Report Problem 4

Idea

Find a path through which the driver can reach the destination following the given conditions. When the driver moves through a square or cell then indicate it in the solution map. Like that we can show the path in chosen in the map. Apart from that, indicate the moves done by the driver (up, down, left, right) and how many turns it has done. Try all the possibilities until a path is found through backtracking.

Methodology

The algorithm did the following:

If the driver reaches the destination: print the solution map.

If the driver doesn´t reach its destination trying all the possibilities: print a message saying no solution was found.

If the driver doesn´t reach its destination: mark the current cell as a solution in the solution map. Check the last direction taken and only move forward or turn to the right. For example, if the last direction was “up”, then we can move either upwards or turn to the right (we can´t turn to the left neither do a 180º turn). While moving, for the specific path, we count the times the driver has turned right.

```
if(latestDir!="right" && latestDir!="up" && moveDriver(map, i, j-1, "left", fw)){   // Move left
    if(latestDir == "down")
    {
        contTurnRight++; // Driver turned 90º to the right
    }
    fw.write(" Left");
    return true;
}
```

If the previous movement doesn´t lead to a solution after trying all the possible movements then use backtracking and mark the current cell as 0 (doesn´t form part of the path).

Input File

A file "example_backtracking.txt", with the following format:

- Line 1: Number of rows (F).
- Line 2: Number of columns (C).
- Line 3: Description of the first row (C characters separated by tabs).
- Line 4: Description of the second row (C characters separated by tabs).
- Line N + 2: Description of the last row (C characters separated by tabs).

example_backtracking: Bloc de notas

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```
4
4
2	X	0	0
0	0	0	0
X	X	0	X
0	0	0	1
```

example_backtracking2: Bloc de notas

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```
4
9
0	0	0	0	0	0	0	0	0
0	X	0	X	0	X	0	X	0
0	X	0	X	0	X	X	2	0
0	0	0	0	0	0	1	X	X
```

Output file

Following the “example_backtracking.txt”

output_backtracking: Bloc de notas

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```
Moves(from latest to earliest):  Up Left Left Left Down Right Up Up Up Left
The driver turned right 5 times.
The path taken is the following one (Start = 1, Destination = 2, Path = 3):
 2 0 3 3
 3 3 3 3
 0 0 3 0
 0 0 3 1
```

Following the “example_backtracking2.txt”

output_backtracking: Bloc de notas

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```
Moves(from latest to earliest):  Left Down Down Right Right Right Right Right Right Right Right Up Up Up Left Left Left Left Left Left
The driver turned right 4 times.
The path taken is the following one (Start = 1, Destination = 2, Path = 3):
 3 3 3 3 3 3 3 3 3
 3 0 0 0 0 0 0 0 3
 3 0 0 0 0 0 0 2 3
 3 3 3 3 3 3 1 0 0
```