CS5050 Assignment Five

Dustin E. Homan

March 17, 2016

Testing and Mathematical Analysis

Mathematical Analysis of space constraint

To begin our analysis assume that the average computer has 4GB of memory and an integer requires 4B of storage. With those assumptions our space will be limited by $\frac{4x10^9}{4} = 1x10^9$ integers that we can store. Knowing that our array will be two dimensional with side n and m equal to the length of the sequences that we are comparing we can divide $1x10^9$ by 2 getting an estimated maximum sequence length of $5x10^8$.

Testing of Maximum Sequence Size

Through testing the maximum value to allocate an array of integers, I caught a bad allocation exception at size of $1x10^6$. Other factors affecting the results include current memory usage by other processes, other overhead for the current process, and how the OS handles memory allocation.

Conclusions

In conclusion I found that the optimization for conserving memory to be relatively easy to implement with huge benefits in memory saved. The implementation of Hirshberg's algorithm was more complex but not so that it overshadowed the enormous gain in memory usage. My final point is based on time. We made a trade-off of gaining memory for taking more time. I attempted to offset this with multi-threading, which in turn brought me back to square one. Which was using to much memory. Therefore the trade-off is a necessity to be able to compute large sequences of characters.