499. The Maze III

Hard 181 41 Add to List Share

There is a **ball** in a maze with empty spaces and walls. The ball can go through empty spaces by rolling **up** (u), **down** (d), **left** (l) or **right** (r), but it won't stop rolling When the ball stops, it could choose the next direction. There is also a **hole** in this maze. The ball will drop into the hole if it rolls on to the hole.

Given the **ball position**, the **hole position** and the **maze**, find out how the ball could drop into the hole by moving the **shortest distance**. The distance is defined **spaces** traveled by the ball from the start position (excluded) to the hole (included). Output the moving **directions** by using 'u', 'd', 'l' and 'r'. Since there could be s ways, you should output the **lexicographically smallest** way. If the ball cannot reach the hole, output "impossible".

The maze is represented by a binary 2D array. 1 means the wall and 0 means the empty space. You may assume that the borders of the maze are all walls. The ball a are represented by row and column indexes.

Example 1:

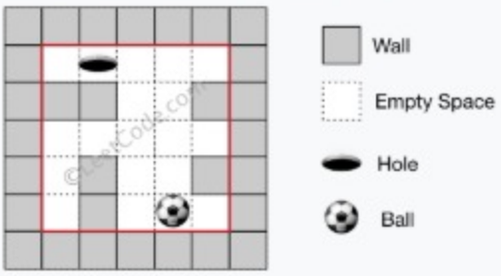
```
Input 1: a maze represented by a 2D array

0 0 0 0 0
1 1 0 0 1
0 0 0 0 0
0 1 0 0 1
0 1 0 0 0

Input 2: ball coordinate (rowBall, colBall) = (4, 3)
Input 3: hole coordinate (rowHole, colHole) = (0, 1)

Output: "lul"

Explanation: There are two shortest ways for the ball to drop into the hole.
The first way is left -> up -> left, represented by "lul".
The second way is up -> left, represented by 'ul'.
Both ways have shortest distance 6, but the first way is lexicographically smaller because 'l' < 'u'. So the output is "lul".
```



Example 2:

```
Input 1: a maze represented by a 2D array

0 0 0 0 0
1 1 0 0 1
0 0 0 0 0
0 1 0 0 1
0 1 0 0 0

Input 2: ball coordinate (rowBall, colBall) = (4, 3)
Input 3: hole coordinate (rowHole, colHole) = (3, 0)

Output: "impossible"

Explanation: The ball cannot reach the hole.
```