Problem 3244: Shortest Distance After Road Addition Queries II

Problem Information

Difficulty: Hard
Acceptance Rate: 26.09%
Paid Only: No
Tags: Array, Greedy, Graph, Ordered Set

Problem Description

You are given an integer `n` and a 2D integer array `queries`.

There are `n` cities numbered from `0` to `n - 1`. Initially, there is a **unidirectional** road from city `i` to city `i + 1` for all `0 <= i < n - 1`.

`queries[i] = [ui, vi]` represents the addition of a new **unidirectional** road from city `ui` to city `vi`. After each query, you need to find the **length** of the **shortest path** from city `0` to city `n - 1`.

There are no two queries such that `queries[i][0] < queries[j][0] < queries[i][1] < queries[j][1]`.

Return an array `answer` where for each `i` in the range `[0, queries.length - 1]`, `answer[i]` is the _length of the shortest path_ from city `0` to city `n - 1` after processing the **first**`i + 1` queries.

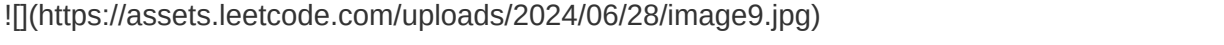
Example 1:

Input: n = 5, queries = [[2,4],[0,2],[0,4]]

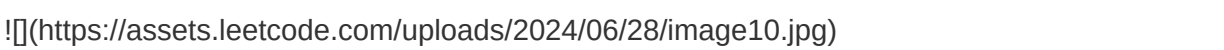
Output: [3,2,1]

Explanation:

After the addition of the road from 2 to 4, the length of the shortest path from 0 to 4 is 3.



After the addition of the road from 0 to 2, the length of the shortest path from 0 to 4 is 2.



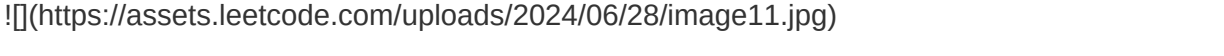
After the addition of the road from 0 to 4, the length of the shortest path from 0 to 4 is 1.

Example 2:

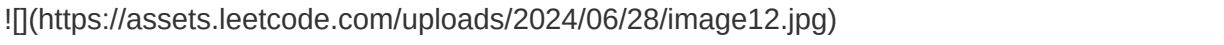
Input: n = 4, queries = [[0,3],[0,2]]

Output: [1,1]

Explanation:



After the addition of the road from 0 to 3, the length of the shortest path from 0 to 3 is 1.



After the addition of the road from 0 to 2, the length of the shortest path remains 1.

Constraints:

* `3 <= n <= 105` * `1 <= queries.length <= 105` * `queries[i].length == 2` * `0 <= queries[i][0] < queries[i][1] < n` * `1 < queries[i][1] - queries[i][0]` * There are no repeated roads among the queries. * There are no two queries such that `i != j` and `queries[i][0] < queries[j][0] < queries[i][1] < queries[j][1]`.

Code Snippets

C++:

```
class Solution {
public:
vector<int> shortestDistanceAfterQueries(int n, vector<vector<int>>& queries)
{

}
};
```

Java:

```
class Solution {
public int[] shortestDistanceAfterQueries(int n, int[][] queries) {

}
}
```

Python3:

```
class Solution:
def shortestDistanceAfterQueries(self, n: int, queries: List[List[int]]) ->
List[int]:
```