Problem 2056: Number of Valid Move Combinations On Chessboard

Problem Information

Difficulty: Hard
Acceptance Rate: 48.37%
Paid Only: No
Tags: Array, String, Backtracking, Simulation

Problem Description

There is an `8 x 8` chessboard containing `n` pieces (rooks, queens, or bishops). You are given a string array `pieces` of length `n`, where `pieces[i]` describes the type (rook, queen, or bishop) of the `ith` piece. In addition, you are given a 2D integer array `positions` also of length `n`, where `positions[i] = [ri, ci]` indicates that the `ith` piece is currently at the **1-based** coordinate `(ri, ci)` on the chessboard.

When making a **move** for a piece, you choose a **destination** square that the piece will travel toward and stop on.

* A rook can only travel **horizontally or vertically** from `(r, c)` to the direction of `(r+1, c)`, `(r-1, c)`, `(r, c+1)`, or `(r, c-1)`. * A queen can only travel **horizontally, vertically, or diagonally** from `(r, c)` to the direction of `(r+1, c)`, `(r-1, c)`, `(r, c+1)`, `(r, c-1)`, `(r+1, c+1)`, `(r+1, c-1)`, `(r-1, c+1)`, `(r-1, c-1)`. * A bishop can only travel **diagonally** from `(r, c)` to the direction of `(r+1, c+1)`, `(r+1, c-1)`, `(r-1, c+1)`, `(r-1, c-1)`.

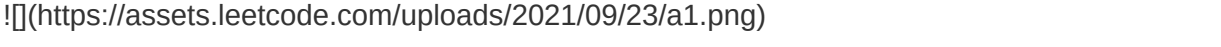
You must make a **move** for every piece on the board simultaneously. A **move combination** consists of all the **moves** performed on all the given pieces. Every second, each piece will instantaneously travel **one square** towards their destination if they are not already at it. All pieces start traveling at the `0th` second. A move combination is **invalid** if, at a given time, **two or more** pieces occupy the same square.

Return _the number of**valid** move combinations_■■■■■.

Notes:

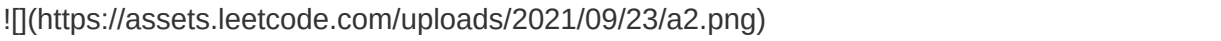
* **No two pieces** will start in the**same** square. * You may choose the square a piece is already on as its **destination**. * If two pieces are **directly adjacent** to each other, it is valid for them to **move past each other** and swap positions in one second.

Example 1:



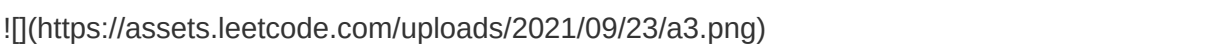
Input: pieces = ["rook"], positions = [[1,1]] **Output:** 15 **Explanation:** The image above shows the possible squares the piece can move to.

Example 2:



Input: pieces = ["queen"], positions = [[1,1]] **Output:** 22 **Explanation:** The image above shows the possible squares the piece can move to.

Example 3:



Input: pieces = ["bishop"], positions = [[4,3]] **Output:** 12 **Explanation:** The image above shows the possible squares the piece can move to.

Constraints:

* `n == pieces.length ` * `n == positions.length` * `1 <= n <= 4` * `pieces` only contains the strings `"rook"`, `"queen"`, and `"bishop"`. * There will be at most one queen on the chessboard. * `1 <= ri, ci <= 8` * Each `positions[i]` is distinct.

Code Snippets

C++:

```
class Solution {
public:
int countCombinations(vector<string>& pieces, vector<vector<int>>& positions)
{
```

```
}
};
```

Java:

```
class Solution {
public int countCombinations(String[] pieces, int[][] positions) {

}
}
```

Python3:

```
class Solution:
def countCombinations(self, pieces: List[str], positions: List[List[int]]) ->
int:
```