Problem 3382: Maximum Area Rectangle With Point Constraints II

Problem Information

Difficulty: Hard
Acceptance Rate: 21.81%
Paid Only: No
Tags: Array, Math, Binary Indexed Tree, Segment Tree, Geometry, Sorting

Problem Description

There are n points on an infinite plane. You are given two integer arrays `xCoord` and `yCoord` where `(xCoord[i], yCoord[i])` represents the coordinates of the `ith` point.

Your task is to find the **maximum** area of a rectangle that:

* Can be formed using **four** of these points as its corners. * Does **not** contain any other point inside or on its border. * Has its edges **parallel** to the axes.

Return the **maximum area** that you can obtain or -1 if no such rectangle is possible.

Example 1:

Input: xCoord = [1,1,3,3], yCoord = [1,3,1,3]

Output: 4

Explanation:

![Example 1 diagram](https://assets.leetcode.com/uploads/2024/11/02/example1.png)

We can make a rectangle with these 4 points as corners and there is no other point that lies inside or on the border. Hence, the maximum possible area would be 4.

Example 2:

Input: xCoord = [1,1,3,3,2], yCoord = [1,3,1,3,2]

Output: -1

Explanation:

![Example 2 diagram](https://assets.leetcode.com/uploads/2024/11/02/example2.png)

There is only one rectangle possible is with points `[1,1], [1,3], [3,1]` and `[3,3]` but `[2,2]` will always lie inside it. Hence, returning -1.

Example 3:

Input: xCoord = [1,1,3,3,1,3], yCoord = [1,3,1,3,2,2]

Output: 2

Explanation:

![Example 3 diagram](https://assets.leetcode.com/uploads/2024/11/02/example3.png)

The maximum area rectangle is formed by the points `[1,3], [1,2], [3,2], [3,3]`, which has an area of 2. Additionally, the points `[1,1], [1,2], [3,1], [3,2]` also form a valid rectangle with the same area.

Constraints:

* `1 <= xCoord.length == yCoord.length <= 2 * 105` * `0 <= xCoord[i], yCoord[i] <= 8 * 107` * All the given points are **unique**.

Code Snippets

C++:

```
class Solution {
public:
long long maxRectangleArea(vector<int>& xCoord, vector<int>& yCoord) {
```

```
}
};
```

Java:

```
class Solution {
public long maxRectangleArea(int[] xCoord, int[] yCoord) {

}
}
```

Python3:

```
class Solution:
def maxRectangleArea(self, xCoord: List[int], yCoord: List[int]) -> int:
```