

DEPARTMENT OF CHANDIGARH COMPUTER SCIENCE & ENGINEERING

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Experiment 6:

Name: Harpreet

UID: 22BCS12757

Branch: BE/CSE

Section/Group: 634/B

Semester: 6th

Date of performance: 28-01-25

Subject Name: APLab-2

Subject Code: 22CSP-351

1) Aim:

Problem 1: Binary Tree Inorder Traversal

- Problem Statement: Given the root of a binary tree, return the inorder traversal of its nodes' values.

Problem 2: Maximum Depth of Binary Tree

- Problem Statement: Given the root of a binary tree, return its maximum depth. A binary tree's maximum depth is the number of nodes along the longest path from the root node down to the farthest leaf node.

Problem 3: Validate Binary Search Tree

- Problem Statement: Given the root of a binary tree, determine if it is a valid binary search tree (BST). A valid BST is defined as follows: The left subtree of a node contains only nodes with keys less than the node's key. The right subtree of a node contains only nodes with keys greater than the node's key. Both the left and right subtrees must also be binary search trees.

2) Objective:

Given the root of a binary tree, perform inorder traversal to return its nodes' values, calculate its maximum depth, and determine if it is a valid binary search tree (BST).

3) Code:

Problem 1: Binary Tree Inorder Traversal

```
class Solution {
    ArrayList<Integer> ans = new ArrayList<>();
    public List<Integer> inorderTraversal(TreeNode root) {
        inorder(root);
        return ans;
    }
    public void inorder(TreeNode root){
```



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```
        if(root == null ){
            return;
        }
        inorder(root.left);
        ans.add(root.val);
        inorder(root.right);
    }
}
```

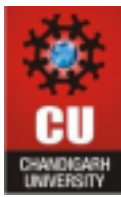
Problem 2: Maximum Depth of Binary Tree

```
class Solution {
    public int maxDepth(TreeNode root) {
        if(root==null){
            return 0;
        }
        int left=maxDepth(root.left);
        int right=maxDepth(root.right);
        int ans=Math.max(left,right)+1;
        return ans;
    }
}
```

Problem 3: Validate Binary Search Tree

```
class Solution {
    private long minVal = Long.MIN_VALUE;
    public boolean isValidBST(TreeNode root) {
        if (root == null) return true;
        if (!isValidBST(root.left)) return false;

        if (minVal >= root.val) return false;
```



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```
minVal = root.val;  
if (!isValidBST(root.right)) return false;  
return true;  
}  
}
```

4) Result:

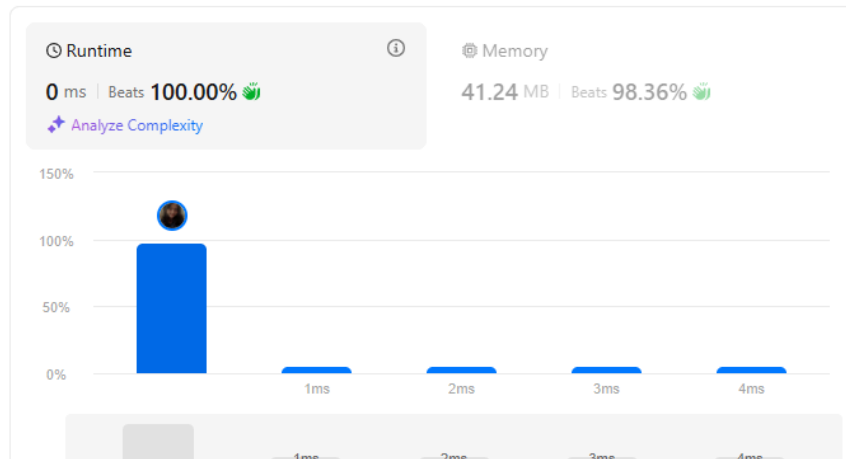
Problem 1: Binary Tree Inorder Traversal

Accepted 70 / 70 testcases passed

Khushi Vishwakarma submitted at Jun 17, 2024 21:07

Editorial

Solution



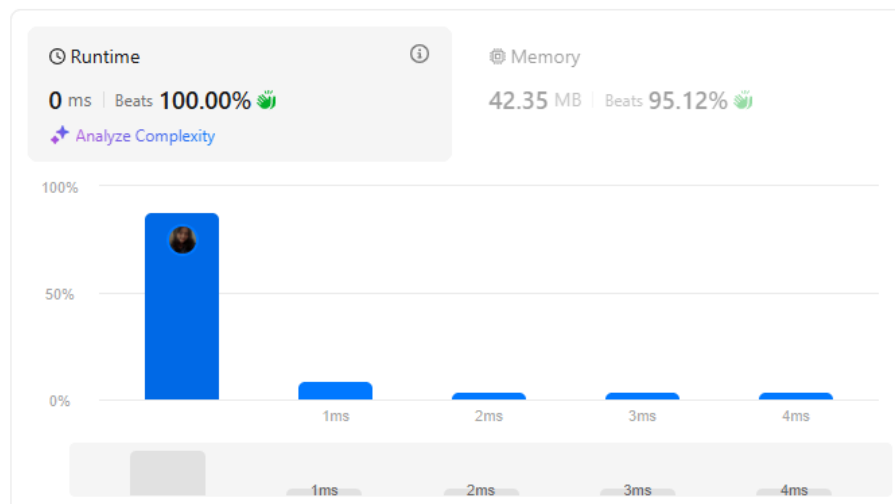
Problem 2: Maximum Depth of Binary Tree

Accepted 39 / 39 testcases passed

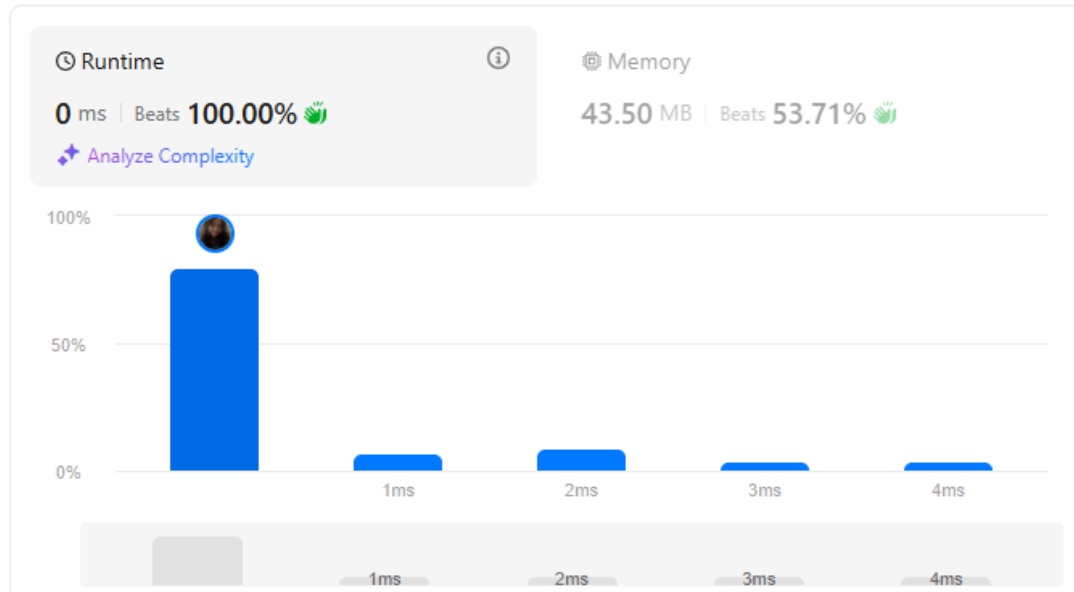
Khushi Vishwakarma submitted at Jun 10, 2024 13:37

Editorial

Solution



Problem 3: Validate Binary Search Tree



5) Learning Outcome:

1. **Inorder Traversal:** Learn to traverse binary trees in inorder to visit nodes in a specific sequence.
2. **Recursive Depth Calculation:** Use recursion to calculate the maximum depth of a binary tree.
3. **BST Validation:** Understand how to check if a binary tree follows the binary search tree properties.
4. **Tree Operations Optimization:** Optimize tree traversal and analysis techniques for efficiency.
5. **Problem-Solving with Trees:** Enhance problem-solving skills with various tree operations and structures.