Welcome ☺

Agenda : Interview problem on arrays 4-5

Q1 Given an array of size N. Given Q queries of s, e

Direct For every query return the sum of all even indexed elements in the range from s to e.

eg:

0	1	2	3	4	5
2	3	1	6	4	5

Q = 4

s	e	
1	3	→ 1
2	5	→ 5
0	4	→ 7
3	3	→ 0

① Brute force

→ For every query, iterate over the array and generate answers.

② Optimisation

→ Whenever range sum query is present, think in direction of Prefix Sum.

⇒ Assume that elements at odd indexes are 0 and then create prefix sum

eg:

	0	1	2	3	4	5
A :	2	3	1	6	4	5
PS →	2	5	6	12	16	21
PSe →	2	2	3	3	7	7

PS[i] ⇒ sum of all elements from 0 → i

$PS_e[i]$ ⇒ sum of all even indexed elements 0 → i

$$PS[i] = \begin{cases} PS[i-1] & \rightarrow \text{if } i \text{ is odd} \\ PS[i-1] + A[i] & \rightarrow \text{if } i \text{ is even} \end{cases}$$

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Q Given an array. Count number of special index in the array.

Special Index : after removing that index

Sum of all even indexed elements == Sum of all odd indexed elements

eg: A :

0	1	2	3	4	5
4	3	2	7	6	-2

i	A[]	Se	So	
0	3 2 7 6 -2	8	8	✓
1	4 2 7 6 -2	9	8	✗

Quiz

0	1	2	3	4	5
4	1	5	3	7	10
4	1	3	7	10	

1 + 7 = 8

Obs ⇒ Indexes are going to change after removing the element.

Sum of odd indexed elements after removing index 2 ⇒ Sum of odd indexed elements from 0 to 1 + sum of even indexed elements from 3 to 5

Sum of even indexed elements after removing index 2 ⇒ Sum of even indexed elements from 0 to 1 + sum of odd indexed elements from 3 to 5

After removal of index i

$S_E \rightarrow S_e[0, i-1] + S_o[i+1, N-1]$

$S_o \rightarrow S_o[0, i-1] + S_e[i+1, N-1]$

$PS_E \rightarrow$ even indexed elements

$PS_o \rightarrow$ odd indexed elements

$S_e[0, i-1] \Rightarrow PS_E[i-1]$

$S_o[0, i-1] \Rightarrow PS_o[i-1]$

$S_o[i+1, N-1] \Rightarrow PS_o[N-1] - PS_o[i]$

$S_e[i+1, N-1] \Rightarrow PS_E[N-1] - PS_e[i]$

T.C $\rightarrow O(N)$

S.C $\rightarrow O(N)$

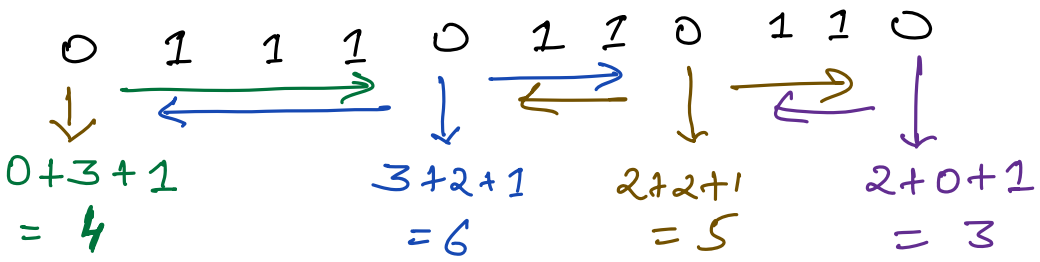
Q3 Amazon MS Adobe :

Given a array of 1 & 0. We can replace one of the 0 with a 1. Return the count of max. consecutive 1's in the array.

eg: 1 1 0 1 1 0 1 1 1

1 1 0 1 1 1 1 1 1 ans = 6

eg:



⇒ for every 0 in the array

→ count # consecutive 1s on left side → l

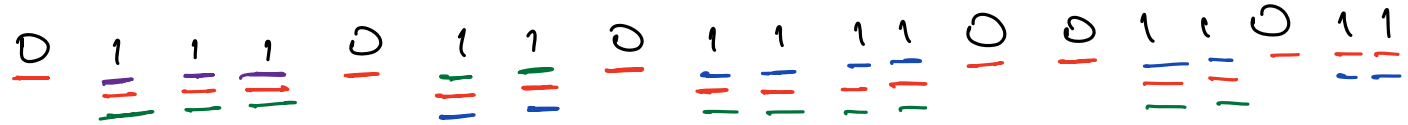
→ count # consecutive 1s on right side → r

→ if (l+r+1 > ans) { ans = l+r+1 }

edge case

A: 1 1 1 1 1 1

```
for( i 0 -> N-1){
  if(A[i]==0){
     for ( -> )
     for ( -> )
  }
}
```



Every element is getting accessed at max 3 times

iteran = 3N ⇒ O(N)

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Q

Given a array of 1 & 0. We can swap one of the 0 with a 1. Return the count of max. consecutive 1's in the array.

eg: 1 1 0 1 1 0 1 1 1

0 1 0 1 1 1 1 1 1 ans = 6

eg: 1 1 0 1 1

⇒ Total count of 1 in the array.

⇒ for every 0 in the array

→ count # consecutive 1s on left side → l

→ count # consecutive 1s on right side → r

→ count = { l+r if (l+r) == #1s ; l+r+1 if (l+r) < #1s }

if (count > ans) { ans = count }

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Q No. of triplets

Given an array. Count # of triplets i, j, k such that

$$i < j < k$$

&

$$A[i] < A[j] < A[k]$$

eg: A:

0	1	2	3	4
2	6	9	4	10

Ans = 5

(2, 6, 9)

Friday.

Contest Timing → 9 — 10:30 PM

3 questions

1 T.C