Data Structures and Algorithms IT2070

Year two Semester two 2023
Online Examination 2
Sri Lanka Institute of Information Technology

Time: 45 minutes   **Marks: 20 Marks**
Paper 2A

Write a python program for the following scenario.

There is a necessity to compute the statistics of the marks obtained for a mathematics exam by a set of students. Initially, the **median** and the **range** have been suggested to be calculated.

Assume there are 9 students in a group and obtain their marks as keyboard inputs. For the sorting of the marks obtained by the students, either the **Selection Sort *OR* Insertion Sort** algorithms can be used.

Calculate the **median** and the **range** of the marks for a given set of students.
(median : middle value;   range : largest value – smallest value)

Save the program as *2A.py.*

```
INSERTION-SORT(A)
for j ← 2 to n
    do key ← A[j]
        ▷ Insert A[j] into the sorted sequence A[1 .. j − 1].
        i ← j − 1
        while i > 0 and A[i] > key
            do A[i + 1] ← A[i]
                i ← i − 1
        A[i + 1] ← key
```

```
SELECTION-SORT(A)
1.  n = A.length
2.  for j = 1 to n − 1
3.        smallest = j
4.        for i = j + 1 to n
5.              if A[i] < A[smallest]
6.                    smallest = i
7.        exchange A[ j ] with A[smallest]
```

Upload the program to the courseweb link "DSA_2A_<center>_<group>"

Grading Sheet:

Execution:

1) Program is compiling. **2 marks**
2) Program is running with correct results **2 marks**

Code:

3) Get the marks of students as a key board input and create an array   **3 marks**
4) Correctly use either selection or insertion sort algorithms **5 marks**
5) Correctly calculate the median and range **4 marks**
6) Display the results **4 marks**