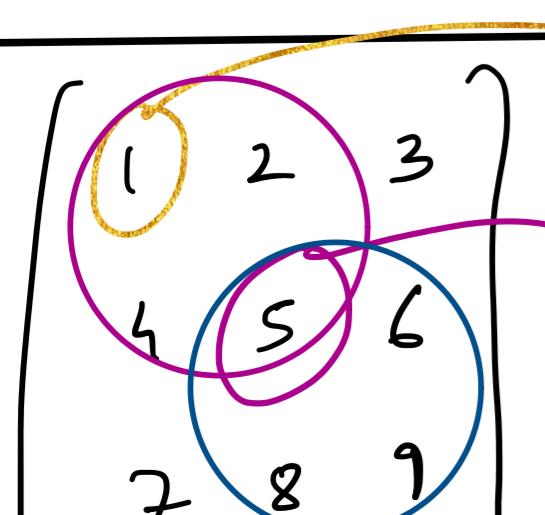
SC = O(1)

$n=2 \quad m=2$

$\begin{matrix} 0 & 1 \\ 1 & 3 \\ 5 & 10 \end{matrix}$ $\text{N} \times \text{N}$	$\text{Ans} = 1 * (1 * 1 * 2 * 2) \rightarrow 4$ $+ 3 * (1 * 2 * 2 * 1) \rightarrow 12$ $+ 5 * (2 * 1 * 1 * 2) \rightarrow 20$ $+ 10 * (2 * 2 * 1 * 1) \rightarrow 40$
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$\begin{matrix} 1 & 3 \\ [1] & [3] \\ 5 & [0] \end{matrix}$
 $\begin{matrix} 4 & 15 \\ 5 & 7 \\ 6 & 17 \\ 3 & 13 \\ 1 & 3 \end{matrix}$
 $\frac{76}{\cancel{76}}$ ✓

$$\begin{bmatrix} 1 & 3 \end{bmatrix} \begin{bmatrix} 5 & 10 \end{bmatrix} \begin{bmatrix} 1 \\ 5 \end{bmatrix} \begin{bmatrix} 3 \\ 10 \end{bmatrix} \begin{bmatrix} 1 \\ 5 \\ 10 \end{bmatrix} = 19 + 19 + 19 + 19 = \underline{\underline{76}}$$



Submatrix = 9

Submatrix = $(2 \times 2) \times (2 \times 2) = \underline{\underline{16}}$