CS 3358 Section 001 – Assignment 4

Due Date: November 8, 2021

In this assignment, you are asked to implement two fundamental sorting algorithms – **quick sort** and **heapsort**. The places you need to fill out in the code are marked by `// TODO`. You need to read the comments in the code carefully.

- (40 points) Implement the quick sort algorithm in `quicksort.cpp` to sort the input array in **ascending** order, where you are expected to implement three functions, such as `Swap()`, `Partition()`, and `Quicksort()`. The function `Partition()` must be implemented based on the **Lomuto's** scheme. In the implementation, you can just use the last element as the pivot element. Note that you will not receive any credit if your implementation is based on the Hoare's scheme.

  * You are not expected to change the `main()` function and declare and implement other additional functions. If you do not want to use `Swap()` in your implementation, you can just delete it or comment it out.

- (60 points) Implement the heapsort algorithm in `heapsort.cpp` to sort the input array in **descending** order, where you are expected to implement five functions, such as `Swap()`, `PercolateDown()`, `DeleteMin()`, `BuildHeap()`, and `Heapsort()`.

  * You are not expected to change the `main()` function and declare and implement other additional functions. If you do not want to use `Swap()` in your implementation, you can just delete it or comment it out. In addition, you can change the parameters (add or delete some parameters) of each function if necessary.

Submission:

You should submit your work via Canvas. You should pack `quicksort.cpp` and `heapsort.cpp` into a single `.zip` file to upload to Canvas. You can also include an optional README file in the `.zip` file. The `.zip` file should be named as `a4_yourNetID.zip`, such as `a4_d_n155.zip`.