

DSA - Tutorial 10 Evaluation

April 7, 2025

Evaluation Question 1: Insertion of 4 Vertices

Consider an initially empty AVL tree and insert the following vertices in the given order:

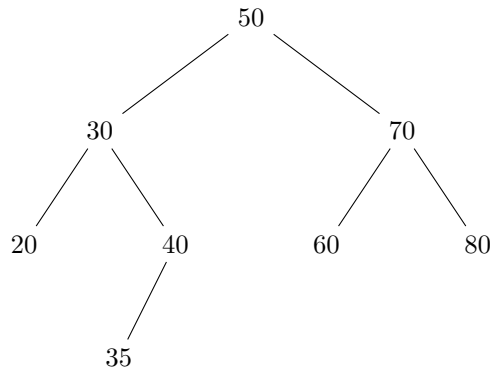
40, 20, 35, 60

Answer the following:

1. **Tree Construction:** Draw the AVL tree after each individual insertion.
2. **Violation Identification:** Identify any node(s) where the AVL property (balance factor between -1 and $+1$) is violated during the insertion process.
3. **Rebalancing:** For each violation, explain which rotation (single or double) is needed to restore balance. Provide diagrams of the tree structure immediately before and after performing the rotation.

Evaluation Question 2: Deletion from a Given AVL Tree

Below is the balanced AVL tree with 8 vertices:



Perform the following deletion operations on the above tree:

- a. Delete vertex **20**.
- b. Delete vertex **70**.

For each deletion, provide:

- (i) A diagram of the AVL tree immediately after the deletion.
- (ii) A description of the retracing process that updates the balance factors from the deletion point up to the root.
- (iii) Identification of the node(s) where the AVL property is violated.
- (iv) An explanation of which rotation (single or double) is required to restore balance, along with diagrams of the tree before and after the rotation.