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CPTS 223
PA2

A.

The purpose of this assignment is to benchmark four different max sub sum algorithms on different data sets in order to learn about the differences between time complexity of different algorithms.

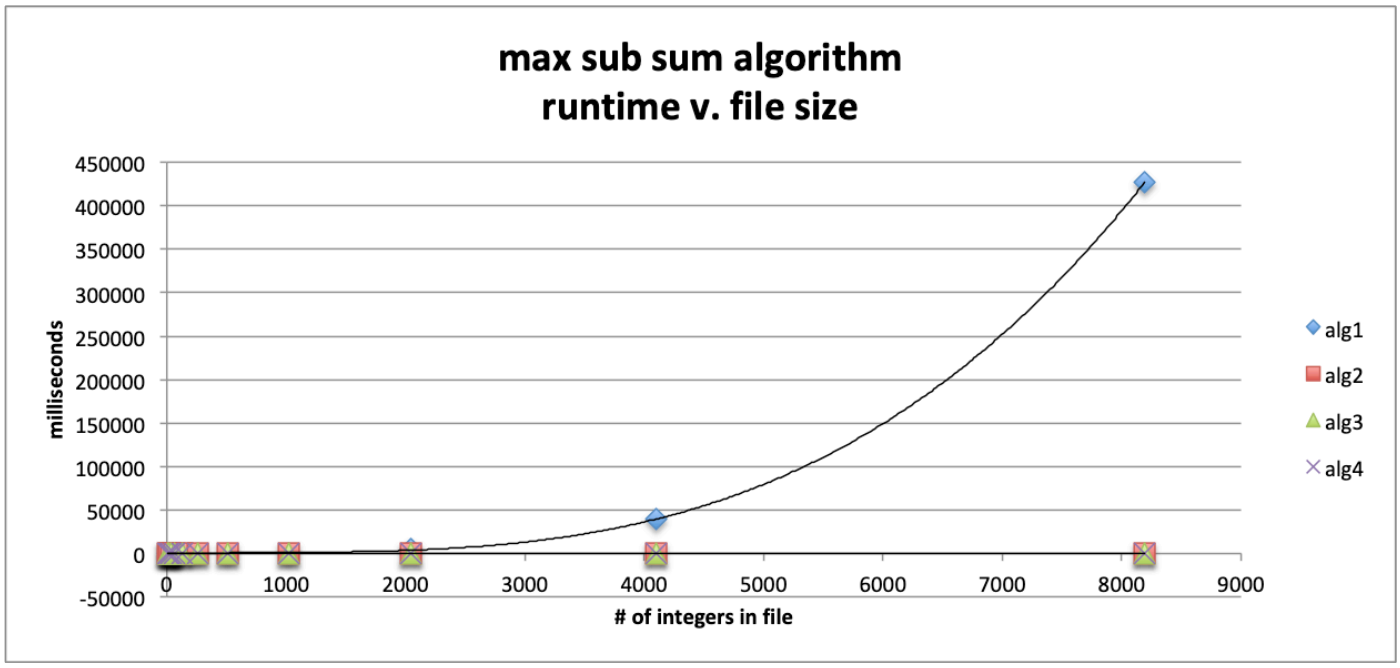
B.

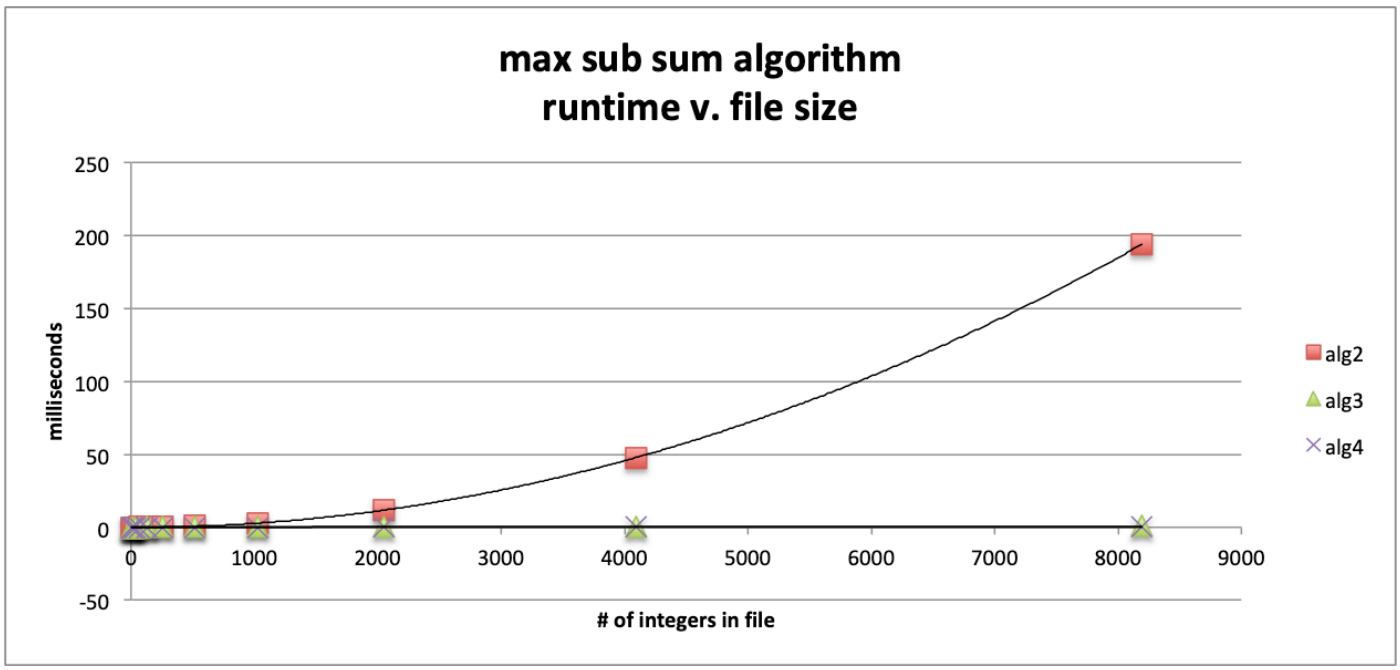
My experiment was performed on the EECS Linux servers, however the code was written and debugged using a Macbook Pro 2015 laptop running MacOS. The test code was ran a single time, but the code used 10 different input files for each file size, which acted as the multiple trials of the experiment. The 10 different run-times from each file size were average to create each point in my plot.

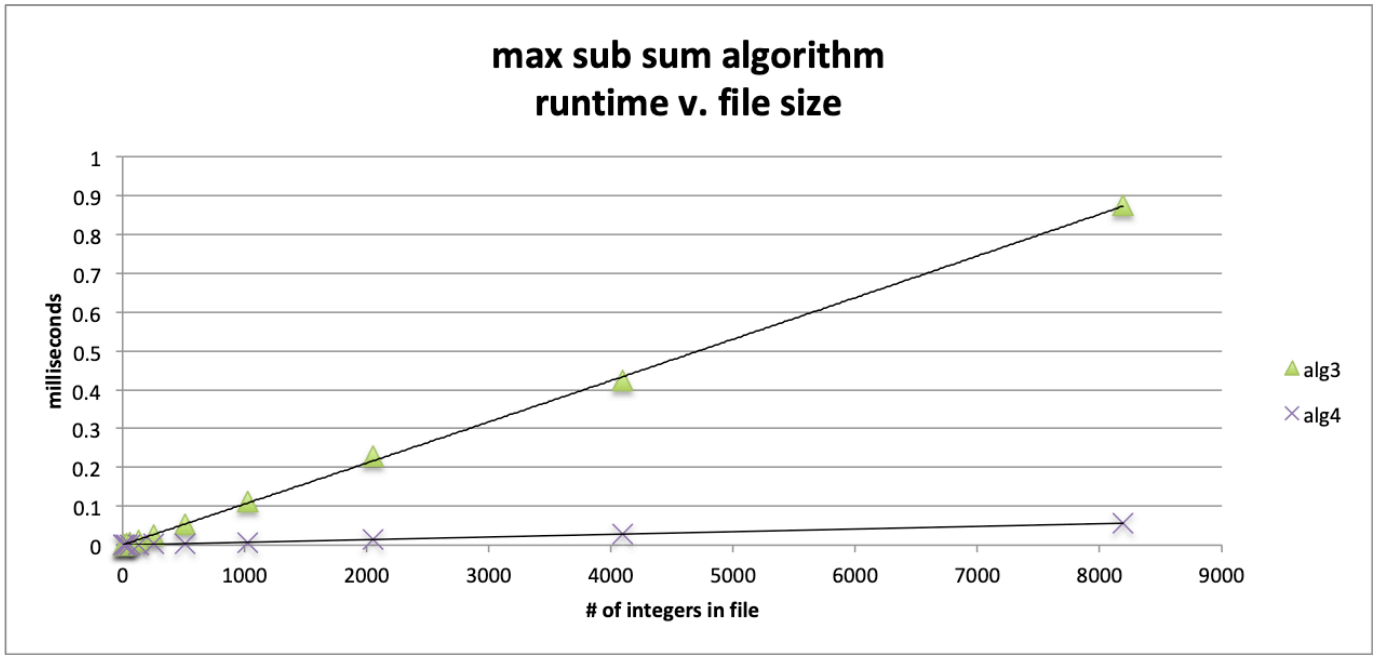
C.

My observations of the plots of my data are approximately what I expected to see. The curves representing the run-time of each algorithm versus the file size each have the correct shape that the time-complexity of the algorithm would suggest. Also, when looking at the average run-time of the algorithms from one file size to another, the difference in time follows the trend that is suggested by the complexity. For example, the first algorithm has a time-complexity of n^3, and for each multiple of 2 that the file size increases by, the run-time increases by approximately 8 times (2^3 = 8). Also, the other algorithms follow the same rule as the first one. Each algorithm's average run-time increased by a factor that was heavily correlated with the run-time complexity of the algorithm.

As you can see in the plots, the difference in magnitude between the runtime of the first algorithm and the others is so dramatic, that the other three plots are barely visible at the bottom. To make it clearer, I included two other charts that only included the three fastest algorithms and the two fastest algorithms respectively.


max sub sum algorithm
runtime v. file size
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
-50000
milliseconds
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
# of integers in file
alg1
alg2
alg3
alg4


max sub sum algorithm
runtime v. file size
250
200
150
100
50
0
-50
milliseconds
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
# of integers in file
alg2
alg3
alg4


max sub sum algorithm
runtime v. file size
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
milliseconds
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
# of integers in file
alg3
alg4