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Assignment 2

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CSC 130

Time Complexity

Time was in Milliseconds, however values had to be pretty big in the case for my trees to get a noticeable increase

Each array size was done 3 times and the median was taken in case it took more or less time per trial

For Example:

AVL Tree: Array Size: 1,000,000

Trial 1:

Ascending: 6

Descending: 6

Random: 5

Trial 2:

Ascending: 6

Descending: 5

Random: 6

Trial3:

Ascending: 6

Descending: 5

Random: 6

Average:

Ascending: 6

Descending: 5

Random: 6

We also notice that Descending and Random times are a bit slower then that of Ascending for the AVL Tree at 1,000,000 size of an array.

Ascending Tree

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tree | 1,000,000 | 2,000,000 | 3,000,000 | 4,000,000 | 5,000,000 |
| AVL Search Tree | 6 | 12 | 18 | 23 | 28 |
| Red Black Tree | 11 | 22 | 32 | 42 | 52 |

Descending Tree

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tree | 1,000,000 | 2,000,000 | 3,000,000 | 4,000,000 | 5,000,000 |
| AVL Search Tree | 5 | 11 | 17 | 22 | 28 |
| Red Black Tree | 10 | 20 | 31 | 41 | 51 |

Random Tree

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Tree | 1,000,000 | 2,000,000 | 3,000,000 | 4,000,000 | 5,000,000 |
| AVL Search Tree | 6 | 12 | 16 | 22 | 28 |
| Red Black Tree | 10 | 20 | 31 | 41 | 52 |

Thoughts: The time complexity was not what I was expecting especially with the Random I thought would be a far more differentiating value range than that of descending and ascending. Overall Ascending kept the most constant time while Descending varied the most between the trials and was the fastest time complexity of the 3. Descending being the fastest, random being the second, and Ascending. AVL was faster than Red Black Tree in all cases while holding the same idea of Descending being the fastest followed by Random and Ascending being the slowest barely in all trees.