Tuesday, 15 June 2021 4:54 PM

Sorting & Searching

arranging things in order.

→ ascending
→ descending
→ based on properties of elements.

① Array (some integer elements) → ascending / descending

② Set of rectangle measurements [[l_1, b_1], [l_2, b_2], [l_3, b_3]]

→ comparator

A[i] < A[j]
area$_i$ < area$_j$
l_i < l_j
b_i < b_j
perimeter$_i$ < perimeter$_j$

x (3,2) , y (4,5)

elements → 4 9 1 32 13

sort

min = ∞ → 3

(1 4 9 13 29)

3 5 4 26

① Given a unsorted array, what would be the worst way to sort the array??

Eg : 2 3 1 4

Create all permutations of the array & pick the required one.

n = 4 elements → per → n! × n

n^2

2	3	1	4
2	3	4	1
2	1	4	3
2	4	1	3
2	4	3	1

② game of cards

unsorted: 9 6 11 8

sorted: left hand

right hand

I

II

III

6 < 9

9 < 11

11 > 8
9 > 8
6 < 8

left right

A = [7 4 5 2]

sorted | unsorted

4 < 7

[4 7 5 2] 4 < 5

[4 5 7 2] 2 < 7

[2 4 5 7] 2 < 5, 2 < 4

sorted region

Time Complexity:

4 3 2 1

① Worst case → $O(n^2)$
② Best case → $O(n)$

1 2 3 4

Space Complexity

→ $O(1)$ [In-place sorting algo]

→ constant extra space.

Applications

① almost sorted array

4 * 3 8 9