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LeetCode – Best Time to Buy and Sell Stock III (Java)

Say you have an array for which the i th element is the price of a given stock on day i .

Design an algorithm to find the maximum profit. You may complete at most two transactions.

Note:

A transaction is a buy & a sell. You may not engage in multiple transactions at the same time (ie, you must sell the stock before you buy again).

Analysis

Comparing to I and II, III limits the number of transactions to 2. This can be solve by "devide and conquer". We use $left[i]$ to track the maximum profit for transactions before i , and use $right[i]$ to track the maximum profit for transactions after i . You can use the following example to understand the Java solution:

Prices: 1 4 5 7 6 3 2 9
 $left = [0, 3, 4, 6, 6, 6, 6, 8]$
 $right = [8, 7, 7, 7, 7, 7, 7, 0]$

The maximum profit = 13

Java Solution

```
public int maxProfit(int[] prices) {
    if (prices == null || prices.length < 2) {
        return 0;
    }

    //highest profit in 0 ... i
    int[] left = new int[prices.length];
    int[] right = new int[prices.length];

    // DP from left to right
    left[0] = 0;
    int min = prices[0];
    for (int i = 1; i < prices.length; i++) {
        min = Math.min(min, prices[i]);
        left[i] = Math.max(left[i - 1], prices[i] - min);
    }

    // DP from right to left
```

```
right[prices.length - 1] = 0;
int max = prices[prices.length - 1];
for (int i = prices.length - 2; i >= 0; i--) {
    max = Math.max(max, prices[i]);
    right[i] = Math.max(right[i + 1], max - prices[i]);
}

int profit = 0;
for (int i = 0; i < prices.length; i++) {
    profit = Math.max(profit, left[i] + right[i]);
}

return profit;
}
```

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If you want someone to read your code, please put the code inside `<pre><code>` and `</code></pre>` tags. For example:

```
<pre><code>
String foo = "bar";
</code></pre>
```

5 Comments

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 prateek shekhar ▾

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mik • 9 months ago

This problem can be solved at $O(N)$ by DP too.

We can track first two max PROFIT values.

Prices: 1 4 5 7 6 3 2 9

we buy 1 and sell it when price decreases at 7. And buy 2, sell for 9 and so on.

So, we take maximum two profit points and add them.

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Turhan • a year ago

Hello. How did you get these arrays, left = [0, 3, 4, 6, 6, 6, 6, 8], right = [8, 7, 7, 7, 7, 7, 7, 0] and how did you calculate The maximum profit = 13 from these arrays. It is too obscure for me and messed up my mind. Thanks for your help.

^ | v • Reply • Share ▸



christv • 3 years ago



3 years ago

min = Math.min(min, prices[i]);
this has to e after finding left[i].

^ | v • Reply • Share ›



Holden • 3 years ago

Could you please explain how you get this array?
right= [8, 7, 7, 7, 7, 7, 7, 0]

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Holden • 3 years ago

How can we return the indexes as well?

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Swati Mewara — public ListNode
removeDuplicate(ListNode head){ var previous =
head; var p = head.next; var newHead = null;

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rupalph — O(logn) solution, call
findPeak(arr,1,arr.length-1,arr[0])public static int
findPeak(int[] arr,int i,int j,int max) { int mid =

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