Project 1: CS325 – Closest to Zero

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Run-Time Analysis:

Algorithm 1:

For every element in the array

    For every subset iteration in the array

        Sum subset

        Compare sum of subset to previous sum of subset

        Save lowest sum value, start position of sub array, and size of sub array

    End For

End For

Printing Results for Algorithm 1:

For start position to size of sub array

    print sub array [i]

End For

Print sum of subset array

Algorithm 2:

For every element in the array

    For the sum of subset array from position to last element (position = 0 at start, then advances)

        Find sum of that subset array

    End For

    For subset array size

        newSum = sum – last element

        compare sum to newSum, keep lowest value

        Save lowest sum value, start position of sub array, and size of sub array

    End For

    reset sum to zero and update position (position++)

End For

Printing Results for Algorithm 2:

For start position to size of sub array

print sub array [i]

End For

Print sum of subset array

Analysis of the Asymptotic running-times of the algorithms:

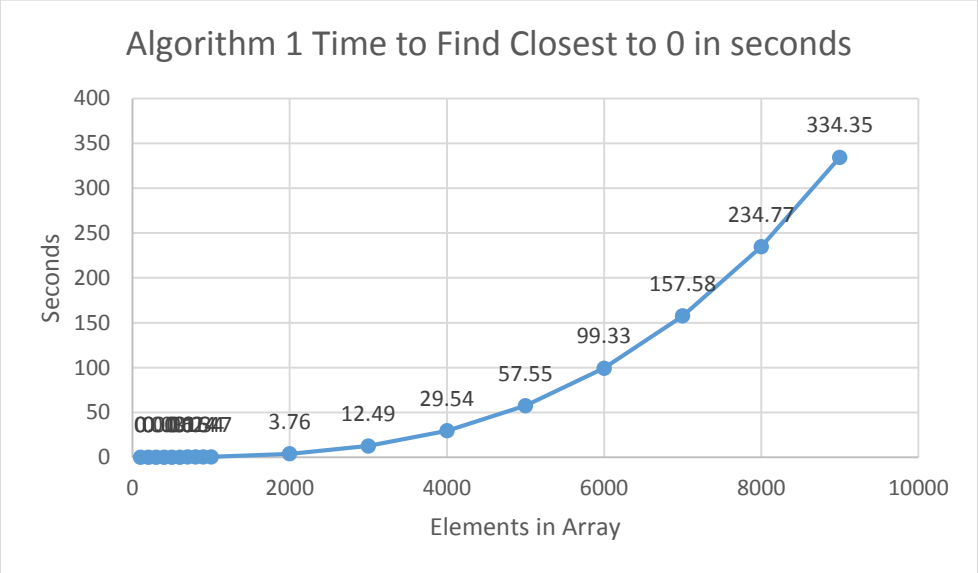
O(n^2) because they are both exponentially growing by n^2.

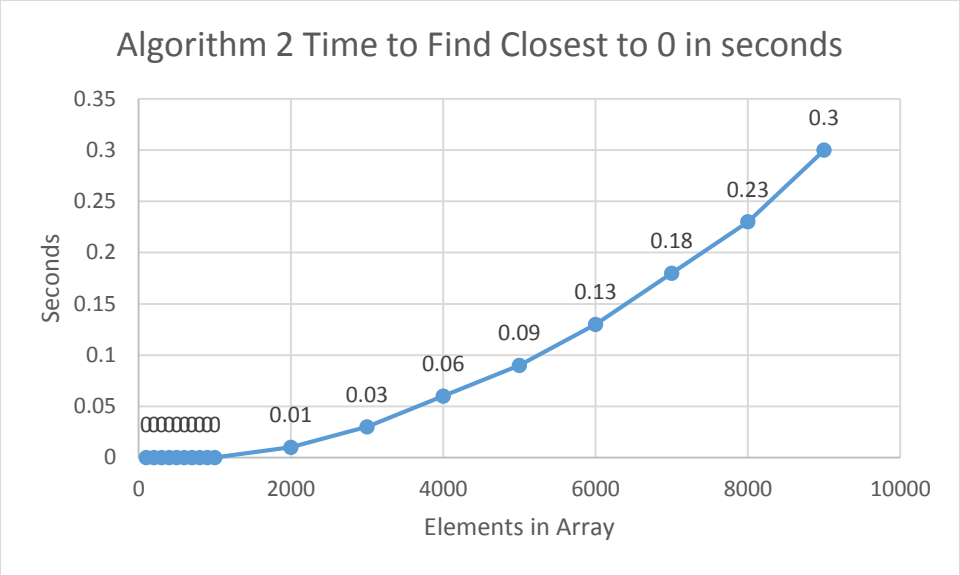
Testing:

After running algorithm 1, results are stored in input_results_Alg1.txt.

After running algorithm 2, results are stored in input_results_Alg2.txt.

Experimental Analysis:





Extrapolation and interpretation:

1) For algorithm 1, to solve within one hour, the biggest instance size would be around 10,700 elements.
2) The equation from our graph for algorithm 1 is y = 4E-10x^3.0117, which is an exponential slope, therefore there were no discrepancies between the experimental and asymptotic running times.

1) For algorithm 2, to solve within one hour, the biggest instance size would be around 610,000 elements.
2) The equation from our graph for algorithm 2 is y = 6E-10x^2.2064, which is an exponential slope, therefore there were no discrepancies between the experimental and asymptotic running times.

Resources Used:

http://stackoverflow.com/questions/5248915/execution-time-of-c-program

http://www.cplusplus.com/reference/cstdlib/abs/

http://www.phanderson.com/C/arraysum.html

http://www-ee.eng.hawaii.edu/~dyun/ee160/Book/chap7/section2.1.2.html

http://www.cprogramming.com/tutorial/c/lesson4.html

http://stackoverflow.com/questions/4108313/how-do-i-find-the-length-of-an-array

http://stackoverflow.com/questions/24881/how-do-i-fix-for-loop-initial-declaration-used-outside-c99-mode-gcc-error

http://www.tutorialspoint.com/cplusplus/cpp_arrays.htm

http://en.wikipedia.org/wiki/Triangular_number

http://www.tutorialspoint.com/c_standard_library/c_function_rand.htm

http://www.mathworks.com/help/matlab/math/floating-point-numbers-within-specific-range.html

http://stackoverflow.com/questions/628761/character-to-integer-in-c

http://talk.maemo.org/showthread.php?t=7501

https://www.cs.bu.edu/teaching/c/file-io/intro/

http://stackoverflow.com/questions/13273746/copying-integers-into-an-array-using-fscanf-in-c

http://www.postgresql.org/docs/9.2/static/arrays.html

http://stackoverflow.com/questions/5750501/escaping-square-bracket-in-sscanf

http://stackoverflow.com/questions/20378430/reading-numbers-from-a-text-file-into-an-array-in-c

http://www.codingunit.com/c-tutorial-file-io-using-text-files

https://nf.nci.org.au/facilities/software/Matlab/techdoc/ref/fscanf.html

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http://answers.microsoft.com/en-us/office/forum/office_2003-excel/calculate-intercept-in-a-log-log-plot/130eb6ce-e29c-4317-90c0-a7f2d16f3b91

http://mathonweb.com/help_ebook/html/expoapps.htm

http://stackoverflow.com/questions/12675919/dynamic-array-in-c-is-my-understanding-of-malloc-realloc-correct

http://stackoverflow.com/questions/10675399/why-cant-the-size-of-a-static-array-be-made-variable

http://stackoverflow.com/questions/5901181/c-string-append

http://www.cprogramming.com/tutorial/c/lesson14.html

http://stackoverflow.com/questions/1712592/variably-modified-array-at-file-scope

http://stackoverflow.com/questions/4237896/im-very-confused-about-malloc-and-calloc-on-c