

CS202 Fall 2021–2022 Homework 3

AVL Tree Rotations

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Question 2

Results from the Code

Rotations on AVL Trees			
Array Size	Random	Ascending	Descending
1000	730	939	935
2000	1442	1885	1886
3000	2068	2862	2833
4000	2700	3781	3792
5000	3390	4748	4750
6000	4099	5696	5709
7000	4747	6631	6654
8000	5446	7609	7589
9000	5920	8494	8586
10000	6677	9484	9459

Do your findings related to average number of rotations in the AVL tree agree with theoretical results?

The average number of rotations was consistent with what I expected. The rotation count was less than insertions every time. This is because not every insertion leads to a rotation. There should be more rotations in ascending and descending arrays because many insertions were on only one side, which causes more imbalance. So, the tree rotates more insertions.

Do different patterns of insertion affect the number of rotations in the AVL tree? If so, explain how. If not, explain why not.

As I mentioned in the first question, ascending and descending arrays cause more imbalance because they are focused on only one side. For example, ascending arrays were inserted more on the right side of the AVL tree instead of anywhere, like random arrays. The difference of rotation count on ascending and descending arrays was not much. This is because mainly the insertion side is changed. The ascending arrays were inserted right, and descending arrays were inserted left of the AVL tree. They cause mainly the same number of rotations.