Documentation: Surrounded Regions

Problem Description

You are given an m x n matrix called board containing letters 'X' and 'O'. Your task is to capture all regions surrounded by 'X' cells.

Definitions

- **Connect:** A cell is connected to adjacent cells horizontally or vertically.
- **Region:** To form a region, connect every 'O' cell.
- **Surround:** A region is surrounded with 'X' cells if you can connect the region with 'X' cells and none of the region cells are on the edge of the board.

A surrounded region is captured by replacing all 'O's with 'X's in the input matrix board.

Example 1

Input: board = [["X","X","X","X"],

["X","O","O","X"],

["X","X","O","X"],

["X","O","X","X"]]

Output: [["X","X","X","X"],

["X","X","X","X"],

["X","X","X","X"],

["X","O","X","X"]]

Explanation:

In the above matrix, the region at the bottom is not captured because it is connected to the edge of the board and therefore cannot be surrounded.

Example 2

Input: board = [["X"]]

Output: [["X"]]

Explanation: The board has only one cell, ' X', so there are no 'O's to capture.

Constraints

- m == board.length
- n == board[i].length
- 1 <= m, n <= 200
- board[i][j] is either 'X' or 'O'.

Approach

1. **Identify Border 'O's:**
   - Traverse the border cells of the matrix and apply Depth-First Search (DFS) to mark all 'O's connected to the border as temporary markers (e.g., 'T').

2. **Capture Surrounded Regions:**
   - Replace all remaining 'O's (which are surrounded by 'X's) with 'X'.

3. **Restore Border 'O's:**
    - Replace all temporary markers ('T') back to 'O'.

This approach ensures that only those 'O' regions which are not connected to the border are captured, while 'O' regions connected to the border remain unchanged.