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Assignment 6 Write Up

In assignment six we used five sorting algorithms to sort large amounts of data and timed each one. Most of the results were surprising. The time difference that was most surprising was bubble sort. It took bubble sort 38 seconds to sort 100,000 numbers. Because of its design it has a big $O(n^2)$ which means it will have to iterate through all 100,000 values 100,000 times. Selection sort and insertion sort were about what was expected. Insertion sort took 8.8 seconds and selection sort took 12 seconds. While they both still have a worst case scenario of $O(n^2)$ their design allows for a faster runtime. The speed of mergesort and quicksort was even faster than imagined. Because of the recursion giving them $n \log n$ runtimes they were both able to sort the data in under one second. Mergesort finished in 36 milliseconds and quicksort finished in 17 milliseconds.

Because C++ is a compiled language it is able to process information much faster than many other languages and it takes up less memory because it has less built in objects. Some tests show that C++ is up to 400 times faster than a language like python. For a data crunching project C++ would be the language of choice because of the speed. The downside is that for big projects all memory must be manually managed which leaves lots of opportunities for memory leaks.

If this test had a smaller sample size the empirical style of the test would have given misleading results. If we had tested closer to 1,000 numbers all of the algorithms would have shown similar results. Empirical tests can be misleading and are scenario dependent. The mathematical analysis gives more accurate results.