Results

The result were simple to get once the sentence, word, and syllable numbers were gathered. Getting those numbers though can be much more complex than the assignment pointed out. I found that syllable count in the english language mainly rely on phonemes, which then can very base on region and what not. I stumbled upon a very detailed answer to a post on Stack Exchange which set me going on a dissertation of hyphenation from 1983. After which, I realized I would have to have to spend a rather long time to implement these designs. Breaking a word out of a sentence wasn't to much a hassle, as once the sentence was found, word boundaries were easy to find. There was one issue though, the files from Project Gutenberg were UTF-8 encoded, which means — for C++ — that some characters are not recognized in the normal text processing. Several libraries can be used to do text encoding, but these required higher overhead code wise.

I was able to find a website(MTR) that also could calculate the values, though it was slow, and only allowed so many per IP. These values can be found in Table 1 under the row *MTR-FK*. If you already notice, I didn't immediately see MTR having just the Flesch Index, so I decided to calculate the Flesch-Kincaid Grade Level to have a comparison to MTR.

Code wise, this application was done in *C++* in the standard *C++11* with a *GCC* compiler that supported *C++11*. This application also relied upon *CMake* to create the build system and *Make* compile the generated files.

The code was broken down rather simply, a class `Flesch_Index` was used within the namespace `fi`. Functionaly, this creates a the object `Flesch_Index`, with the *filename* to read in. Once this is initialized, `Read` is called, then `Analyze`. `Read` just reads the file in and breaks the text into *sentences* and *words*. `Analyze` calls the methods that break the *words* into *syllables* using two rules.

A sentence was broken down with this rule:

1. A sentence ends if characters *?*, *!*, and . were found.

A word was broken down with these rules:

1. A word ends if whitespace is found.
2. Strip the word of all non-alphanumeric.
3. Lowercase the entire word.

Note: An em dash, '—', could separate a word, but this application will count the two words as one. This is the issue talked about with encoding above.

A vowel was broken down with these rules:

1. A vowel at the start of a word or
2. A vowel following a consonant in a word
   - One exception to Rule 2: A lone *e* at the end of a word does not count as a syllable.

From the comparisons with MTR, I can definitely say that I got something different. I also didn't realize that I can get the statistical break down of sentences, words, and syllables until I already used all of my queries. If I would have it would have allowed me to see better where we differed. I used Flesch reading-was test and Flesch–Kincaid grade level to calculate the reading levels. The second one so that I could compare to the MTR results.

1. $FI = 206.835 - 1.015(\frac{totalwords}{totalsentences}) - 84.6(\frac{totalsyllables}{totalwords})$
2. $FK = 0.39(\frac{totalwords}{totalsentences}) + 11.8(\frac{totalsyllables}{totalwords}) - 15.59$

These equations were fairly straight forward to implement, and difference between my calculations and MTR are most likely the result of values *syllables*, *words*, and *sentences* differing.

Bar graph 1 and 2 show a fair relationship between the *sentence*, *word*, and *syllable* counts.

Line graph 1 shows the various files resulting Flesch reading-ease test score — the higher the score, the easier to read. Line graph 2 shows the Flesch-Kincaid Grade Level that I calculated compared with the calculation from MTR. The higher the score here is harder to read.

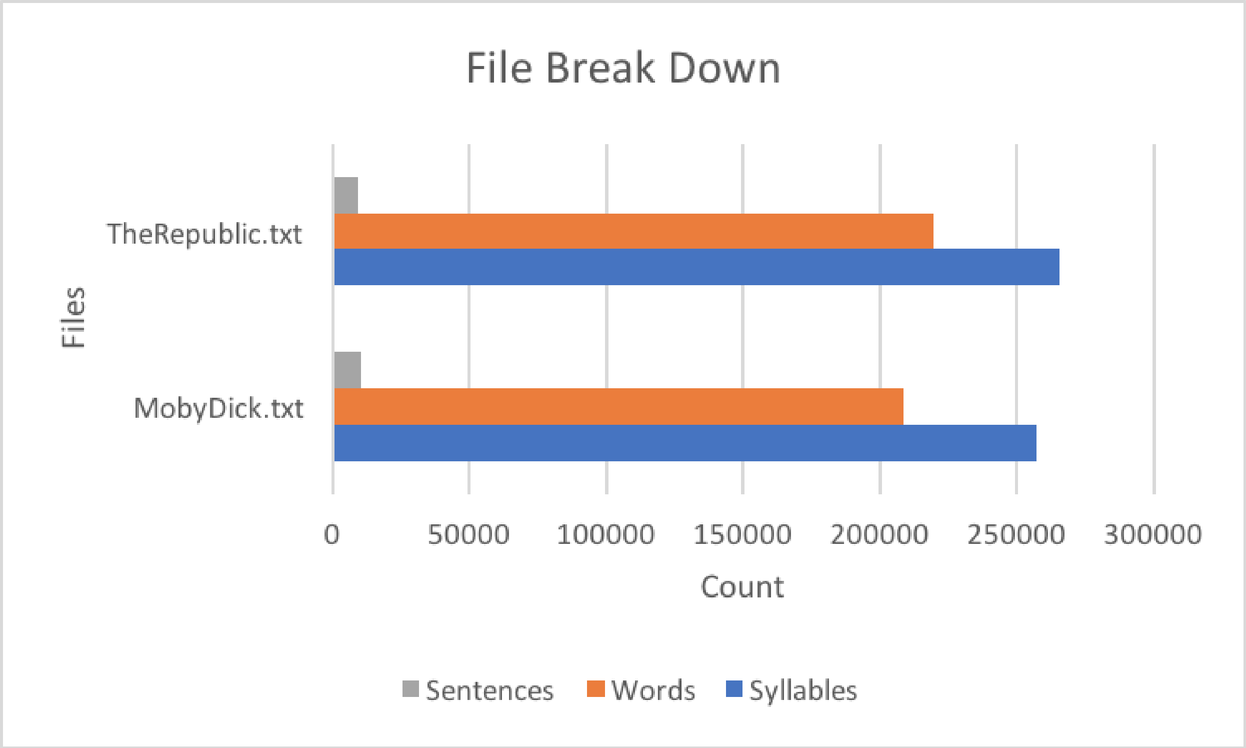
I found it interesting in Line graph 1 that Gettysburg Address is ranked so highly. Also, Line graph 2 shows my calculation and MTR's calculation crossing briefly in `NYTimes.txt`, where in the other values I have been having a much higher value.

This project was fairly straight forward, and because of the extra reading it lead me too, I would say I learned much from this. I focused early on learning *CMake* build structures, as I felt that this would be a good opportunity to get to know it. Because of the extra readings into hyphenation and syllables, I would be interested to see if there is something to be looked into for a more simplified library for syllables in *C++*.

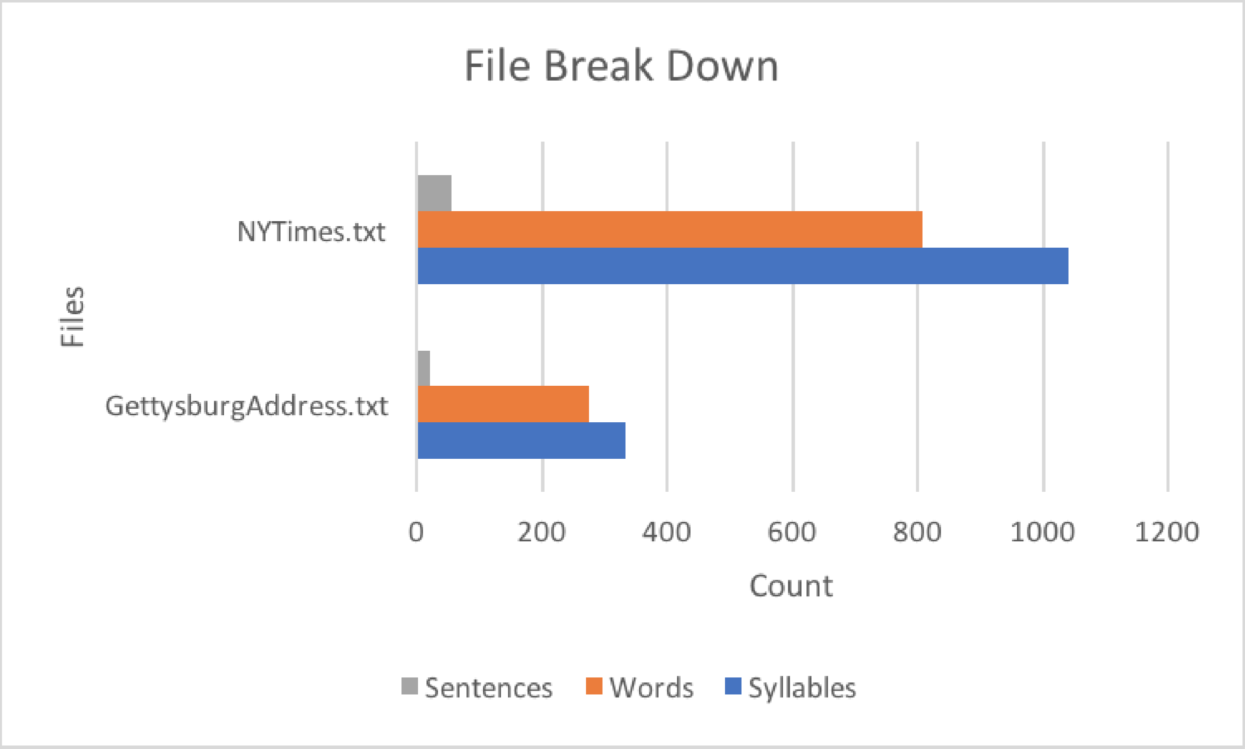
Table 1

File	Gettysburg Address	Moby Dick	NY Times	The Republic
Syllables	333	257100	1041	265674
Words	274	208742	808	219368
Sentences	21	10120	55	9225
FI	90.7749	81.7001	82.9279	80.2405
FK	6.3377	9.10077	6.11673	10.5733
MTR-FK	3.9	4.2	8.1	4.9

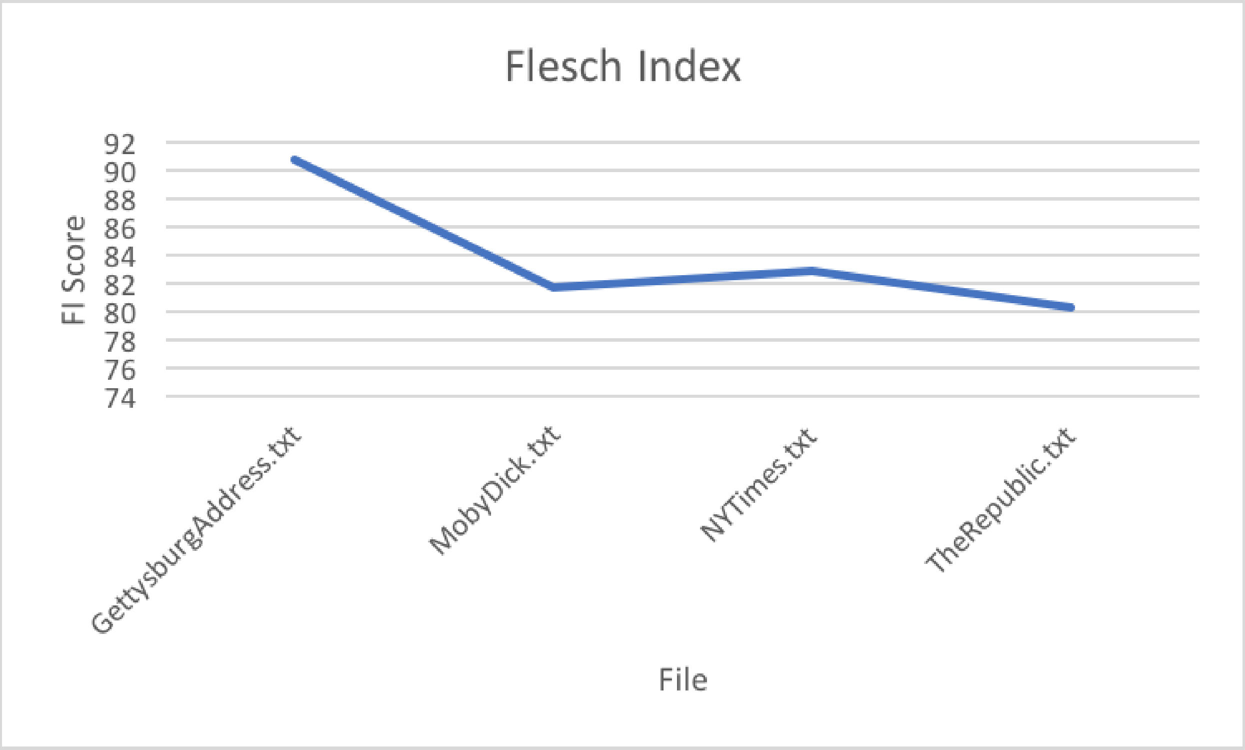
Bar Graph 1



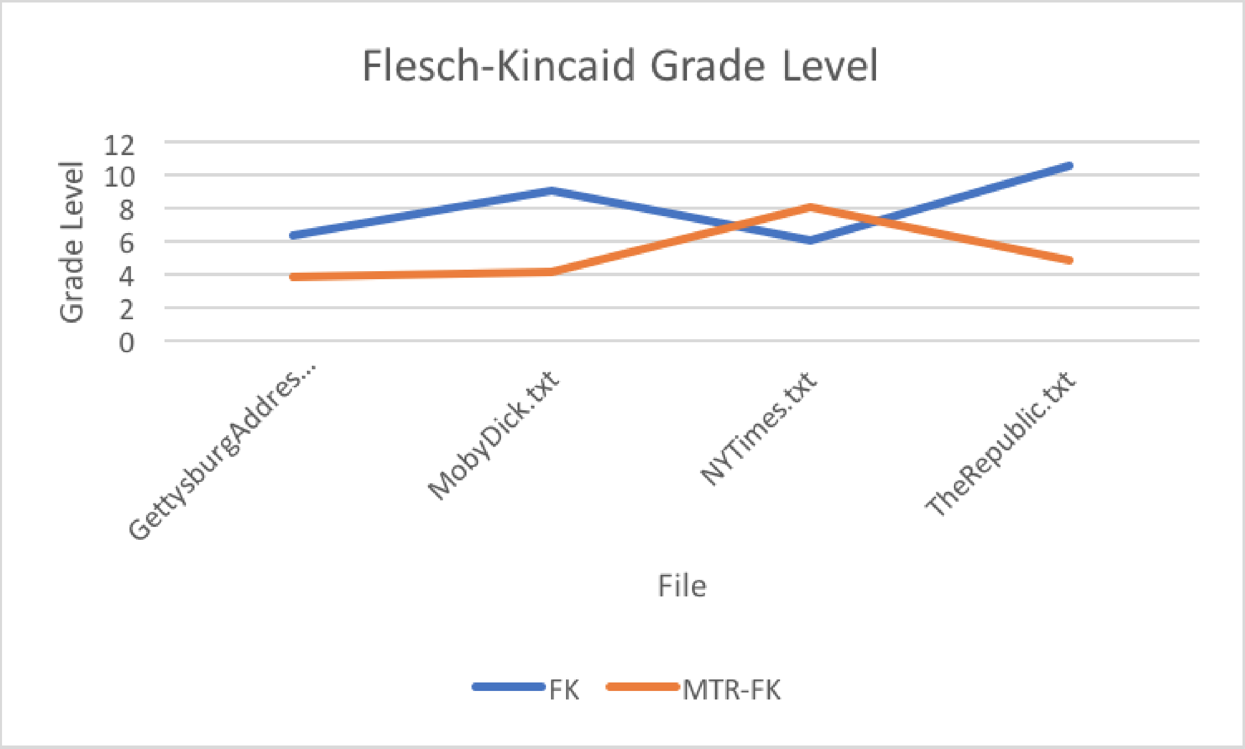
Bar Graph 2



Line Graph 1



Line Graph 2


Flesch-Kincaid Grade Level
Grade Level
12
10
8
6
4
2
0
GettysburgAddres...
MobyDick.txt
NYTimes.txt
TheRepublic.txt
File
FK
MTR-FK