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JULY 8TH 2018

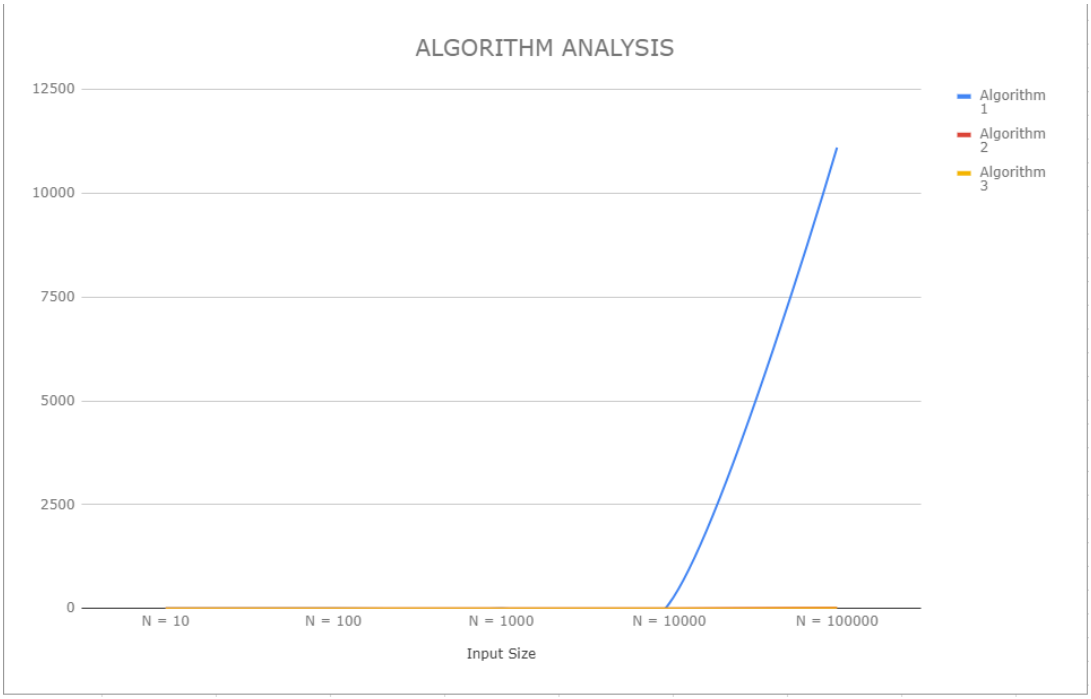
ALGORITHM ANALYSIS

HOMEWORK 2

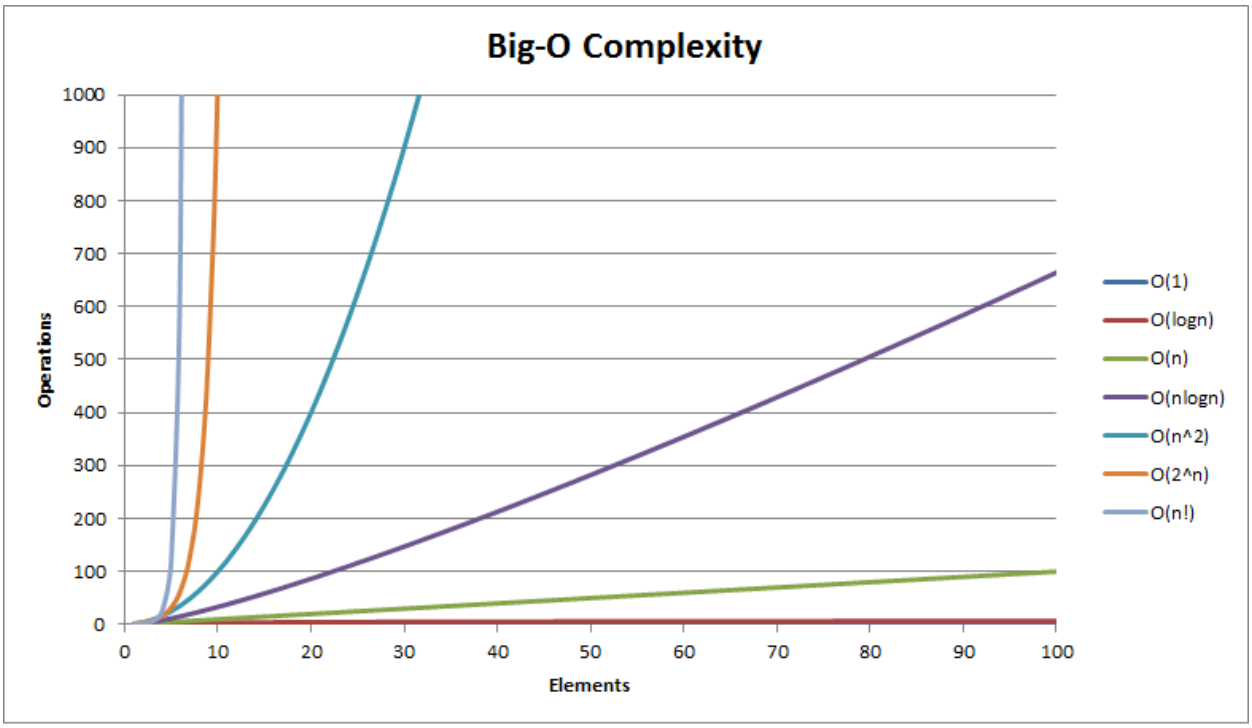
Upon studying the algorithms given in homework assignment and experimenting with different array sizes to sort the input array, I have come to the conclusion that the time complexity of Algorithm 1 is $O(n^2)$, Algorithm 2 is O(nlogn), Algorithm 3 is O(nlogn). Here below is the table of running time of each algorithm.

	Algorithm Analysis (milliseconds)		
Input Size	Algorithm 1	Algorithm 2	Algorithm 3
N = 10	0.001	0.001	0.005
N = 100	0.02	0.009	0.015
N = 1000	1.337	0.097	0.107
N = 10000	120.368	1.302	1.007
N = 100000	11105.7	15.636	7.888

Based on this table the time complexity graph is below:



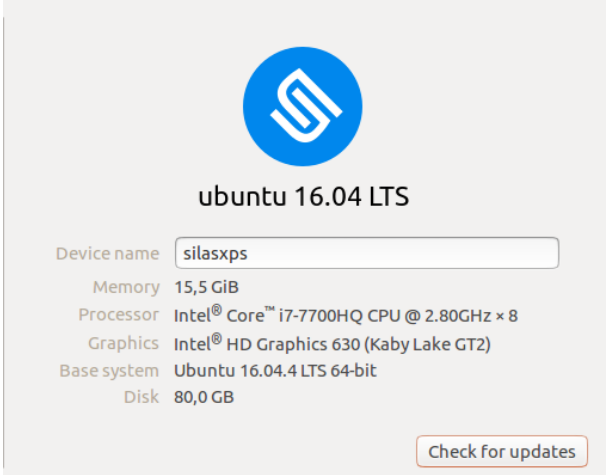
The theoretical time complexity of sorting algorithms can be found below.



Algorithm 1 simply iterates the array and uses the principle of Selection Sort, Finds the max and/or min of the unsorted part of an array and sorts the the array one by one. Algorithm 2 and 3 uses the principle of Quick Sort algorithm which is divide and conquer. However they differ by the approach on the algorithm.

It is seen clearly that experimental and theoretical results show some difference in my report. The theoretical results are calculated mathematically, my results are found with experiments with the given algorithms which may have flaws. The growth rates which is seen in the theoretical analysis are quite hard to achieve due to our computers which does not only calculate the run time of these algorithms but also run several background applications that occupy the computer's memory. The number of data moves and key comparisons in selection algorthm are less than the quick sort algortihm. This affects the elapsed time while runnign the program. These numbers may change if we use ascending or descending numbers instead of randomly selected numbers in our input array. The first algorithm is not very efficient compared to Algorith 2 and 3. Because it iterates the array 2 times which results in the time complexity of $O(n^2)$.

Properties of My Computer



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