CS2124 Data Structures - Spring 2022

Assignment 5: Graph Algorithms

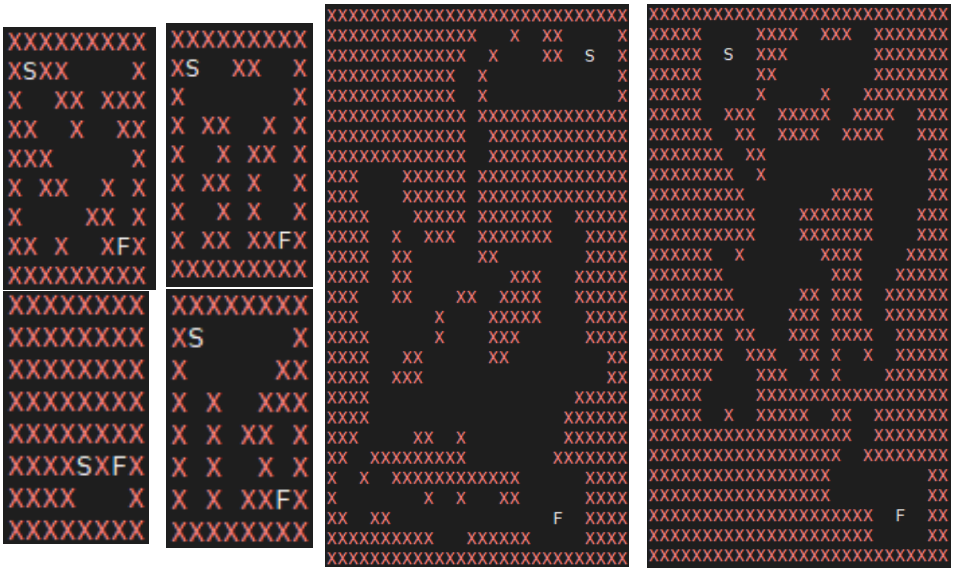
Due 4/19/22 by 11:59pm

For the following functions you'll be passed an character array which represents a maze. The symbol 'X' represents a space that is impassable. The symbol ' ' represents a space that is passable. The symbols 'S' and 'F' represent the starting point and ending point of the maze respectively. You may only travel up, down, left, and right (i.e, no diagonals).

You will create a graph to represent the maze. Nodes/vertices represent locations in the char** array maze (e.g, the pair (i, j) represents the $maze[i][j]$ location) . Here is a short description of the functions you should complete:

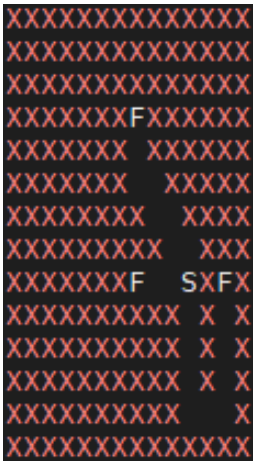
hasPath (8pts):

Detect whether there is a path from 'S' to 'F'. Return a *pathResult* value to indicate whether you found a path in the graph.



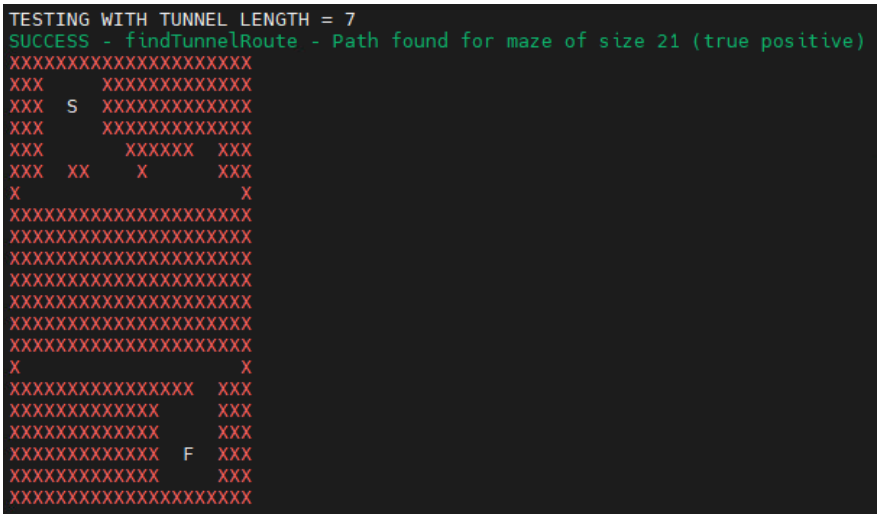
findNearestFinish (6pts):

The maze contains one 'S' and multiple 'F's (1 or more). Find the length of the shortest path to any 'F' from 'S' and return it in *spDist*. If no 'F' is reachable set *spDist* to INT_MAX. Return a *pathResult* value to indicate whether you found a path in the graph. For example we can reach.



findTunnelRoute (6pts):

Determine if there is way to reach 'F' by tunneling through no more than k of the 'X' symbols.



Deliverables:

Your solution should be submitted as "graphPathAlg.c". Also attach any additional files you create to solve this problem.

Upload this file to Blackboard under Assignment 5. **Do not zip your files**.

To receive full credit, your code must compile and execute. You should use valgrind to ensure that you do not have any memory leaks.

Remember:

The program you submit should be the work of only you and one other partner. Cheating will be reported to SCCS. Both the copier and copiee will be held responsible.