<https://www.lintcode.com/problem/787/>

**Description**

There is a ball in a maze with empty spaces and walls. The ball can go through empty spaces by rolling **up**, **down**, **left** or **right**, **but it won't stop rolling until hitting a wall**. When the ball stops, it could choose the next direction.

Given the ball's start position, the destination and the maze, determine whether the ball could stop at the destination.

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 start and destination coordinates are represented by row and column indexes.

1.There is only one ball and one destination in the maze.

2.Both the ball and the destination exist on an empty space, and they will not be at the same position initially.

3.The given maze does not contain border (like the red rectangle in the example pictures), but you could assume the border of the maze are all walls.

5.The maze contains at least 2 empty spaces, and both the width and height of the maze won't exceed 100.

**Example**

Example 1:

Input:

map =

[

[0,0,1,0,0],

[0,0,0,0,0],

[0,0,0,1,0],

[1,1,0,1,1],

[0,0,0,0,0]

]

start = [0,4]

end = [3,2]

Output:

false

Example 2:

Input:

map =

[[0,0,1,0,0],

[0,0,0,0,0],

[0,0,0,1,0],

[1,1,0,1,1],

[0,0,0,0,0]

]

start = [0,4]

end = [4,4]

Output:

true

**Attempt 1: 2022-11-26**

**Wrong solution**

public class Solution {

/\*\*

\* @param maze: the maze

\* @param start: the start

\* @param destination: the destination

\* @return: whether the ball could stop at the destination

\*/

int[] dx = new int[]{0,0,1,-1};

int[] dy = new int[]{-1,1,0,0};

public boolean hasPath(int[][] maze, int[] start, int[] destination) {

if(maze == null || maze.length == 0) {

return false;

}

boolean[][] visited = new boolean[maze.length][maze[0].length];

return helper(maze, visited, start[0], start[1], destination[0], destination[1]);

}

private boolean helper(int[][] maze, boolean[][] visited, int start\_x, int start\_y, int dest\_x, int dest\_y) {

if(start\_x == dest\_x && start\_y == dest\_y) {

return true;

}

if(start\_x < 0 || start\_x >= maze.length || start\_y < 0 || start\_y >= maze[0].length || visited[start\_x][start\_y]) {

return false;

}

visited[start\_x][start\_y] = true;

for(int k = 0; k < 4; k++) {

// rolling until out or hit the wall

while(start\_x >= 0 && start\_x < maze.length && start\_y >= 0 && start\_y < maze[0].length && maze[start\_x][start\_y] != 1) {

start\_x += dx[k];

start\_y += dy[k];

}

// one step back to the stop position

start\_x -= dx[k];

start\_y -= dy[k];

// start a new dfs from the stop position

if(helper(maze, visited, start\_x, start\_y, dest\_x, dest\_y)) {

return true;

}

}

return false;

}

}

**Solution 1:  DFS (30min, use 'iter' to start current dfs then restore 'iter' back to start new dfs)**

**Correct Solution with reassign start\_i, start\_j to x, y**

**Caution: The difference here is very important, after each time rolling until hit the wall, we must return back to original start position to prepare another direction DFS, same as normal DFS one direction one step, but since we have to rolling until hit the wall in this problem, recording the original position by int x = start\_i, int y = start\_j is very critical**

public class Solution {

/\*\*

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\* @param destination: the destination

\* @return: whether the ball could stop at the destination

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}

private boolean helper(int[][] maze, boolean[][] visited, int start\_x, int start\_y, int dest\_x, int dest\_y) {

if(start\_x == dest\_x && start\_y == dest\_y) {

return true;

}

if(start\_x < 0 || start\_x >= maze.length || start\_y < 0 || start\_y >= maze[0].length || visited[start\_x][start\_y]) {

return false;

}

visited[start\_x][start\_y] = true;

for(int k = 0; k < 4; k++) {

// Don't understand why assign start\_i, start\_j to new variable x, y?

// Recording start position before start rolling in the maze, for next time start another

// direction's DFS, since we are rolling until hit the wall, so start position if not

// record will change to the stop position, which change the start condition of DFS in this

// time recursion, actually we do this in an implicit way in normal DFS as directly start

// four directions DFS in for loop, which not modify the start position

// Refer to

// https://leetcode.com/problems/flood-fill/

// for(int k = 0; k < 4; k++) {

// dfs(i + dx[k], j + dy[k], image, visited, iniColor, newColor);

// }

int iter\_x = start\_x;

int iter\_y = start\_y;

// rolling until out or hit the wall

while(iter\_x >= 0 && iter\_x < maze.length && iter\_y >= 0 && iter\_y < maze[0].length && maze[iter\_x][iter\_y] != 1) {

iter\_x += dx[k];

iter\_y += dy[k];

}

// one step back to the stop position

iter\_x -= dx[k];

iter\_y -= dy[k];

// start a new dfs from the original position

if(helper(maze, visited, iter\_x, iter\_y, dest\_x, dest\_y)) {

return true;

}

}

return false;

}

}