Leetcode 刷題

部分節選

簡介：

- 從入學至今我練習了大約140題Leetcode，主要由easy和medium難度組成。在此節選一些題目，包含各題的解題思路與輸出結果。

1. Two sum

1. Two Sum

Hint ⋯

Easy ✓ 👍 48.1K 👎 1.6K ☆ ↗

🔒 Companies

Given an array of integers `nums` and an integer `target`, return *indices of the two numbers such that they add up to* `target`.

You may assume that each input would have **exactly one solution**, and you may not use the *same* element twice.

You can return the answer in any order.

Example 1:

```
Input: nums = [2,7,11,15], target = 9
Output: [0,1]
Explanation: Because nums[0] + nums[1] == 9, we return [0, 1].
```
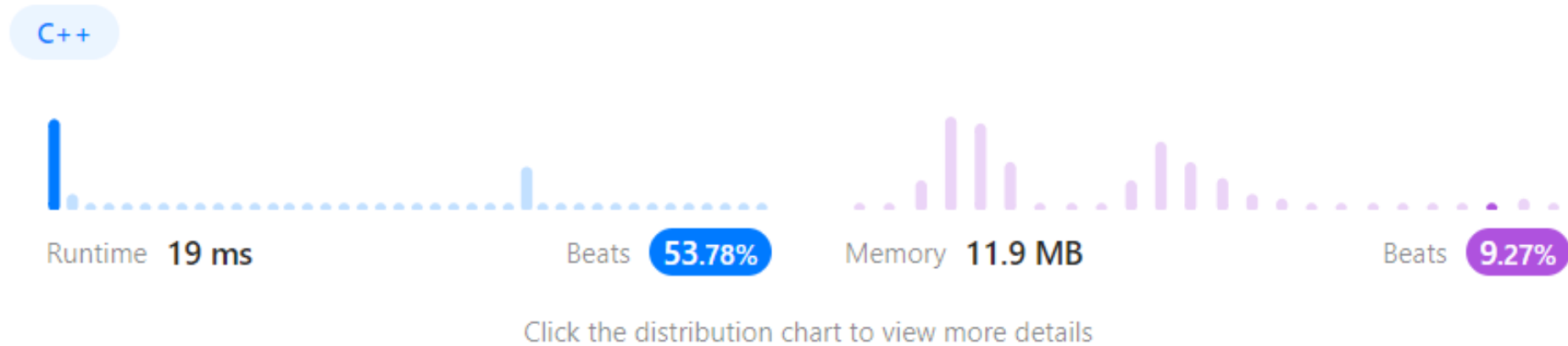
Think:

- 想法很簡單：target由兩個整數構成，而傳入的容器元素中只有唯一一個解，可以用for迴圈逐項檢查。但應該有改進的空間。

- Unordered_map：類似dictionary的概念，一個key對一個value。Unordered_map因為記憶體的不連續使其搜尋效率很高，相對地空間複雜度也很大。這種做法可以有效提高執行效率。

Solution：雜湊表

```cpp
class Solution {
public:
    vector<int> twoSum(vector<int>& nums, int target) {
        unordered_map<int, int> T;
        for(int i = 0; i < nums.size(); i++){
            T[nums[i]] = i;
        }
        for(int n = 0; n < nums.size(); n++){
            int temp = target - nums[n];
            if(T.count(temp) && T[temp] != n){
                return {n, T[temp]};
            }
        }
        return {};
    }
};
```

Output

C++

Runtime **19 ms**   Beats **53.78%**   Memory **11.9 MB**   Beats **9.27%**

Click the distribution chart to view more details

9. Palindrome number

9. Palindrome Number

Hint

Easy ✓ 👍 10.1K 👎 2.5K ☆ ↗

🔒 Companies

Given an integer `x`, return `true` *if* `x` *is a **palindrome**, and* `false` *otherwise.*

Example 1:

```
Input: x = 121
Output: true
Explanation: 121 reads as 121 from left to right and from right to left.
```

Think:

- 題目中的回文數有以下限制：不得為負數或小數，且不論從頭至尾或是相反的閱讀順序都能得出相同的整數。
- 將輸入整數逐位數切個並進行比對。
- 優先排除負數與小數

Solution:

```cpp
class Solution {
public:
    bool isPalindrome(int x) {
        if(x < 0){//排除負數
            return 0;
        }
        if(x >= 0 && x < 10){//一位數算是回文數
            return 1;
        }
        if(x%10 == 0 && x != 0){//排除尾數為零且二位數以上的數字
            return 0;
        }

        int num = 0;
        while(num < x){
            num = num * 10 + x % 10;
            x /= 10;
            if(num == x/10 || num == x){
            return 1;
            break;
        }
        }

        return 0;
    }
};
```
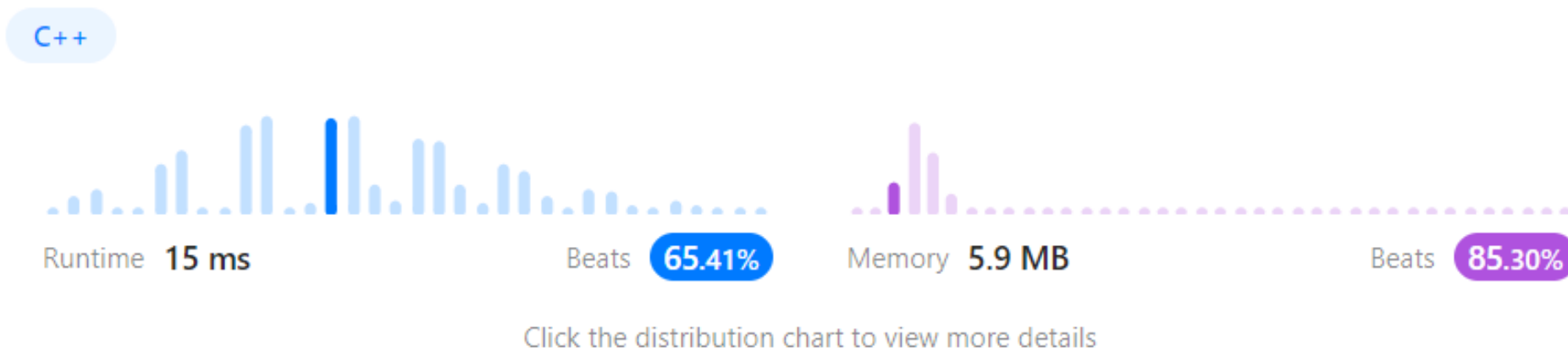
13. Roman to Integer

13. Roman to Integer

Easy ⊘ 👍 11.1K 👎 634 ☆ ↗

🔒 Companies

Roman numerals are represented by seven different symbols: I, V, X, L, C, D and M.

Given a roman numeral, convert it to an integer.

Example 1:

```
Input: s = "III"
Output: 3
Explanation: III = 3.
```

Think:

Roman numerals are represented by seven different symbols: I, V, X, L, C, D and M.

```
Symbol     Value
I          1
V          5
X          10
L          50
C          100
D          500
M          1000
```

For example, 2 is written as II in Roman numeral, just two ones added together. 12 is written as XII, which is simply X + II. The number 27 is written as XXVII, which is XX + V + II.

Roman numerals are usually written largest to smallest from left to right. However, the numeral for four is not IIII. Instead, the number four is written as IV. Because the one is before the five we subtract it making four. The same principle applies to the number nine, which is written as IX. There are six instances where subtraction is used:

- I can be placed before V (5) and X (10) to make 4 and 9.

- X can be placed before L (50) and C (100) to make 40 and 90.

- C can be placed before D (500) and M (1000) to make 400 and 900.

Given a roman numeral, convert it to an integer.

- Ex：VI = 6，但IV = 4
- 右加左減：當右側為較小的數字時，兩者相加；但若左側較小，則右側減去左側數字
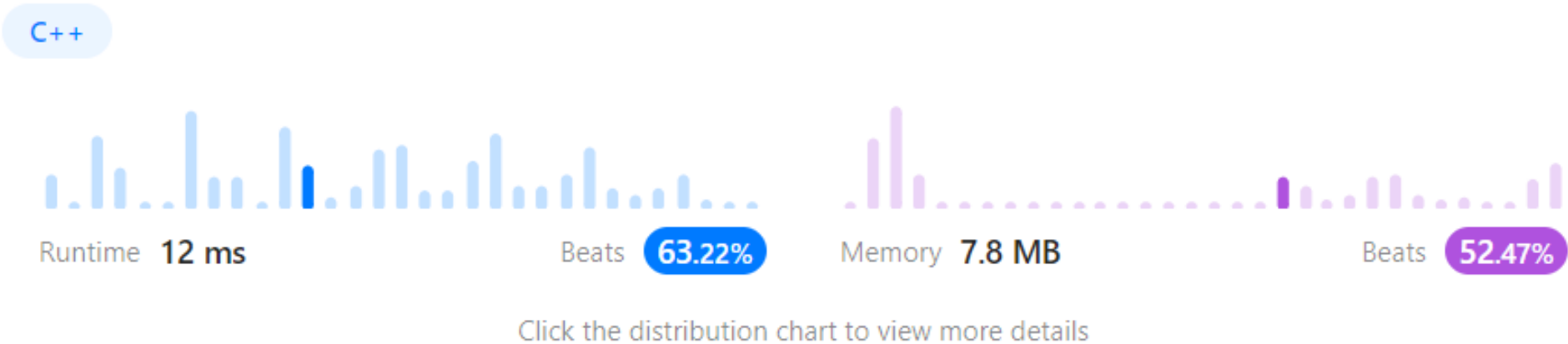- 可由左至右讀
- 同樣可以透過建立Unordered_map來加快執行效率

Solution:
雜湊表

```cpp
class Solution {
public:
    int romanToInt(string s)
{
    unordered_map<char, int> T = { { 'I' , 1 },
                                   { 'V' , 5 },
                                   { 'X' , 10 },
                                   { 'L' , 50 },
                                   { 'C' , 100 },
                                   { 'D' , 500 },
                                   { 'M' , 1000 } };

    int sum = T[s.back()];
    for (int i = s.length() - 2; i >= 0; --i)
    {
        if (T[s[i]] < T[s[i + 1]])
        {
            sum -= T[s[i]];
        }
        else
        {
            sum += T[s[i]];
        }
    }

    return sum;
}
};
```

13

Output

C++

Runtime **12 ms**   Beats **63.22%**   Memory **7.8 MB**   Beats **52.47%**

Click the distribution chart to view more details

26. Remove Duplicates from Sorted Array

Hint

Easy

11.5K   15.4K

🔒 Companies

Given an integer array `nums` sorted in **non-decreasing order**, remove the duplicates **in-place** such that each unique element appears only **once**. The **relative order** of the elements should be kept the **same**. Then return *the number of unique elements in* `nums`.

Consider the number of unique elements of `nums` to be `k`, to get accepted, you need to do the following things:

- Change the array `nums` such that the first `k` elements of `nums` contain the unique elements in the order they were present in `nums` initially. The remaining elements of `nums` are not important as well as the size of `nums`.

- Return `k`.

Think:

- 針對各個位置代換數字，最後回傳代換次數(也等於容器長度)
- 會檢測原容器

Custom Judge:

The judge will test your solution with the following code:

```
int[] nums = [...]; // Input array
int[] expectedNums = [...]; // The expected answer with correct length

int k = removeDuplicates(nums); // Calls your implementation

assert k == expectedNums.length;
for (int i = 0; i < k; i++) {
    assert nums[i] == expectedNums[i];
}
```
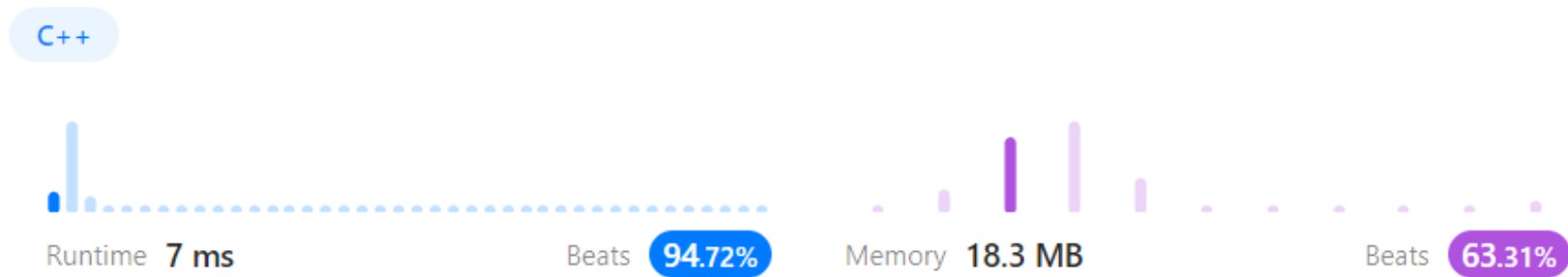
If all assertions pass, then your solution will be **accepted**.

Solution:

```cpp
class Solution {
public:
    int removeDuplicates(vector<int>& nums) {//由小至大排列
        int k = 1;//指定要放的位置
        for(int i = 1; i < nums.size(); i++){//第一個不用排
            if(nums[i] != nums[k - 1]){
                nums[k] = nums[i];
                k++;
            }
        }
        return k;
    }
};
```

Output

C++

Runtime **7 ms** Beats **94.72%** Memory **18.3 MB** Beats **63.31%**

Click the distribution chart to view more details

141. Linked List Cycle

141. Linked List Cycle

Easy   👍 12.9K   👎 1.1K   ☆   ↻

🔒 Companies

Given `head`, the head of a linked list, determine if the linked list has a cycle in it.

There is a cycle in a linked list if there is some node in the list that can be reached again by continuously following the `next` pointer. Internally, `pos` is used to denote the index of the node that tail's `next` pointer is connected to. **Note that** `pos` **is not passed as a parameter**.

Return `true` *if there is a cycle in the linked list. Otherwise, return* `false`.

Example 1:
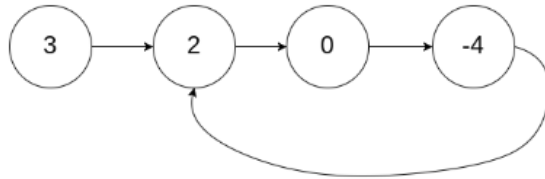

```
Input: head = [3,2,0,-4], pos = 1
Output: true
Explanation: There is a cycle in the linked list, where the tail connects to
the 1st node (0-indexed).
```

Constarints

Constraints:

- The number of the nodes in the list is in the range $[0, 10^4]$.

- $-10^5 <=$ `Node.val` $<= 10^5$

- `pos` is `-1` or a **valid index** in the linked-list.

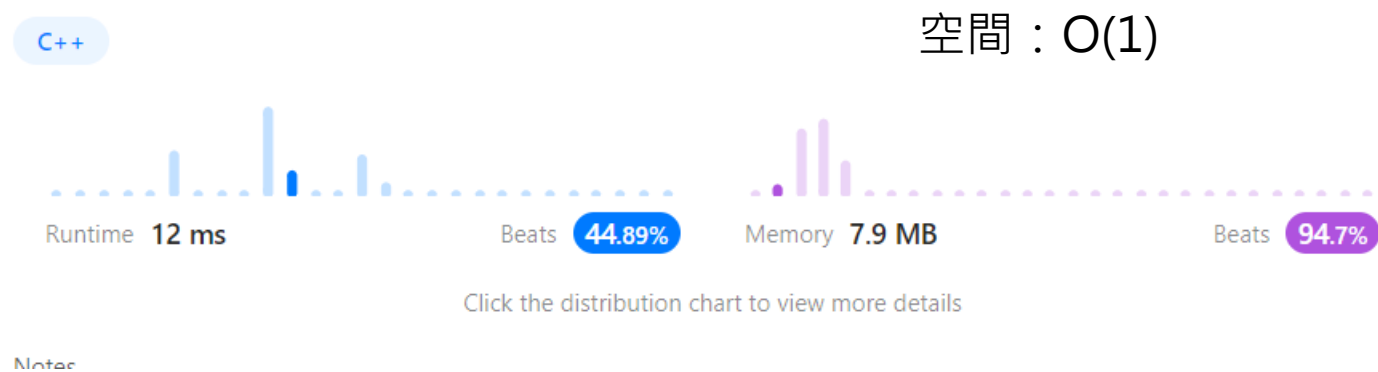**Follow up:** Can you solve it using `O(1)` (i.e. constant) memory?

Think:

- 循環代表其中必定不包含NULL
- 試試看把空間複雜度壓到O(1)
- 既然已經得知Node至多10000個，可以以此為下限：在跑迴圈的過程中計算長度，一旦達到10000即確定為循環linked list

Solution:

```
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode(int x) : val(x), next(NULL) {}
 * };
 */
class Solution {
public:
    bool hasCycle(ListNode *head) {
        if(head == NULL) return false;
        if(head -> next == NULL) return false;
        int len = 0;
        while(head)
        {
            if(len >= 10000) return true;
            len++;
            head = head -> next;
        }
        return false;

    }
};
```

Output

C++

空間：O(1)

Runtime **12 ms**   Beats **44.89%**   Memory **7.9 MB**   Beats **94.7%**

Click the distribution chart to view more details

Notes

5. Longest Palindromic Substring

5. Longest Palindromic Substring

Hint ⋯

Medium ✓ 👍 25.7K 👎 1.5K ☆ ↗

🔒 Companies

Given a string s , return *the longest palindromic substring* in s .

Example 1:

```
Input: s = "babad"
Output: "bab"
Explanation: "aba" is also a valid answer.
```

Think:

- 一組字串有多種可能的回文字串，但最長的只有一組。
- 針對奇數與偶數數量的字母要有不同的處理方式。
- 雙向檢查。

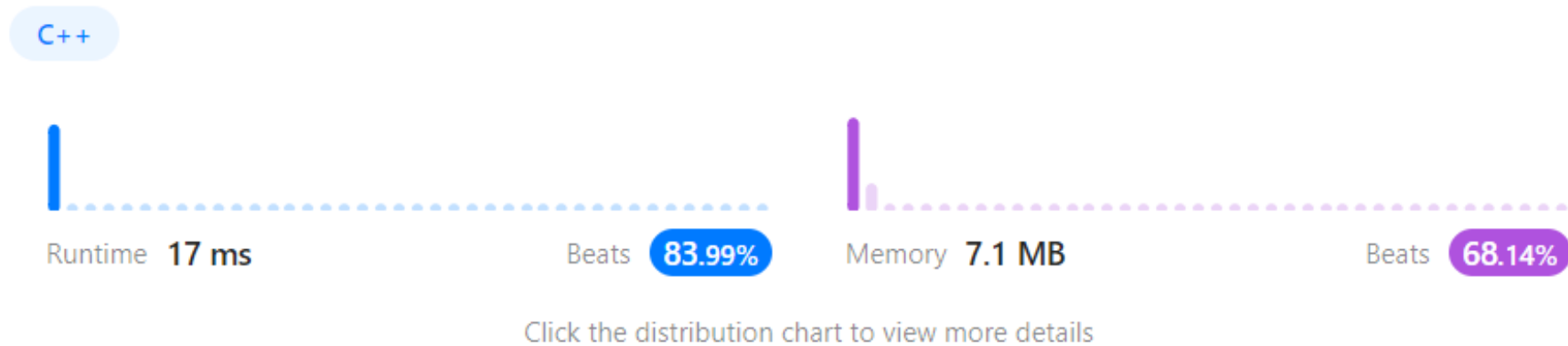# Solution: (1)

```cpp
class Solution {
public:
    string longestPalindrome(string s){ //要最長的
        string ans = "";
        int start = 0;
        int end = 0;
        int len = 0;
        for(int i = 1; i < s.size(); i++){
            //奇數
            int left = i - 1;
            int right = i + 1;
            while(left >= 0 && right <= s.size() && s[left] == s[right]){
                if(right - left + 1 > len){
                    len = right - left + 1;//取代原先長度紀錄
                    start = left;
                    end = right;
                }

                left--;
                right++;
            }
            //偶數
```

Solution: (2)

```
        //偶數
        left = i - 1;
        right = i;
        while(left >= 0 && right <= s.size() && s[left] == s[right]){
            if(right - left + 1 > len){
                len = right - left + 1;
                start = left;
                end = right;
            }
            left--;
            right++;
        }
    }
    for(int n = start; n <= end; n++){
        ans += s[n];
    }
    return ans;
    }
};
```

Output

C++

Runtime **17 ms**   Beats **83.99%**   Memory **7.1 MB**   Beats **68.14%**

Click the distribution chart to view more details

7. Reverse Integer

7. Reverse Integer

Medium ☑ 👍 11K 👎 12.3K ☆ ↗

🔒 Companies

Given a signed 32-bit integer x, return x *with its digits reversed*. If reversing x causes the value to go outside the signed 32-bit integer range $[-2^{31}, 2^{31} - 1]$, then return 0.

Assume the environment does not allow you to store 64-bit integers (signed or unsigned).

Example 1:

```
Input: x = 123
Output: 321
```

Think:

- 可以使用在回文數題目中的方法
- 但要注意，在運算的過程中會不會在生成回文數的過程中超出整數的極限
- Ex：INT_MAX – 1 = 2147483646，若直接將前後顛倒，會得到6463847412，這個數字在在32位元中的系統是無法表達的。
- 解決方法：提早觀察前一位的數字，若當前顛倒數再加一位數字必然會超出整數範圍，則回傳0

Solution:
雜湊表

```cpp
class Solution {
public:
    int reverse(int x) {
        int n = 0;
        while(x){
            if(x > INT_MAX || x < INT_MIN) return 0;
            if(n > INT_MAX / 10 || n < INT_MIN / 10) return 0;
            n = n * 10 + x % 10;
            x /= 10;
        }
        return n;
    }
};
```

Output

C++

Runtime **3 ms**

Beats **52.24%**   Memory **5.9 MB**   Beats **93.96%**
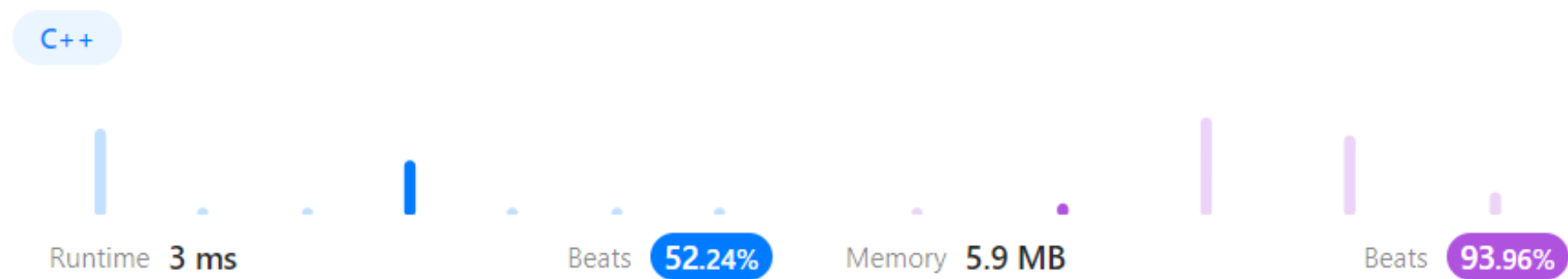
Click the distribution chart to view more details

11. Container With Most Water

11. Container With Most Water

You are given an integer array `height` of length `n`. There are `n` vertical lines drawn such that the two endpoints of the ith line are `(i, 0)` and `(i, height[i])`.
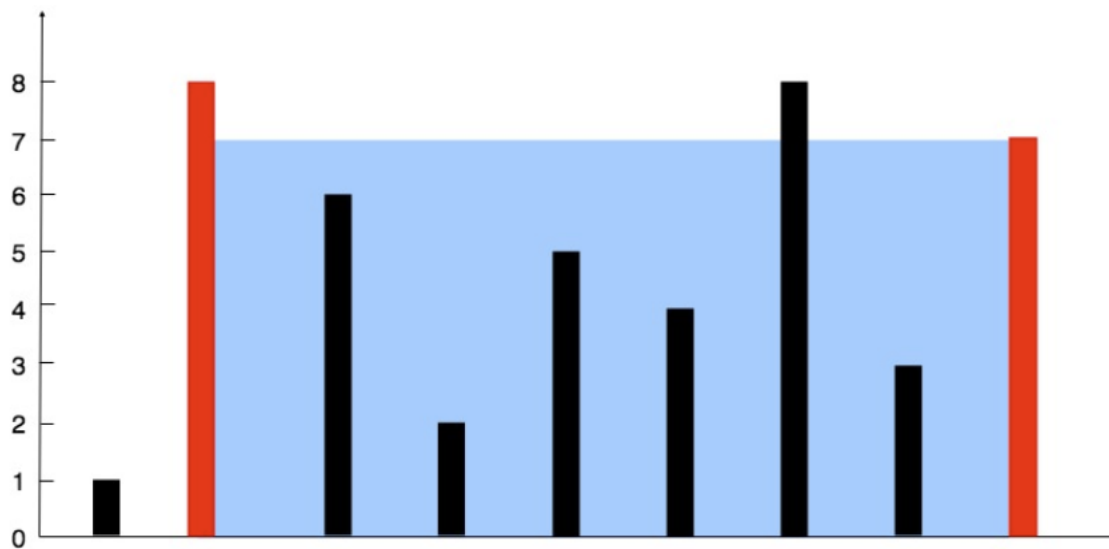
Find two lines that together with the x-axis form a container, such that the container contains the most water.

Return *the maximum amount of water a container can store.*

Notice that you may not slant the container.

Think:
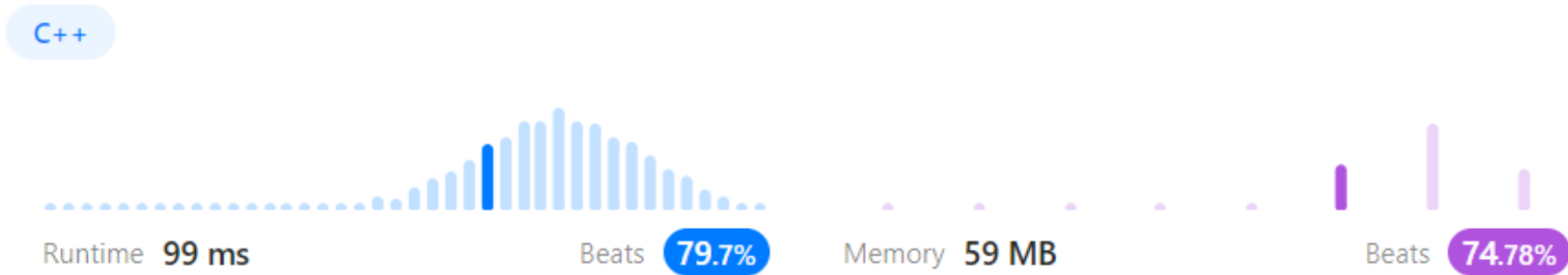
Example 1:


```
Input: height = [1,8,6,2,5,4,8,3,7]
Output: 49
```

- 最後只會有一條水平線，不會有不同的高度

- 從左右兩端各取一根柱子，相互比較，並計算容量。

- 備註：當時間複雜度為O(n**2)時過不了

Solution:

```cpp
class Solution {
public:
    int maxArea(vector<int>& height) {
        int volume = 0, h = height.size();
        int i  = 0, j = h - 1;
        while(i < j)
        {
            if(height[i] > height[j])
            {
                volume = max(volume, (j-i) * height[j]);
                j--;
            }
            else
            {
                volume = max(volume, (j-i) * height[i]);
                i++;
            }
        }
        return volume;
    }
};
```

Output

C++

Runtime **99 ms**   Beats **79.7%**   Memory **59 MB**   Beats **74.78%**

Click the distribution chart to view more details

92. Reverse Linked List II
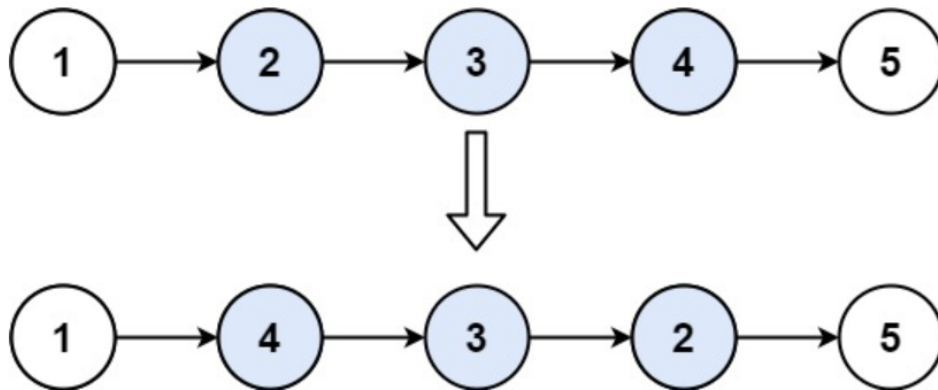
92. Reverse Linked List II

Medium   👍 9.4K   👎 427   ☆   ↻

🔒 Companies

Given the `head` of a singly linked list and two integers `left` and `right` where `left <= right`, reverse the nodes of the list from position `left` to position `right`, and return *the reversed list*.

Example 1:


```
Input: head = [1,2,3,4,5], left = 2, right = 4
Output: [1,4,3,2,5]
```

Think:

- Vector 的LIFO特性剛好契合這題的指示，因為執行完後順序會剛好顛倒。
- 接下來只需要把linkedlist和vector結合即可。
- 輸入的數字一定不重複。
- 能省則省：數字相同就直接回傳原Node

Solution:

```cpp
/**
 * Definition for singly-linked list.
 * struct ListNode {
 *     int val;
 *     ListNode *next;
 *     ListNode() : val(0), next(nullptr) {}
 *     ListNode(int x) : val(x), next(nullptr) {}
 *     ListNode(int x, ListNode *next) : val(x), next(next) {}
 * };
 */
class Solution {
public:
    ListNode* reverseBetween(ListNode* head, int left, int right)
    {
        if(left == right) return head;
        vector<int> temp;
        ListNode *p = head;
        int i = 0;

        while (p != nullptr)
        {
            temp.push_back(p -> val);
            p = p->next;
            i++;
        }

        while (left < right)
        {
            swap(temp[left - 1], temp[right - 1]);
            left++;
            right--;
        }

        ListNode* newHead = new ListNode(temp[0]);
        ListNode* current = newHead;

        for (int i = 1; i < temp.size(); i++)
        {
            ListNode* newNode = new ListNode(temp[i]);
            current -> next = newNode;
            current = newNode;
        }

        return newHead;
    }
};
```
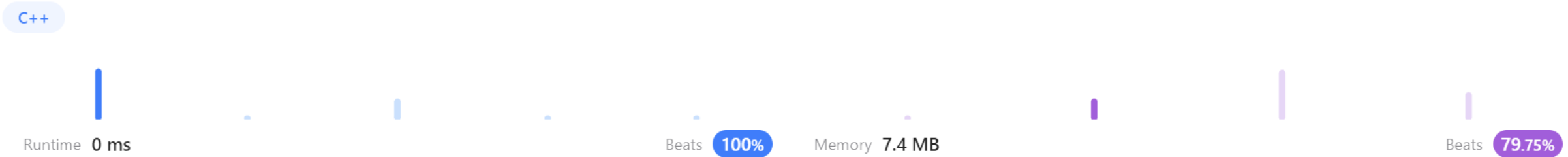
Output

C++

Runtime **0 ms**

Beats **100%**   Memory **7.4 MB**

Beats **79.75%**

Click the distribution chart to view more details

42. Trapping Rain Water

42. Trapping Rain Water

Hard ✅ 👍 27.3K 👎 375 ☆ ↻

🔒 Companies

Given n non-negative integers representing an elevation map where the width of each bar is 1, compute how much water it can trap after raining.

Example 1:


```
Input: height = [0,1,0,2,1,0,1,3,2,1,2,1]
Output: 6
Explanation: The above elevation map (black section) is represented by array
[0,1,0,2,1,0,1,3,2,1,2,1]. In this case, 6 units of rain water (blue section)
are being trapped.
```

Think:

- 不再有單一高度限制，只要有凹槽就能夠有雨水。
- 如何判斷凹槽，及計算凹槽能裝多少水？
- 凹槽的容積取決於凹槽兩端的高度與水面下已存在的階梯，每單位的凹槽區域所能容納的水為「水平面（凹槽兩端較低者）減去階梯高」
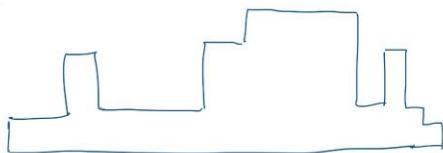
☒ 寬度為 1 就不用乘寬度
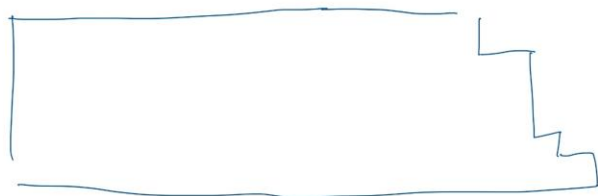
ex. [1,2,0,1,2] ⇒

☒ 左右端裝不了　　用高度減去占有的高度

height[i]

ex:

左右比較

從左看:

從右看:

⇒ 交互比對再減去原高度可得 ∨

Solution:

```cpp
class Solution {
public:
    int trap(vector<int>& height) {
        int h = height.size();
        int temp;

        vector<int> left(h, 0);
        vector<int> right(h, 0);

        left[0] = height[0];
        right[h - 1] = height[h - 1];
        for(int i = 1; i < height.size(); i++)
        {
            left[i] = max(left[i - 1], height[i]);
        }
        for(int i = h - 2; i >= 0; i--)
        {
            right[i] = max(right[i + 1], height[i]);
        }
        int sum = 0;
        for(int i = 0; i < h; i++)
        {
            sum += min(left[i], right[i]) - height[i];
        }
        return sum;

    }
};
```