

CST 370

Programming Assignment (Sorting Algorithms)

In this assignment you will implement the sorting algorithms covered in class.

1. In the first part of the assignment you will implement the simple selection sort algorithm. You can use an array to store the elements.

As you are aware the selection sort algorithm runs in $O(n^2)$ time. Implement your algorithm in a separate function called SelectionSort().

Sample Test Cases

Input: 4, 6, 8, 15, 20, 22, 10, 3, 9, 2

Output: 2, 3, 4, 6, 8, 9, 10, 15, 20, 22

2. In the second part of the assignment you will modify the selection sort algorithm to sort the first k smallest elements of the array (the value of k will be entered by the user). Your algorithm must run in $O(nk)$ time.

Sample Test Case 1

Input: 4, 6, 8, 15, 20, 22, 10, 3, 9, 2

$k = 4$

Output: 2, 3, 4, 6

Sample Test Case 2

Input: 4, 6, 8, 15, 20, 22, 10, 3, 9, 2

$k = 6$

Output: 2, 3, 4, 6, 8, 9

3. Use the implementation in part 2 to determine the median value of the input array. You can assume that the values in the array are distinct. If the array is of even size, then the median is the average of the two middle values in the array.

[Hint: Median is the middle value in the array i.e., it is that value in the array for which exactly half the values are greater than and half the values are less than it]

Grading

I will download your code on my computer and execute it. If your code does not compile, you may lose more than 50% of your points (based on my discretion). If your code compiles, but still produces incorrect results you may still lose more than 30% of your points (based on my discretion).

Your code should have the following characteristics for you to get full points on the assignment

1. Compile without error.
2. Produce correct output.
3. Good programming structure.

4. Comments. (Title, Abstract, Author, ID, and Date are mandatory.)
5. Meaningful and related variable names.

Extra credit

You will receive extra credit equal to 10% of your score if you submit a video (a link) explaining how you implement it (as well as some running samples of your program). Note that there is a separate place for you to submit the video link and that is where extra credit will be recorded. It should be submitted before the submission is closed (i.e., two days after the submission due date), but not subject to the late submission penalty. I will initiate a new topic on Discussion Forum to publish the video links to the class.

What to turn in?

Submit your source programs **and** **'HomeworkSubmission_yourlastname.pdf'** as a single zipped file **'Program4_yourfullname'** on iLearn. For the program, please include only the source files needed to compile and run successfully.

If you do not submit the above mentioned documents in the format specified your assignment will not be graded.

Homework Submission_yourlastname.pdf

For each homework problem, you are expected to submit screenshots of the results obtained from running your code. You should also explain what each screenshot means and why the result on the screenshot is correct.

This link explains how to take screenshots in Mac and Windows.
<http://www.take-a-screenshot.org/>