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Assignment 5
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Abstract:

The problem at hand was to import words from a randomized dictionary and store them in an array of binary search trees called list. The array length is 26. list[0] stores all words beginning with ‘a’, list[1] stores all words beginning with ‘b’ and so on throughout the entire alphabet. The next thing the program will do is read from a book in the form of a text file named “oliver.txt”. It will go through the text file word by word to see if the word from Oliver is also a word in the list. The algorithm will check what the first letter of the word from Oliver, then go to the corresponding linked list within the array and search from there. Being that the words are in binary search trees, the searching will be very fast and have a time complexity of O(log N). The algorithm will count the number of elements it searches through until it finds the matching word. If the word is not found, the counter will still have a value, but it will instead accumulate in words not found. The algorithm keeps track of two other counts: number of words found, and number of words not found. Lastly, it will take the number of comparisons of words found, divided by the total number of words found which will give the average number of comparisons per word, given that the word is in the dictionary. The same is done for the words that are not found, producing the average number of comparisons per word, given that the word is not in the dictionary. The binary search tree algorithm is far more efficient than the linked list linear search algorithm. The average number of searches for all words (found or not found) for the linear search is about 3810 as opposed to just under 16 with the binary search tree. The greatest number of comparisons for a single word is only 34 compared to the linear search’s 14848.

Outputs:

Words found: 916179
Words not found: 62412
Comparisons found: 14910749
Comparisons not found: 689058
Average comparisons found: 16.2749
Average comparisons not found: 11.0405
Average total comparisons: 15.9411
Most comparisons for a single word: 34