

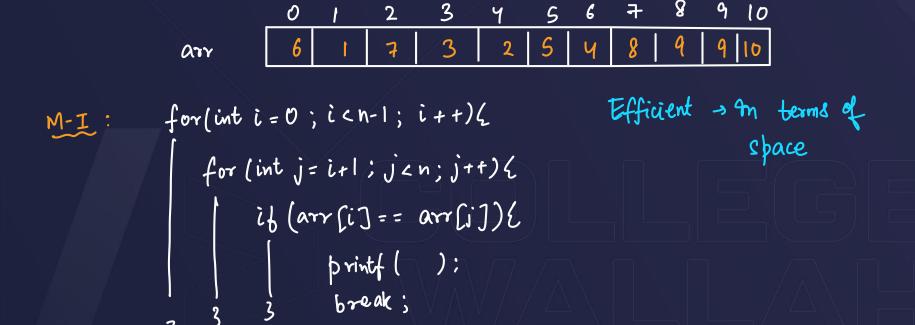
Sorting Algorithms



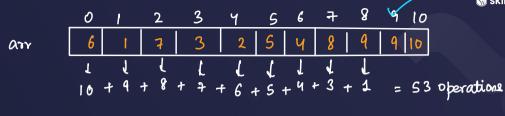
Today's Checklist

- Time Complexity
- 2 Pointer approach
- Bubble sort
- Selection sort
- Insertion sort

Ques: Given an array of integers with 1 to n elements and the size of the array if n+1. One element is occurring more than once i.e duplicate number is present. Find the duplicate element.



SKILLS



M-2 brr

visited array

Efficient = In terms of time ..

Not Efficient = In terms of space = O(n) Extra space

We are using extra space

M-3

										9 10
atr	6	1	7	3	2	5	4	8	9	9 10

Sum of numbers from 1 to 10
$$\Rightarrow$$
 $\frac{|0 \times 1|}{2} = 55$

$$S_n = n(n+1) \qquad 64-SS = \boxed{9}$$

Efficient in terms of time & space both

3rd gen i3



3rd gen i3



Time Complexity

Space Comparity

TLE > stime limit exceeded

for (int i=0; i<n; i++){ print f (" Hello"); n operations $\rightarrow O(n)$ for (int i = -2; i < n; i++){ print f (" Kello"); $n+3 \rightarrow O(n+3) \sim O(n)$

$$O(n+a) \approx O(n)$$
constant

Big O Notation?

for (int i=1; i < 3 tn; i++) { print f(" Hello"); $O(3*n) \sim O(n)$ for(int i=1; i < ntn; i++){ printf("Hello");

 $O(n^4n) = O(n^2)$

$$O(K^*n) \approx O(n)$$
 l
 $K \rightarrow constant$

for (int
$$i = 1$$
; $i \le n$; $i + t \ne 1$)
for (int $j = 10$; $j \le n$; $j + t \ne 1$)
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for (int
$$j = 1$$
; $i \le n$; $i+t$) $\begin{cases} 0\left(n\frac{n+1}{2}\right) = 0\left(\frac{n^2}{2} + \frac{n}{2}\right) \\ \text{for (int } j = 1; j \le i; j+t) \end{cases} \end{cases}$

$$= 0\left(\frac{1}{2}n^2 + \frac{1}{2}n\right)$$

$$= 0$$

i=1 → j=1 ton

Q,

(skills

$$O(3n^3 + 2n^2 + 8n) \approx O(n^3 + n^2 + n) \approx O(n^3)$$

$$0 (n^{3/2} + n + 1) \approx 0(n^{3/2})$$

Extra Space: 'n' size array, n' size array,
$$\frac{n}{2}$$
 size \rightarrow 5 size array \rightarrow \times