

Assignment 9

CS329E - Elements of Software Design

Graph Traversal

(100 points)

Due Date on Canvas and Gradescope

1 Description

In this assignment you will be creating a graph from an input data file called **graph.txt**. The first line in that file will be a single integer v . This number will denote the number of vertices to follow. The next v lines will be the labels for the vertices. There will be one label to a line. Assume that the labels are unique. The next line after the labels for vertices will be a single number e . This number will denote the number of edges to follow. There will be one edge per line. Each edge will be of the form - **fromVertex, toVertex, and weight**. If the weight is not given, assign a default weight of 1 to that edge. After the list of edges there will be a label for the starting vertex. This will be the starting vertex for both the Depth First Search and Breadth First Search. After that there will be two cities and you will have to delete the edges connecting the two cities and print the adjacency matrix. Then there will be a single city and you will delete this vertex and all edges from and to this vertex. You will print the list of vertices and the adjacency matrix showing all edges from it and all edges to it have been deleted. To delete a vertex from the graph - remove it from the vertex list and remove the corresponding row and column for this vertex.

Output:

Here is sample output. For grading purpose, please follow this output format. Matching the provided sample prompt will expedite grading and prevent unexpected grading error.

```
1 Depth First Search
2 Houston
3 Atlanta
4 Kansas City
5 Los Angeles
6 San Francisco
7 Seattle
8 Denver
9 Chicago
10 Boston
11 New York
12 Dallas
13 Miami
14
15 Breadth First Search
16 Houston
17 Atlanta
18 Miami
19 Dallas
20 Kansas City
21 New York
```

```

22 Los Angeles
23 Denver
24 Chicago
25 Boston
26 San Francisco
27 Seattle
28
29 Deletion of an edge
30
31 Adjacency Matrix
32 0 1 0 1 0 1 0 0 0 0 0 0
33 1 0 1 1 0 0 0 0 0 0 0 0
34 0 1 0 1 1 0 0 0 0 0 1 0
35 1 1 1 0 1 1 0 0 0 0 0 0
36 0 0 1 1 0 1 0 1 1 0 1 0
37 1 0 0 1 1 0 1 1 0 0 0 0
38 0 0 0 0 0 1 0 1 0 0 0 0
39 0 0 0 0 1 1 1 0 1 0 0 0
40 0 0 0 0 1 0 0 1 0 1 0 1
41 0 0 0 0 0 0 0 0 1 0 0 1
42 0 0 1 0 1 0 0 0 0 0 0 1
43 0 0 0 0 0 0 0 0 1 1 1 0
44
45 Deletion of a vertex
46
47 List of Vertices
48 Seattle
49 San Francisco
50 Los Angeles
51 Kansas City
52 Chicago
53 Boston
54 New York
55 Atlanta
56 Miami
57 Dallas
58 Houston
59
60 Adjacency Matrix
61 0 1 0 0 1 0 0 0 0 0 0 0
62 1 0 1 0 0 0 0 0 0 0 0 0
63 0 1 0 1 0 0 0 0 0 0 1 0
64 0 0 1 0 1 0 1 1 0 1 0
65 1 0 0 1 0 1 1 0 0 0 0
66 0 0 0 0 1 0 1 0 0 0 0
67 0 0 0 1 1 1 0 1 0 0 0
68 0 0 0 1 0 0 1 0 1 0 1
69 0 0 0 0 0 0 0 1 0 0 1
70 0 0 1 1 0 0 0 0 0 0 1
71 0 0 0 0 0 0 0 1 1 1 0

```

Pair Programming

For this assignment you may work with a partner. Both of you must read the paper on Pair Programming¹ and abide by the ground rules as stated in that paper. If you are working with a partner then only one of you will be submitting the code. But make sure that your partner's name and UT EID is in the header. If you are working alone then remove the partner's name and eid from the header.

1.1 Turnin

Turn in your assignment on time on Gradescope system on Canvas. For the due date of the assignments, please see the Gradescope and Canvas systems.

1.2 Academic Misconduct Regarding Programming

In a programming class like our class, there is sometimes a very fine line between "cheating" and acceptable and beneficial interaction between students (In different assignment groups). Thus, it is very important that you fully understand what is and what is not allowed in terms of collaboration with your classmates. We want to be 100% precise, so that there can be no confusion.

The rule on collaboration and communication with your classmates is very simple: you cannot transmit or receive code from or to anyone in the class in any way – visually (by showing someone your code), electronically (by emailing, posting, or otherwise sending someone your code), verbally (by reading code to someone) or in any other way we have not yet imagined. Any other collaboration is acceptable.

The rule on collaboration and communication with people who are not your classmates (or your TAs or instructor) is also very simple: it is not allowed in any way, period. This disallows (for example) posting any questions of any nature to programming forums such as **StackOverflow**. As far as going to the web and using Google, we will apply the "two line rule". Go to any web page you like and do any search that you like. But you cannot take more than two lines of code from an external resource and actually include it in your assignment in any form. Note that changing variable names or otherwise transforming or obfuscating code you found on the web does not render the "two line rule" inapplicable. It is still a violation to obtain more than two lines of code from an external resource and turn it in, whatever you do to those two lines after you first obtain them.

Furthermore, you should cite your sources. Add a comment to your code that includes the URL(s) that you consulted when constructing your solution. This turns out to be very helpful when you're looking at something you wrote a while ago and you need to remind yourself what you were thinking.

We will use the following Code plagiarism Detection Software to automatically detect plagiarism.

- **Staford MOSS**

<https://theory.stanford.edu/~aiken/moss/>

- **Jplag - Detecting Software Plagiarism**

<https://github.com/jplag/jplag> and <https://jplag.ipd.kit.edu/>

¹Read this paper about Pair Programming <https://collaboration.csc.ncsu.edu/laurie/Papers/Kindergarten.PDF>