

# CSCI 310, Data Structures, Summer 2009

## Assignment 11 (25 points)

In this assignment you will compare the running times of several different sorting algorithms. You will do this by implementing the algorithms and timing how long they take to run with a variety of different inputs that I will provide. Since the performance of the different sorting routines varies significantly, you do not need to run the slower algorithms on the larger input files. You should run each sorting algorithm on increasingly larger input files until the running time of the algorithm exceeds 10 minutes. A description of the input files is included in Figure 1.

To summarize your findings, I want you to write a short paper containing a minimum of one paragraph for each sorting routine you implemented. Each paragraph should address your implementation and explain why it has the running time performance you observed. In addition to the individual paragraphs, you are to include a chart (see Figure 2 for an example) that shows the running time of the different algorithms as the size of the input increases.

To get you started I have provided a program that tests two versions the Bubble Sort algorithm (the first one is extremely inefficient and the second one is somewhat better). The chart for these two algorithms is shown in Figure 2. You should add to this chart to include the sorting algorithms you implement. This is the chart that is to appear in your paper.

The points for this assignment are as follows:

1. (5 points) Implementation of Bubble Sort with early termination (terminates as soon as the list is sorted).
2. (5 points) Implementation of Insertion Sort.
3. (5 points) Implementation of Selection Sort.
4. (5 points) Implementation of Bidirectional Selection Sort.
5. (5 points) Paper summarizing your results.

File Name	Input Size	Description
listA1.txt	10	Random permutation
listB1.txt	100	Random permutation
listC1.txt	1,000	Random permutation
listD1.txt	10,000	Random permutation
listE1.txt	20,000	Random permutation
listF1.txt	40,000	Random permutation
listG1.txt	60,000	Random permutation
listH1.txt	80,000	Random permutation
listI1.txt	100,000	Random permutation
listJ1.txt	500,000	Random permutation
listK1.txt	1,000,000	Random permutation

Figure 1: A description of the input files.

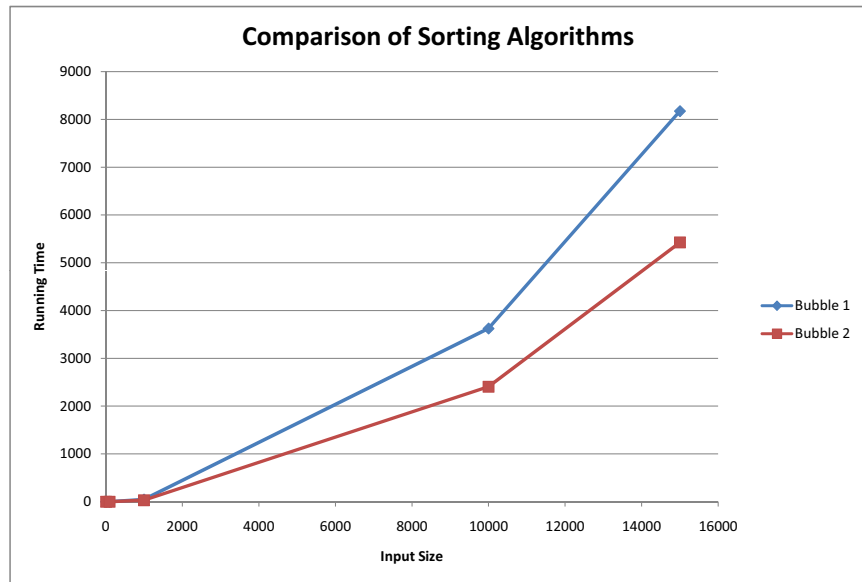


Figure 2: A sample chart comparing the running time of two versions of the Bubble Sort algorithm.