Project 4: Sorting

Project Deadline: 11:59 PM, Nov. 8, 2017

No Late Submission

1. Build a min heap and a max heap for given array

Given an array, build a min heap and a max heap within the array.

For example,

Input: arr = [12, 11, 13, 5, 6, 7, 20, 18, 31, 2]

Output: Max heap: 31 18 20 12 6 7 13 11 5 2
Min heap: 2 5 7 11 6 20 13 31 12 18

2. Heap Sort

Given an array, sort the elements within the array using heap sort.

For example,

Input: arr = [12, 11, 13, 5, 6, 7, 20, 18, 31, 2]

Output: Max heap: 31 20 18 13 12 11 7 6 5 2
Min heap: 2 5 6 7 11 12 13 18 20 31

3. Find the kth largest element

Given an unsorted array, find the kth largest element in the array using **Three** approaches with running time $O(nlogn), O(nlogk)$ and $O(n + klogn)$, respectively. Please mention the running time after the pseudo code for each algorithm you designed in the report.

For example,

Input: arr = [12, 11, 13, 5, 6, 7, 20, 18, 31, 2]
K = 4

Output: The 4th largest element in the array is 13.

Note: You may discuss the general concepts in this project with other students, but you must finish your program on your own. NO SHARING OF CODE OR REPORT IS ALLOWED. Violation of this policy can result in grade penalty.

What to submit

Please submit a .zip file containing (1) a working program written in C++, (2) a report with the pseudo code of you program. Before submit your project, please make sure to test your program (at least) on the given example.