Problem 3459: Length of Longest V-Shaped Diagonal Segment

Problem Information

Difficulty: Hard
Acceptance Rate: 56.55%
Paid Only: No
Tags: Array, Dynamic Programming, Memoization, Matrix

Problem Description

You are given a 2D integer matrix `grid` of size `n x m`, where each element is either `0`, `1`, or `2`.

A **V-shaped diagonal segment** is defined as:

* The segment starts with `1`. * The subsequent elements follow this infinite sequence: `2, 0, 2, 0, ...`. * The segment: * Starts **along** a diagonal direction (top-left to bottom-right, bottom-right to top-left, top-right to bottom-left, or bottom-left to top-right). * Continues the**sequence** in the same diagonal direction. * Makes**at most one clockwise 90-degree****turn** to another diagonal direction while **maintaining** the sequence.

Return the **length** of the **longest** **V-shaped diagonal segment**. If no valid segment _exists_ , return 0.

Example 1:

Input: grid = [[2,2,1,2,2],[2,0,2,2,0],[2,0,1,1,0],[1,0,2,2,2],[2,0,0,2,2]]

Output: 5

Explanation:

The longest V-shaped diagonal segment has a length of 5 and follows these coordinates: `(0,2) -> (1,3) -> (2,4)`, takes a **90-degree clockwise turn** at `(2,4)`, and continues as `(3,3) -> (4,2)`.

Example 2:

Input: grid = [[2,2,2,2,2],[2,0,2,2,0],[2,0,1,1,0],[1,0,2,2,2],[2,0,0,2,2]]

Output: 4

Explanation:

The longest V-shaped diagonal segment has a length of 4 and follows these coordinates: `(2,3) -> (3,2)`, takes a **90-degree clockwise turn** at `(3,2)`, and continues as `(2,1) -> (1,0)`.

Example 3:

Input: grid = [[1,2,2,2,2],[2,2,2,2,0],[2,0,0,0,0],[0,0,2,2,2],[2,0,0,2,0]]

Output: 5

Explanation:

The longest V-shaped diagonal segment has a length of 5 and follows these coordinates: `(0,0) -> (1,1) -> (2,2) -> (3,3) -> (4,4)`.

Example 4:

Input: grid = [[1]]

Output: 1

Explanation:

The longest V-shaped diagonal segment has a length of 1 and follows these coordinates: `(0,0)`.

Constraints:

* `n == grid.length` * `m == grid[i].length` * `1 <= n, m <= 500` * `grid[i][j]` is either `0`, `1` or `2`.

Code Snippets

C++:

```
class Solution {
public:
int lenOfVDiagonal(vector<vector<int>>& grid) {

}
};
```

Java:

```
class Solution {
public int lenOfVDiagonal(int[][] grid) {

}
}
```

Python3:

```
class Solution:
def lenOfVDiagonal(self, grid: List[List[int]]) -> int:
```