CISC 610 Assignment 3

Fall 2016 Session
Due Date: November 7, 2016 by 11:55 P.M. EST

1 Description

1.1 Finding Median

I would like you to use heaps to find a median number. We will start the algorithm with an initial set of numbers following which there can be a running process. For example, if we start with the following array:

$$A = [4, 3, 2, 90, 16, 78]$$

you will be required to return the median of this array. What is the runtime of this process?

After this initial median, the algorithm should accept numbers, one or more at a time, and return a median without redoing the heap building process or in linear time. For example, we could add numbers, 22 and 24, and your algorithm it should return the median in a better than linear runtime. We can set a bound to the runtime of the algorithm so that the runtime does not exceed O(lg k) where k is the number of elements that are passed to the algorithm at each step. If we hand it 2 numbers the time taken to find the median should be O(lg 2), and so on.

Please note that the initial array could be different from the shown example.

1.2 Improving selection sort

Selection sort algorithm involves iterating through an array and finding the smallest number and storing at index 0, followed by iterating over the array again and finding the second smallest number and storing it at index 2, and so on. As a result of this iterative process its run time is of the order of $O(n^2)$. Present a way to improve the runtime of selection sort algorithm.

1.3 Grading Criteria

This assignment carries 10 points of your assignment grade. You will be graded on logic, comments, whether the code runs or not and the output. You are expected to do this work on your own. You may use the code provided in the class and modify it to apply on this assigment.

1.4 Submission

You have the option to use 2 extra days to finish this assignment unless you have already used two extensions.

Save all your source code files (only .py, .java, .c or .cpp) and upload them to Moodle. Please add a README section in your file as comments to let me know how to successfully run your code.

Note: Upload only source code files not the entire project. Submitting wrong files or in the wrong format will not be accepted nor will any re-submission be allowed for any such mistake.