Problem 1632: Rank Transform of a Matrix

Problem Information

Difficulty: Hard
Acceptance Rate: 41.77%
Paid Only: No
Tags: Array, Union Find, Graph, Topological Sort, Sorting, Matrix

Problem Description

Given an `m x n` `matrix`, return _a new matrix_`answer` _where_`answer[row][col]`_is the_ _**rank** of _`matrix[row][col]`.

The **rank** is an **integer** that represents how large an element is compared to other elements. It is calculated using the following rules:

* The rank is an integer starting from `1`. * If two elements `p` and `q` are in the **same row or column** , then: * If `p < q` then `rank(p) < rank(q)` * If `p == q` then `rank(p) == rank(q)` * If `p > q` then `rank(p) > rank(q)` * The **rank** should be as **small** as possible.

The test cases are generated so that `answer` is unique under the given rules.

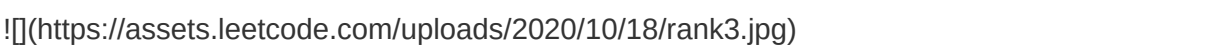
Example 1:

Input: matrix = [[1,2],[3,4]] **Output:** [[1,2],[2,3]] **Explanation:** The rank of matrix[0][0] is 1 because it is the smallest integer in its row and column. The rank of matrix[0][1] is 2 because matrix[0][1] > matrix[0][0] and matrix[0][0] is rank 1. The rank of matrix[1][0] is 2 because matrix[1][0] > matrix[0][0] and matrix[0][0] is rank 1. The rank of matrix[1][1] is 3 because matrix[1][1] > matrix[0][1], matrix[1][1] > matrix[1][0], and both matrix[0][1] and matrix[1][0] are rank 2.

Example 2:

Input: matrix = [[7,7],[7,7]] **Output:** [[1,1],[1,1]]

Example 3:



Input: matrix = [[20,-21,14],[-19,4,19],[22,-47,24],[-19,4,19]] **Output:** [[4,2,3],[1,3,4],[5,1,6],[1,3,4]]

Constraints:

* `m == matrix.length` * `n == matrix[i].length` * `1 <= m, n <= 500` * `-109 <= matrix[row][col] <= 109`

Code Snippets

C++:

```
class Solution {
public:
vector<vector<int>> matrixRankTransform(vector<vector<int>>& matrix) {

}
};
```

Java:

```
class Solution {
public int[][] matrixRankTransform(int[][] matrix) {

}
}
```

Python3:

```
class Solution:
def matrixRankTransform(self, matrix: List[List[int]]) -> List[List[int]]:
```