INDIAN STATISTICAL INSTITUTE

M. Tech (CS) - I Year, 2018-2019 (Semester - II)

Design and Analysis of Algorithms

Assignment-1: Programming Assignment

Submission: The assignment is being uploaded on 28.02.2019 and has to be submitted by 10.03.2019. The submission procedure will be informed shortly.

Note: Implementations need to be in C/C++. For plotting purposes, you can use gnuplot.

(Q1) Write recursive and iterative implementations for sorting an array with n numbers using the following algorithms:

- mergesort
- heapsort
- quicksort

(Q2) Vary n from small numbers to as large as possible numbers and compare the machine run times of

- recursive mergesort vs iterative mergesort
- recursive heapsort vs iterative heapsort
- recursive quicksort vs iterative quicksort

and generate a plot where n is in the x-axis and time is in the y-axis. For each n, generate the inputs of the n-sized array in a random fashion and take the result for a particular n averaged over a few runs.

(Q3) Vary n from small numbers to as large as possible numbers and compare the machine run times of

- recursive mergesort vs recursive heapsort vs recursive quicksort
- iterative mergesort vs iterative heapsort vs iterative quicksort

and generate a plot where n is in the x-axis and time is in the y-axis. For each n, generate the inputs of the n-sized array in a random fashion and take the result for a particular n averaged over a few runs.