CS 3510: Advanced Algorithms/Data Structures

Spring 2016 Assignment 4

Problems due as noted.

Assignment

Problems identified by x.y(z) denote the problem “y”, in chapter “x” of the textbook, with part “z”. If “z” is not noted, then the entire problem is required.

Due Mar 1 Dijkstra

- 4.1 Run Dijkstra, tracking the problem data as we did in class.
- 4.14 By efficient, we mean no worse than Dijkstra’s algorithm.
- 4.22 Read this problem, and write down your questions about it. Don’t solve it.

Due Mar 1 NOT REQUIRED

- 4.19 Look for a modified version of Dijkstra that meets the criteria.
- 4.22 (a) This is a mathematical question, using the formulas in the problem. A negative cycle is a path that starts and ends at the same location, and has a total path cost less than 0.

Due Mar 3 Bellman-Ford

- 4.2 Run Bellman-Ford, tracking the problem data as we did in class.
- 4.11 How can you find cycles using algorithms in this chapter?
- 4.15 Assume you have a solution to problem 4.5. How can you quickly solve this problem?

Due Mar 15 Heaps

- 4.8 Prove = proof, disprove = counter-example
- 4.12 Your algorithm should be $O(|V|^2)$ or better.

Due Mar 15 Heaps (Only one of this or the one from chapter 3 is required) 10 points

- Implement the binary heap from Figure 4.16. Measure the performance of decreasekey(), deletemin() and makeheap() as a function of the number of elements in the heap. Create a graph with the runtimes of each of these functions plotted.

Submission

- For the written work, at the beginning of class, on the due dates, submit paper copies of your solutions.
- For the experimental determination, at the beginning of class on the due date, submit paper copies of the graphs.