Number of Islands II

Given a n,m which means the row and column of the 2D matrix and an array of pair A(size k). Originally, the 2D matrix is all 0 which means there is only sea in the matrix. The list pair has k operator and each operator has two integer A[i].x, A[i].y means that you can change the grid matrix[A[i].x][A[i].y] from sea to island. Return how many island are there in the matrix after each operator.You need to return an array of size K.

0 is represented as the sea, 1 is represented as the island. If two 1 is adjacent, we consider them in the same island. We only consider up/down/left/right adjacent.

Example

Example 1:

```
Input: n = 4, m = 5, A = [[1,1],[0,1],[3,3],[3,4]]
Output: [1,1,2,2]
Explanation:
0.  00000
    00000
    00000
    00000
1.  00000
    01000
    00000
    00000
2.  01000
    01000
    00000
    00000
3.  01000
    01000
    00000
    00010
4.  01000
    01000
    00000
    00011
```

Example 2:

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Input: n = 3, m = 3, A = [[0,0],[0,1],[2,2],[2,1]]
Output: [1,1,2,2]
``````Python
'''
Definition for a point.
class Point:
    def __init__(self, a=0, b=0):
        self.x = a
        self.y = b
'''

class Solution:
    """
    @param n: An integer
    @param m: An integer
    @param operators: an array of point
    @return: an integer array
    """
    def numIslands2(self, n, m, operators):
        # write your code here
        cell = [-1]*(n*m)
        rank = [None]*(n*m)
        ans = []
        count= 0
        directions = [(-1,0),(0,1),(1,0),(0,-1)]
        for i in range(len(operators)):
            x = operators[i].x
            y = operators[i].y
            cellNo = x*m+y
            if cell[cellNo]!=-1:
                ans.append(count)
                continue
            cell[cellNo] = cellNo
            rank[cellNo] = 1
            count = count+1
            for r,c in directions:
                rowdash = x+r
                coldash = y+c
                celldash = rowdash*m + coldash
                if rowdash<0 or coldash<0 or rowdash>=n or coldash>=m or
cell[celldash]==-1:
                    continue
~~~~

```
                lx = self.find(cellNo,cell)
                ly = self.find(celldash,cell)
                if lx!=ly:
                    if rank[lx]>rank[ly]:
                        cell[ly] = lx
                    elif rank[lx]<rank[ly]:
                        cell[lx]=ly
                    else:
                        cell[ly] = lx
                        rank[lx]=rank[lx]+1
                    count=count-1
            ans.append(count)
        return ans

    def find(self,x,parent):
        if parent[x]==x:
            return x
        temp = self.find(parent[x],parent)
        parent[x] = temp
        return temp
```