CS 372/469
Fall 2018
Lab 5: Due 11/19, before lab

1 Description

In this lab, we will get some experience with breadth-first search in a graph, and experimentally verify that the running-time is $O(|V| + |E|)$, i.e., linear in the number of vertices and edges. The BFS function will take in a graph $G = (V, E)$ and a source node to start the BFS from. The function will return a *distance label* for each node. The *distance label* for a given node indicates the distance of the node from the source node. They will be stored in the graph data structure – you can use the graph class from Lab 4, and should feel free to enhance the class. You are free to design your own strategy and describe it in your lab report. Use a queue to store the discovered, but not yet processed nodes.

2 Testing

Generate five example graphs to test your code. The graphs do not have to be very large but try to represent a variety: cyclic/acyclic, directed/undirected.

3 Report: around 2 pages

Write a lab report to describe your lab work done in the following sections

1. Introduction (define the background, motivation, and the problem)
2. Methods (provide the solutions)
3. Results: show plots for empirical runtime on graphs. Discuss if they appear to be $O(|V| + |E|)$ – which is the expected time for BFS. If not, explain, or speculate on the possible reasons.
4. Discussions (general implications and issues)

How to submit: Upload your **pdf** file and source code on Canvas before the due date.