Assignment 6 Write Up

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When sorting smaller sample sizes of below one thousand, the time difference between the nlog(n) algorithms and the n^2 algortihms is negligible. It is when you start to evaluate datasets in the hundreds of thousands or even millions of elements, that the difference in time becomes serious.

Upon sorting one million floating point values, the resulting runtimes were as follows:

Quick Sort: .1906 seconds
Merge Sort: .2775 seconds
Bubble Sort: 48.37 hours
Insert Sort: 20.49 minutes
Selection Sort: 19.80 minutes

The nlog(n) algortihms take less then a second each, even with a million values to sort. Bubble sort is the unequivocally slowest sorting algortihm of the five ran, though it's simplicity makes it useful for smaller datasets. Insert sort and selection sort both fall in the middle of the pack. Neither are nearly as fast as merge sort or quicksort, but they also don't require a recursive definition.

While merge sort and quick sort are far more efficient than the other sorting algorithms, they both have their own strengths and shortcomings. Quicksort generally requires more processing power but sorts slightly faster than merge sort. Merge sort, on the other hand, requires more memory allocation.

After running quicksort for a sample size of ten million floats, the CPU of my computer spriked from an average of 9% to an average of about 28%. It took 2.07 seconds to sort the dataset.

The same sample size was sorted via merge sort, with the CPU spiking to an average of about 22%. With the decreased processing power required, however, came an increased use of memory, from 9.1GB to 9.6GB.

All in all, bubble sort, selection sort and insert sort all take exponentially more time than merge sort and quicksort. However, with a faster big-Oh time comes increased complexity. Bubble sort is the most simple and easy to memorize, and could come in handy in a pinch where you dont have access to the more complex algorithms, but any time you are dealing with large datasets, using mergesort or quicksort is crucial.