

CS2023 - Data Structures and Algorithms

In-class Lab Exercise

Week 5

You are required to answer the below questions and submit a PDF to the submission link provided under this week lab section before end of the session time (no extensions will be provided). You can either write / type your answers, but either way your answers should be readable.

Create GitHub repository, add your codes there and add respective link to the submission file.

Question 1

- Implement Recursive Quick Sort algorithm.
- Watch the following video to get to know how does quick sort work.
 - https://www.youtube.com/watch?v=Vtckgz38QHs&ab_channel=BroCode (Watch until 7.45 minutes)
- Try to implement non-recursive quick sort algorithm.
- Compare time taken for execution and plot the graph.

Question 2: Find running median.

- The median of a set of integers is the midpoint value of the data set for which an equal number of integers are less than and greater than the value. To find the median, you must first sort your set of integers in non-decreasing order, then:
 - If your set contains an odd number of elements, the median is the middle element of the sorted sample. In the sorted set {1, 2, 3}, 2 is the median.
 - If your set contains an even number of elements, the median is the average of the two middle elements of the sorted sample. In the sorted set {1, 2, 3, 4}, $(2+3)/2=2.5$ is the median.
- Given an input stream of n integers, perform the following task for each i^{th} integer:
 - Add the i^{th} integer to a running list of integers.
 - Find the median of the updated list (i.e., for the first element through the i^{th} element).
 - Print the updated median on a new line. The printed value must be a double-precision number scaled to 1 decimal place (i.e., 12.3 format).
- Example:
 - *Input:* a = [7, 3, 5, 2]
 - *Output:*

Sorted	Median
[7]	7.0
[3, 7]	5.0
[3, 5, 7]	5.0
[2, 3, 5, 7]	4.0