Problem 2285: Maximum Total Importance of Roads

Problem Information

Difficulty: Medium
Acceptance Rate: 69.13%
Paid Only: No
Tags: Greedy, Graph, Sorting, Heap (Priority Queue)

Problem Description

You are given an integer `n` denoting the number of cities in a country. The cities are numbered from `0` to `n - 1`.

You are also given a 2D integer array `roads` where `roads[i] = [ai, bi]` denotes that there exists a **bidirectional** road connecting cities `ai` and `bi`.

You need to assign each city with an integer value from `1` to `n`, where each value can only be used **once**. The **importance** of a road is then defined as the **sum** of the values of the two cities it connects.

Return _the**maximum total importance** of all roads possible after assigning the values optimally._

Example 1:

Input: n = 5, roads = [[0,1],[1,2],[2,3],[0,2],[1,3],[2,4]] **Output:** 43 **Explanation:** The figure above shows the country and the assigned values of [2,4,5,3,1]. - The road (0,1) has an importance of 2 + 4 = 6. - The road (1,2) has an importance of 4 + 5 = 9. - The road (2,3) has an importance of 5 + 3 = 8. - The road (0,2) has an importance of 2 + 5 = 7. - The road (1,3) has an importance of 4 + 3 = 7. - The road (2,4) has an importance of 5 + 1 = 6. The total importance of all roads is 6 + 9 + 8 + 7 + 7 + 6 = 43. It can be shown that we cannot obtain a greater total importance than 43.

Example 2:

Input: n = 5, roads = [[0,3],[2,4],[1,3]] **Output:** 20 **Explanation:** The figure above shows the country and the assigned values of [4,3,2,5,1]. - The road (0,3) has an importance of 4 + 5 = 9. - The road (2,4) has an importance of 2 + 1 = 3. - The road (1,3) has an importance of 3 + 5 = 8. The total importance of all roads is 9 + 3 + 8 = 20. It can be shown that we cannot obtain a greater total importance than 20.

Constraints:

* `2 <= n <= 5 * 104` * `1 <= roads.length <= 5 * 104` * `roads[i].length == 2` * `0 <= ai, bi <= n - 1` * `ai != bi` * There are no duplicate roads.

Code Snippets

C++:

```cpp
class Solution {
public:
long long maximumImportance(int n, vector<vector<int>>& roads) {


}
};
```

Java:

```java
class Solution {
public long maximumImportance(int n, int[][] roads) {


}
}
```

Python3:

```python
class Solution:
def maximumImportance(self, n: int, roads: List[List[int]]) -> int:
```