410. Split Array Largest Sum

24 December 2021 12:16 AM

(K K)

Given an array `nums` which consists of non-negative integers and an integer `m`, you can split the array into `m` non-empty continuous subarrays.

Write an algorithm to minimize the largest sum among these `m` subarrays.

Example 1:

```
Input: nums = [7,2,5,10,8], m = 2
Output: 18
Explanation:
There are four ways to split nums into two subarrays.
The best way is to split it into [7,2,5] and [10,8],
where the largest sum among the two subarrays is only 18.
```

nums = [7, 2, 5, 10, 8]

m = 2

```
Input: nums = [1,2,3,4,5], m = 2
Output: 9
```

xample 3:

```
Input: nums = [1,4,4], m = 3
Output: 4
```

onstraints:

- `1 <= nums.length <= 1000`
- `0 <= nums[i] <= 10^6`

arr = [7, 2, 5, 10, 8]

m = 2 → two parts

[7, 2, 5, 10] | [8] ⇒ largest → 24

(24, 8)

[7, 2, 5] | [10, 8] ⇒ 18 minimize Ans

(14, 18)

[7, 2] | [5, 10, 8] ⇒ 23

(9, 23)

[2] | [7, 5, 10, 8] ⇒ 30

(2, 30)

* min no of partition that we can make $m = 1$

* max no of partition that we can make $m = N$

$arr = [3, 4, 1, 2] \Rightarrow [3], [4], [1], [2]$

What will be the (ans) in case 1:

$[7, 2, 5, 10, 8]$ — Sum of entire array = ans

$= 32$

in case 2:

$N = 4$

we can divide in 4 ways

Sum of subarray = Individual array

So, ans for this = max element in array is 4.

max value of ans of question = Case 1

min value of ans of question = Case 2

minAns = maxValue in array

maxAns = Sum of all values in array.

$[7, 2, 5, 10, 8] \quad [10, 32]$

minAns → 10, maxAns → 32

now I can apply Binary Search

$[10, 32]$

Start = 10, end = 32

$mid = \frac{42}{2} = 21$ → might be possible ans

Try to see if you can split the array with 21 as the max sum. (if it exceed more than 21 split it and count the pieces)

7, 2, 5, 8, 10

pieces
✗ 2

[7, 2, 5], [8, 10] → in question

m = 2

if (pieces ≤ m) ⇒ end = mid

Check

S = 10, e = 21

mid = 15

7, 2, 5, 8, 10

pieces = ✗ ✗ 3

↓

now the m

[7, 2, 5], [8], [10]

now

start = mid + 1

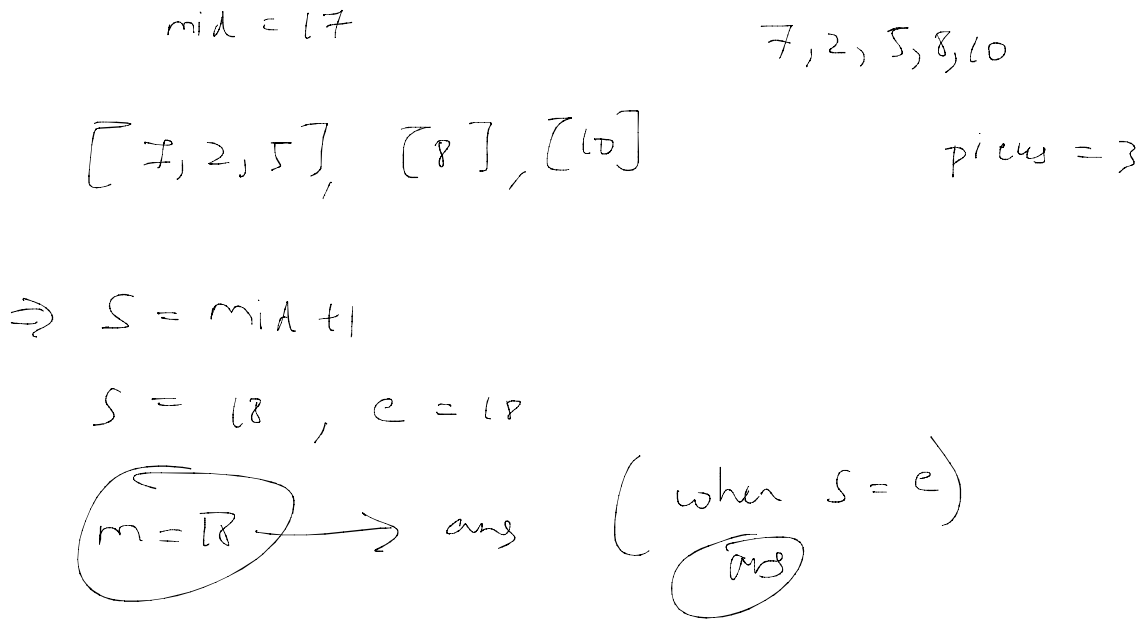
Check Start = 16 end = 21

7, 2, 5, 8, 10

mid = 18

[7, 2, 5], [8, 10] pieces = 2

⇒ S = 16, end = 18




```
                // say you add this in new subarray, then sum = num
                sum = num;
                pieces++;
            } else {
                sum += num;
            }
        }
        if (pieces > m) {
            start = mid + 1;
        } else {
            end = mid;
        }
    }

    return end; // here start == end
  }
}
```

for explaination check my link : [https://drive.google.com/file/d/1bJ2Z169s9kyNvuiLPaZNLARhfmNYHslN/view?usp=sharing]

If you find the solution useful do upvote! comment down for any doubt.