goal (1): convert a maze to a graph. (mapMazeToGraph)
(2) implement graph traversal algorithms to go through the maze. (find a path from start vertex to end vertex)

EECE 2560: Fundamentals of Engineering Algorithms

Department of Electrical and Computer Engineering

Project #5

start

exit

In this project, you will develop algorithms that find paths through a maze.

The input is a text file containing a collection of mazes. Each maze begins with the number of rows and columns in the maze and a character for every cell in the maze. A cell contains a space if the solver is allowed to occupy the cell. A cell contains `X` if the solver is not allowed to occupy the cell.

The solver starts at cell `(0,0)` in the upper left, and the goal is to get to cell `(rows-1, cols-1)` in the lower right. A legal move from a cell is to move left, right, up, or down to an immediately adjacent cell that contains a space. Moving off any edge of the board is not allowed.

p5.cpp. Basic code graph.h

Part a

Functions to handle file I/O and a complete graph class, are included as part of the assignment. In the printout of the graph, the current cell is represented by + and the goal cell is represented by *. Add functions that:

maze class. maze :: mapMazeTo graph.

1. Create a graph that represents the legal moves between cells. Each vertex should represent a cell, and each edge should represent a legal move between adjacent cells.
2. Write a recursive function `findPathRecursive` that looks for a path from the start cell to the goal cell. If a path from the start to the goal exists, your program should print a sequence of correct moves (`Go left, go right`, etc.). If no path from the start to the goal exists, the program should print, `No path exists`. Hint: consider recursive-DFS.
3. Write a function `findPathNonRecursive` that does the same thing as in 2, but without using recursion. Hint: consider either stack-based DFS or queue-based BFS.

The code you submit should apply both findPath functions to each maze, one after the other. If a solution exists, the solver should simulate the solution to each maze by calling the `maze::print()` function after each move.

Example of a maze input file:

undirected. directed w two edges

```
7
10
OXXXXXXXXX
OOOOOOOOXX
OXOXOXOXXX
OXOXOXOOOO
XXOXXXOXXX
XOOOOOOOXX
XXXXXXXOOX
```

row ✓ col. ✓

0: occupied Yes → vertex

X: .. No