Problem 3532: Path Existence Queries in a Graph I

Problem Information

Difficulty: Medium
Acceptance Rate: 55.02%
Paid Only: No
Tags: Array, Hash Table, Binary Search, Union Find, Graph

Problem Description

You are given an integer `n` representing the number of nodes in a graph, labeled from 0 to `n - 1`.

You are also given an integer array `nums` of length `n` sorted in **non- decreasing** order, and an integer `maxDiff`.

An **undirected** edge exists between nodes `i` and `j` if the **absolute** difference between `nums[i]` and `nums[j]` is **at most** `maxDiff` (i.e., `|nums[i] - nums[j]| <= maxDiff`).

You are also given a 2D integer array `queries`. For each `queries[i] = [ui, vi]`, determine whether there exists a path between nodes `ui` and `vi`.

Return a boolean array `answer`, where `answer[i]` is `true` if there exists a path between `ui` and `vi` in the `ith` query and `false` otherwise.

Example 1:

Input: n = 2, nums = [1,3], maxDiff = 1, queries = [[0,0],[0,1]]

Output: [true,false]

Explanation:

* Query `[0,0]`: Node 0 has a trivial path to itself. * Query `[0,1]`: There is no edge between Node 0 and Node 1 because `|nums[0] - nums[1]| = |1 - 3| = 2`, which is greater than `maxDiff`. * Thus, the final answer after processing all the queries is `[true, false]`.

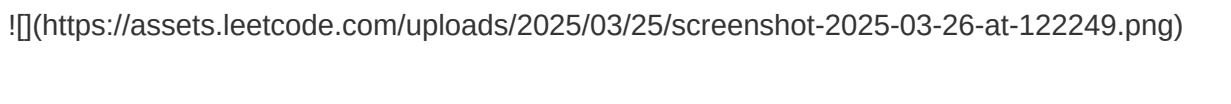
Example 2:

Input: n = 4, nums = [2,5,6,8], maxDiff = 2, queries = [[0,1],[0,2],[1,3],[2,3]]

Output: [false,false,true,true]

Explanation:

The resulting graph is:



* Query `[0,1]`: There is no edge between Node 0 and Node 1 because `|nums[0] - nums[1]| = |2 - 5| = 3`, which is greater than `maxDiff`. * Query `[0,2]`: There is no edge between Node 0 and Node 2 because `|nums[0] - nums[2]| = |2 - 6| = 4`, which is greater than `maxDiff`. * Query `[1,3]`: There is a path between Node 1 and Node 3 through Node 2 since `|nums[1] - nums[2]| = |5 - 6| = 1` and `|nums[2] - nums[3]| = |6 - 8| = 2`, both of which are within `maxDiff`. * Query `[2,3]`: There is an edge between Node 2 and Node 3 because `|nums[2] - nums[3]| = |6 - 8| = 2`, which is equal to `maxDiff`. * Thus, the final answer after processing all the queries is `[false, false, true, true]`.

Constraints:

* `1 <= n == nums.length <= 105` * `0 <= nums[i] <= 105` * `nums` is sorted in **non-decreasing** order. * `0 <= maxDiff <= 105` * `1 <= queries.length <= 105` * `queries[i] == [ui, vi]` * `0 <= ui, vi < n`

Code Snippets

C++:

```
class Solution {
public:
vector<bool> pathExistenceQueries(int n, vector<int>& nums, int maxDiff,
vector<vector<int>>& queries) {
```

```
}
};
```

Java:

```
class Solution {
public boolean[] pathExistenceQueries(int n, int[] nums, int maxDiff, int[][]
queries) {

}
}
```

Python3:

```
class Solution:
def pathExistenceQueries(self, n: int, nums: List[int], maxDiff: int,
queries: List[List[int]]) -> List[bool]:
```