Indian Institute of Technology Mandi
February-June 2017 Semester

CS202: Data Structure and Algorithms

Programming Assignment 2

Last date of submission of code: 6th March, 2017

1. Implement the following sorting algorithms using C++ programing language and sort the input sequence in **ascending order**.
   a) Insertion sort
   b) Selection sort
   c) Rank sort
   d) Buble sort
   e) Merge sort
   f) Quick sort
2. Datasets with different input sizes are given. Implement the above mentioned sorting algorithms by reading the inputs from the file. Observe the running time for the above mentioned sorting algorithms for each of the data with different input sizes. Note down the running time for each dataset and compare the running time for each of the algorithms by plotting the recorded running times for each dataset for each algorithms.
3. Datasets of different sizes in **ascending order** is given. Use the data files containing data points in ascending order as input to the programs of each of the above mentioned sorting algorithms for ascending order and observe the running time. Compare the running time for each of the algorithms by plotting the recorded running times for each dataset for each algorithms.
4. Datasets of different sizes in **descending order** is given. Use the data files containing data points in descending order as input to the programs of each of the above mentioned sorting algorithms for ascending order and observe the running time. Compare the running time for each of the algorithms by plotting the recorded running times for each dataset for each algorithms.

Note:

1. The main program should have both the options of **reading the numbers to be sorted from user** as well as **reading them from file**.
2. Each array is implemented using the sequential linear list data structure (seqLinearList.hpp).
3. Everyone should use the seqLinearList.hpp and sorting.hpp classes provided. Do not change the class names. It is expected to strictly use the interfaces provided in the classes to implement the tasks.
4. Use the timer.hpp to record the running time of each sorting algorithm.

Submit the report in PDF form on the observations and resoning behind the obtained results on or before 06th March 2017.
The report should include the pseudo-code of each algorithms (both original and modified) and their running time analysis (including the acutal and asymptotic best base and worst case running time) as discussed in the class. The report should also contain the plots/graphs showing the asymptotic running time for the different algorithms as a functon of input size as well as the recorded running time as a uncton of input size. The report ahould also contain the comparision of different algorithms and the reasonings.

Note: The report should be neat and clear. Use the uniform fonts for the different sections and main body of the report. **Prepare the report using word document or equivalent. (No hand written report is accepted). Convert the report to PDF format before submitting. Reports not in PDF form will not be accepted/evaluated.**