

Problem 3710: Maximum Partition Factor

Problem Information

Difficulty: Hard

Acceptance Rate: 30.02%

Paid Only: No

Tags: Array, Binary Search, Depth-First Search, Breadth-First Search, Union Find, Graph

Problem Description

You are given a 2D integer array `points`, where `points[i] = [xi, yi]` represents the coordinates of the `ith` point on the Cartesian plane.

The **Manhattan distance** between two points `points[i] = [xi, yi]` and `points[j] = [xj, yj]` is $|xi - xj| + |yi - yj|$.

Split the `n` points into **exactly two non-empty** groups. The **partition factor** of a split is the **minimum** Manhattan distance among all unordered pairs of points that lie in the same group.

Return the **maximum** possible **partition factor** over all valid splits.

Note: A group of size 1 contributes no intra-group pairs. When `n = 2` (both groups size 1), there are no intra-group pairs, so define the partition factor as 0.

Example 1:

Input: points = [[0,0],[0,2],[2,0],[2,2]]

Output: 4

Explanation:

We split the points into two groups: `[[0, 0], [2, 2]]` and `[[0, 2], [2, 0]]`.

* In the first group, the only pair has Manhattan distance `|0 - 2| + |0 - 2| = 4`.

* In the second group, the only pair also has Manhattan distance $|0 - 2| + |2 - 0| = 4$.

The partition factor of this split is `min(4, 4) = 4`, which is maximal.

****Example 2:****

****Input:**** points = [[0,0],[0,1],[10,0]]

****Output:**** 11

****Explanation:** ████ ████ ████ ████

We split the points into two groups: `{{0, 1}, [10, 0]}` and `{{0, 0}}`.

* In the first group, the only pair has Manhattan distance $|0 - 10| + |1 - 0| = 11$.

* The second group is a singleton, so it contributes no pairs.

The partition factor of this split is `11`, which is maximal.

****Constraints:****

* $2 \leq \text{points.length} \leq 500$ * $\text{points}[i] = [x_i, y_i]$ * $-108 \leq x_i, y_i \leq 108$

Code Snippets

C++:

```
class Solution {
public:
    int maxPartitionFactor(vector<vector<int>>& points) {
        ...
    }
};
```

Java:

```
class Solution {
    public int maxPartitionFactor(int[][] points) {
```

```
    }  
    }
```

Python3:

```
class Solution:  
    def maxPartitionFactor(self, points: List[List[int]]) -> int:
```