Count of Number of Inversions

70, 50, 60, 10, 20, 30, 80, 15

0 1 2 3 4 5 6 7

↑ ↑ ↑ ↑

70 → 50, 60, 10, 20, 30, 15

50 → 10, 20, 30, 15

60 → 10, 20, 30, 15

10 → X

20 → 15

30 → 15

80 → 15

15 → X

Inversion
- ↳ i < j → index
- AND
- a(i) > a(j) → number

Inversions = 17

1) Divide → mid = i + (j - i)/2 → O(1)

2) Conquer → T(n/2) + T(n/2)

3) combine → mergeprocedure → Mergesort
   ↳ n

Recurrence Relation

$T(n) = 2T(n/2) + n$

Using master's method / substitution method

$\Rightarrow O(n \log n)$

Recursive Tree

Divide & conquer approach

↳ Single element

↳ # inversion = 0

10 →

50 → 15, 20, 30

60 → 15, 20, 30

70 → 15, 20, 30

$\frac{0+7}{2} = 3$

C1

arr, 0, 7,
5+3+9 = 17

20 → 15

30 → 15

50 → 10

70 → 10, 60

C2

10, 50, 60, 70

arr, 0, 3
1+1+3 = 5

C9

15, 20, 30, 80

arr, 4, 7,
0+1+2 = 3

$\frac{4+7}{2}$

$\frac{0+3}{2} = 1$

15, 80 → 5

C3

50, 70

arr, 0, 1,
0+0+1 = 1

C6

10, 60

arr, 2, 3,
0+0+1 = 1

C10

20, 30

arr, 4, 5,
0+0+0 = 0

C13

arr, 6, 7,
0+0+1 = 1

C4

arr, 0,
0, 0

70

C5

arr, 1, 1
0

C7

arr, 2, 2
0 → 50

C8

arr, 3, 3
0 → 10

C11

arr, 4, 4
0 → 20

C12

arr, 5, 50
→ 30

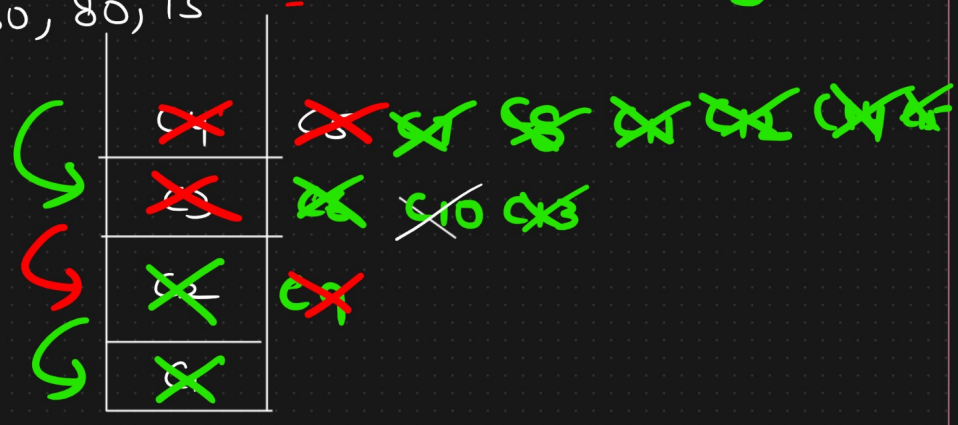
C15

arr, 7, 77
0 → 15

C14

arr, 6, 60
→ 80

0	1	2	3	4	5	6	7
70	50	60	10	20	30	80	15



90-95%

MergeSort
↳ Implementation

5% → Pending

Practice task :- Implementation of count of number of inversions
↳ github

↓↓

LinkedIn
↳ Tag "Priya Bhatia"