Analysis Document for Assignment 4

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Problem 1

Andrew Keaton Bruce is my programming partner. He submitted the source code of our program.
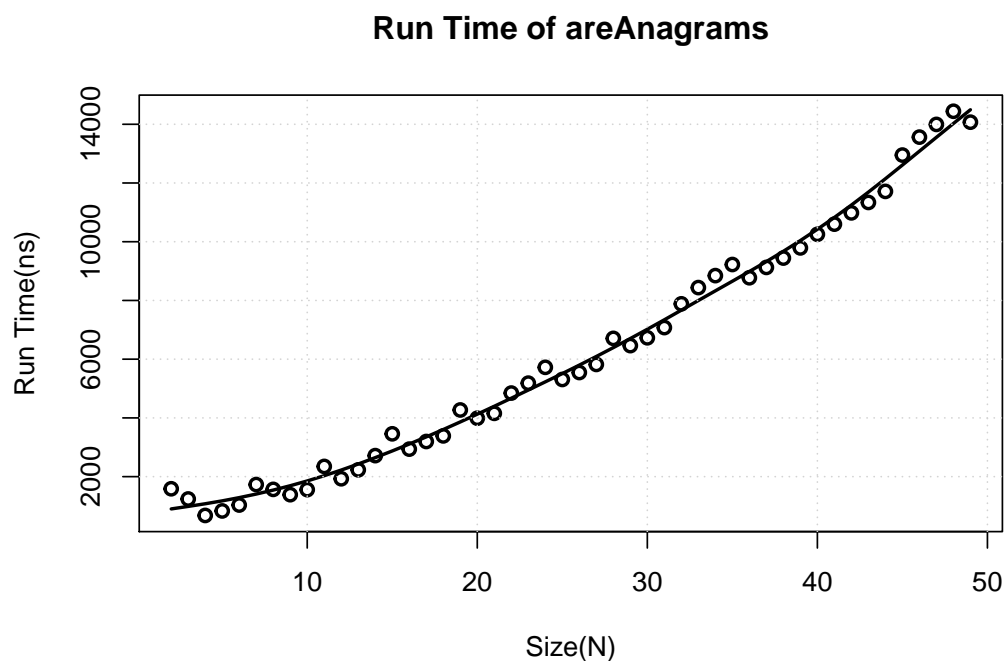
Problem 2

We are exchanging opinions all the time. For example code style, algorithms arrangement and a lot of other things. We switch roles time to time and we make suggestions thus we learn from each other. I have learned some of his code style and he may learn some of my code implementations.

Problem 3

Keaton is a great partner. I am planning to work with him again.

Problem 4

1. The Big-O behavior of areAnagrams should be $O(N^2)$. But the longest word in a major dictionary has the length of 45(according to Wikipedia), and most of words contains 5 to 15 charactors and the complexity for insertion sort to sort small arrays would less than $O(N^2)$.

2. We test random words with length from 2 to 50. Here is the plot.

Run Time of areAnagrams

3. I think the growth rate is about $O(N^2)$ but looks like $O(N)$. The N is to small for complexity testing.

Problem 5

1. The Big-O behavior of getLargestAnagramGroup should be $O(N^2)$. Each time we sort the list we sort every word first, but the length of the words are small so it is considered as constat.

2. We test a list of 109582 English words. Each time we cut a piece of the list of certain length to test. It takes so much time that we did not averaging the test result.
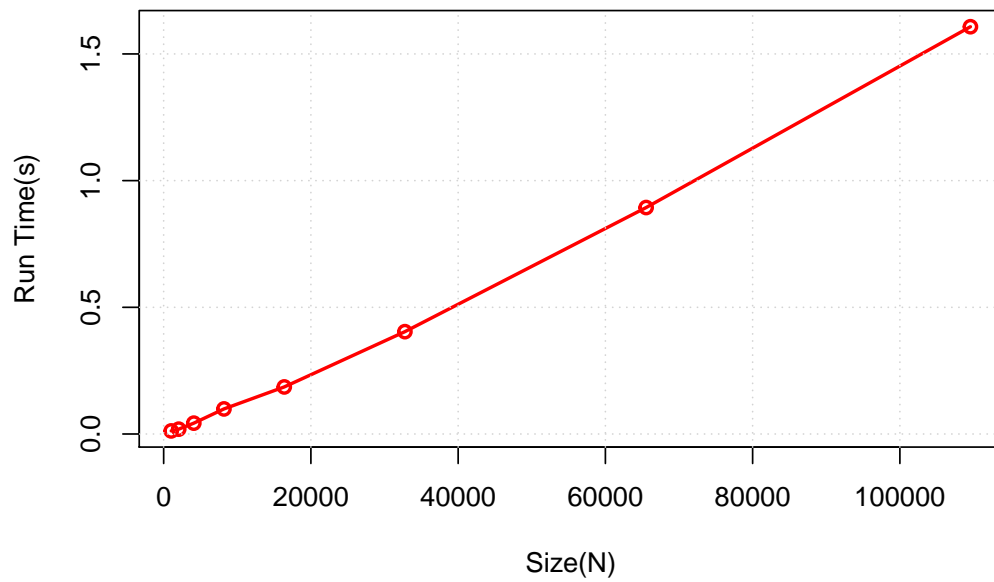
Run Time of getLargestAnagramGroup
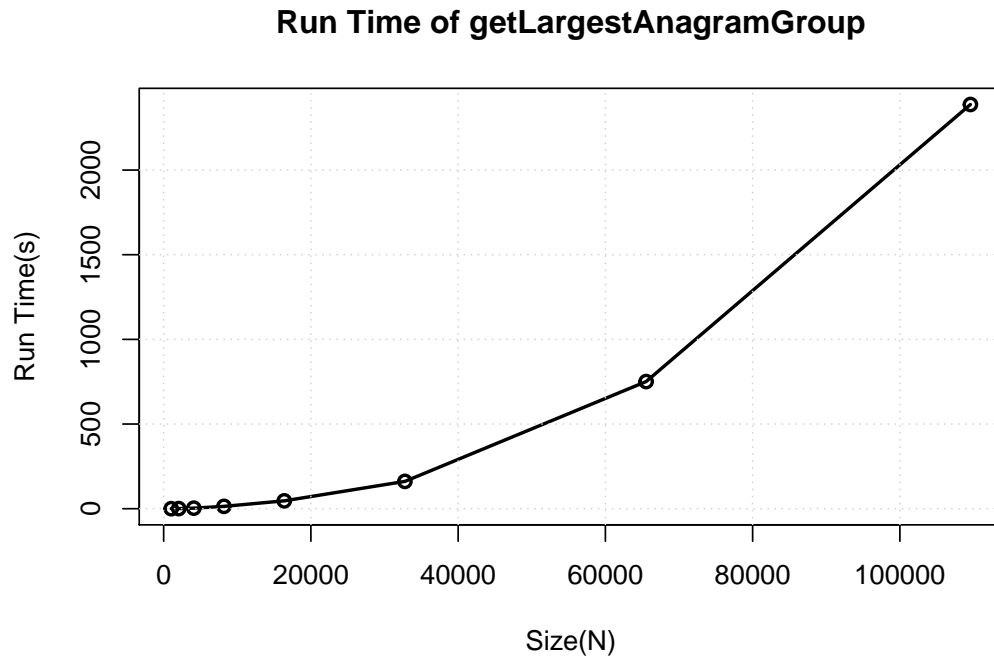
3. The growth rate is about $O(N^2)$, as predicted.

Problem 6

1. The Java's sort method uses mergesort. The Big-O behavior of getLargestAnagramGroup using Java's sort should be $O(NlogN)$.

2. We test a list of 109582 English words. Each time we cut a piece of the list of certain length to test.
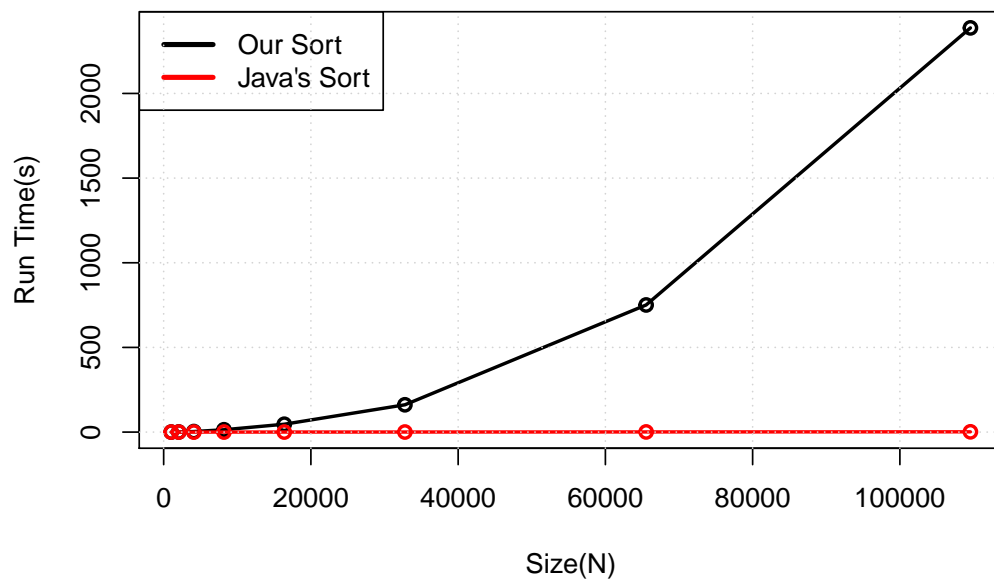
Run Time of getLargestAnagramGroup Using Java's Sort

3. The growth rate is more like $O(N)$. Not as my prediction.

4. The Java's sort is much much faster.

Run Time Comparison

Problem 7

About 12 hours. 10 hours for coding and 2 hours for this document.

Reference

1. Longest word in English - Wikipedia