

AVL Tree Rotation Practice Set

Basic Level

1. Insert the following nodes into an empty AVL tree and draw the tree after each insertion:
10, 20, 30
 - Identify if rotation is needed and which type.
2. Insert nodes: 30, 20, 10
 - Identify if rotation is needed and perform it.
3. Insert nodes: 20, 10, 25, 5
 - Show the balance factor after each insertion.
4. Insert nodes: 15, 10, 20, 8, 12
 - Draw the AVL tree and highlight any rotation needed.
5. Insert nodes: 50, 30, 70, 60, 80, 65
 - Indicate rotation type at the step it occurs.

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Intermediate Level

6. Insert nodes: 30, 10, 20
 - Determine if an LR rotation is required.
7. Insert nodes: 10, 30, 20
 - Determine if an RL rotation is required.
8. Insert nodes: 40, 20, 60, 10, 30, 25
 - Draw the tree after each insertion and perform rotations where necessary.
9. Insert nodes: 15, 5, 20, 25, 10
 - Identify the first node where imbalance occurs and which rotation fixes it.
10. Insert nodes: 50, 30, 70, 60, 80, 55, 58
 - Perform all rotations needed and show the final balanced tree.

Advanced Level

11. Insert nodes: 30, 20, 40, 10, 25, 50, 5, 15
 - Track balance factor at each node.
 - Perform necessary rotations.
12. Insert nodes: 50, 30, 70, 20, 40, 60, 80, 10, 25, 35, 45
 - Highlight all rotations.
 - Draw final AVL tree.

13. Perform deletion in an AVL tree:

Initial tree: 30, 20, 40, 10, 25, 35, 50

Delete node: 10 → balance tree

Delete node: 40 → balance tree

14. Insert nodes: 10, 20, 30, 40, 50, 25

- Determine the rotations and final tree structure.

15. Insert nodes: 60, 20, 80, 10, 30, 70, 90, 25, 35, 65

- Show all rotations step by step.

Challenge Questions

- Draw AVL tree for: 10, 20, 30, 40, 50, 25, 5, 15
- Insert 15 in the AVL tree 10, 20, 30 → Show rotations.
- Delete 30 from AVL tree 10, 20, 30, 40, 50 → Show tree balance steps.

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