"Difference Array / Range Update Query"

ALGORITHM

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[" Hello World "]

Problems : -

We have to Update an array 'm' times for a given range [l , r] by 2

Example:-

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

Of length n = 7

Problems : -

We have to Update an array 'm' times for a given range [l , r] by 2

Example:-

0	1	2	3	4	5	6
2	5	7	10	15	16	13

Of length n = 7

Let suppose m = 2

Case 1 : L = 1 to r = 5   Update value by 1
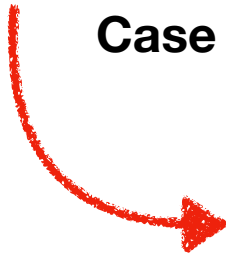
0	1	2	3	4	5	6
2	6	8	11	16	17	13

Case 2 : L = 2 to r = 4   Update value by 2

0	1	2	3	4	5	6
2	6	10	13	18	17	13

RANGE UPDATE QUERY

Let suppose m = 'n'

Case 1 :	**L = 1 to r = 5**	**Update value by 1**
Case 2 :	**L = 2 to r = 4**	**Update value by 2**
Case 3 :	**L = 3 to r = 5**	**Update value by 3**
Case 4 :	**L = 0 to r = 2**	**Update value by 5**
.	**.**	**.**
.	**.**	**.**
.	**.**	**.**
Case n :	**L = 0 to r = 4**	**Update value by 3**

Basically how System Works,

```
for( int i=0 ;i<m ;i++ )
{
      for( int j=l ; j<=r ; j++ )
       {
            a[ j ] = a[ j ] + 2;

       }
}
```

This whole works in o (n^2)
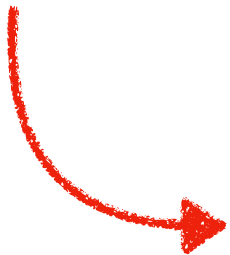
Now we want this whole this comes under —> o(1)

Solution : - [ALGORITHM]

Given —>   A [ ] =

0	1	2	3	4	5	6
2	5	7	10	15	16	13

Step 1 : **Make the Difference Array**

1)   d [ ] =

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

We take an Array with 1 size greater than the original Array

2)   **Fill the Value of d [i]**

If (i==0)

d [i] = A [i]

else

d [i] = A [i] - A [i -1]

RANGE UPDATE QUERY

Solution : - [ALGORITHM]

Given —>

A [ ] =

0	1	2	3	4	5	6
2	5	7	10	15	16	13

Step 2 : Make the Difference Array

Now, We have Difference Array

d [ ] =

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

Step 3 : Now We have to Update Range [L , R] by x

$$d[L] = d[L] + x$$

$$d[R+1] = d[R+1] - x$$

This whole works in o (1)

Now Range is Updated ..

Step 3 : To Get the Final Answer After Updating the Values in the Array A[ ]
Find the prefix sum array of difference arrya

If (I ==0)   Else
        A[i] = d[i]   A[i] = Prefix Sum of d[i]

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" If you feel any problem then comments in my video
I will reply as soon as possible "

- Prince Agarwal