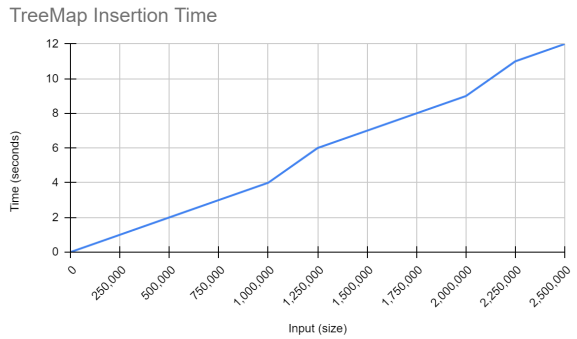
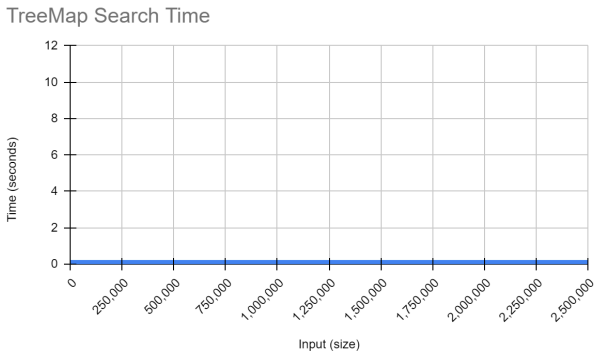
COS285 Data Structures
Alex Bard & Devin Chamberlain
Assignment 7

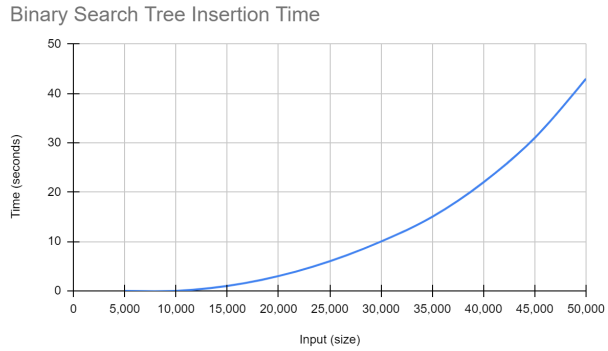
Link to GitHub Repository:
https://github.com/AlexBard122/Assignment7

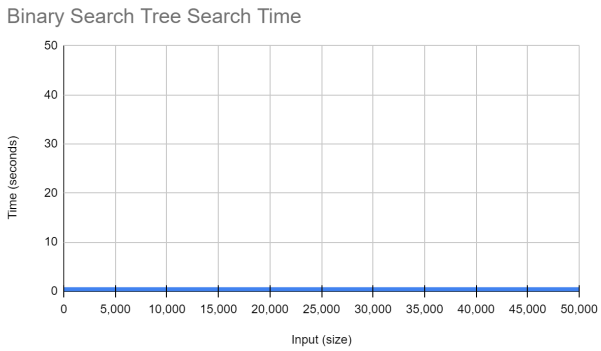
Task 1:
Run Time: 17.32 seconds. Complexity order is O(nlogn) because that is the complexity order of creating an AVL tree.
Task2:
Run Time: 0.001 seconds. Complexity order is O(logn) because that is the complexity of the methods used to search and calculate the number of accidents

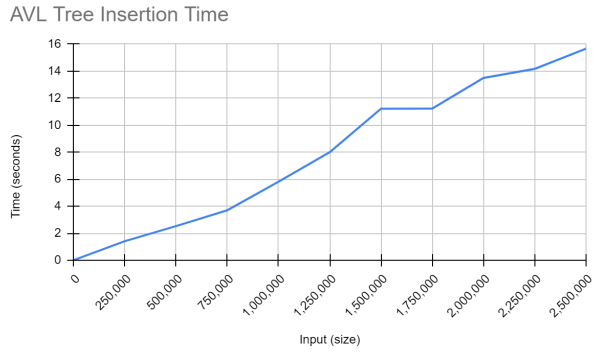
Diagrams:

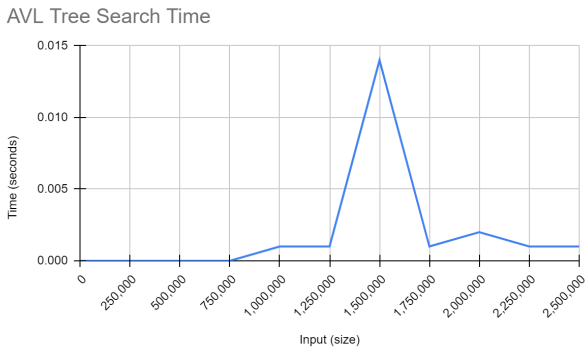












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Discussion:

When comparing the insertion times for each data structure, TreeMaps are the best, AVL Trees are second best (they take several seconds longer to store the same amount of data), and Binary Search trees are the worst. However, when looking at the search times of each data structure, AVL trees are slightly faster than both methods. So although initially creating the AVL tree is time intensive, it is the best option for storing data that only needs to be accessed and not modified after storing. However, for this application the TreeMap is still the best choice since its insertion time is more than good enough to make up for its search time when compared to the AVL Tree.

Rotations:

When filling the AVL tree with 2.5 million reports, it required 2,083,506 left rotations and 475,786 right rotations to balance the tree.