Assignment5

StudentName:Keshav Singla **UID:22BCS13486**
Branch:CSE **Section/Group:22BCS_IOT_612(B)**
Semester: 6th **DateofPerformance:10/03/25**
Subject Name: Advance programming Lab **Subject Code: 22CSP-351**

Q1)MaximumDepthofaBinaryTree

- **Code:**

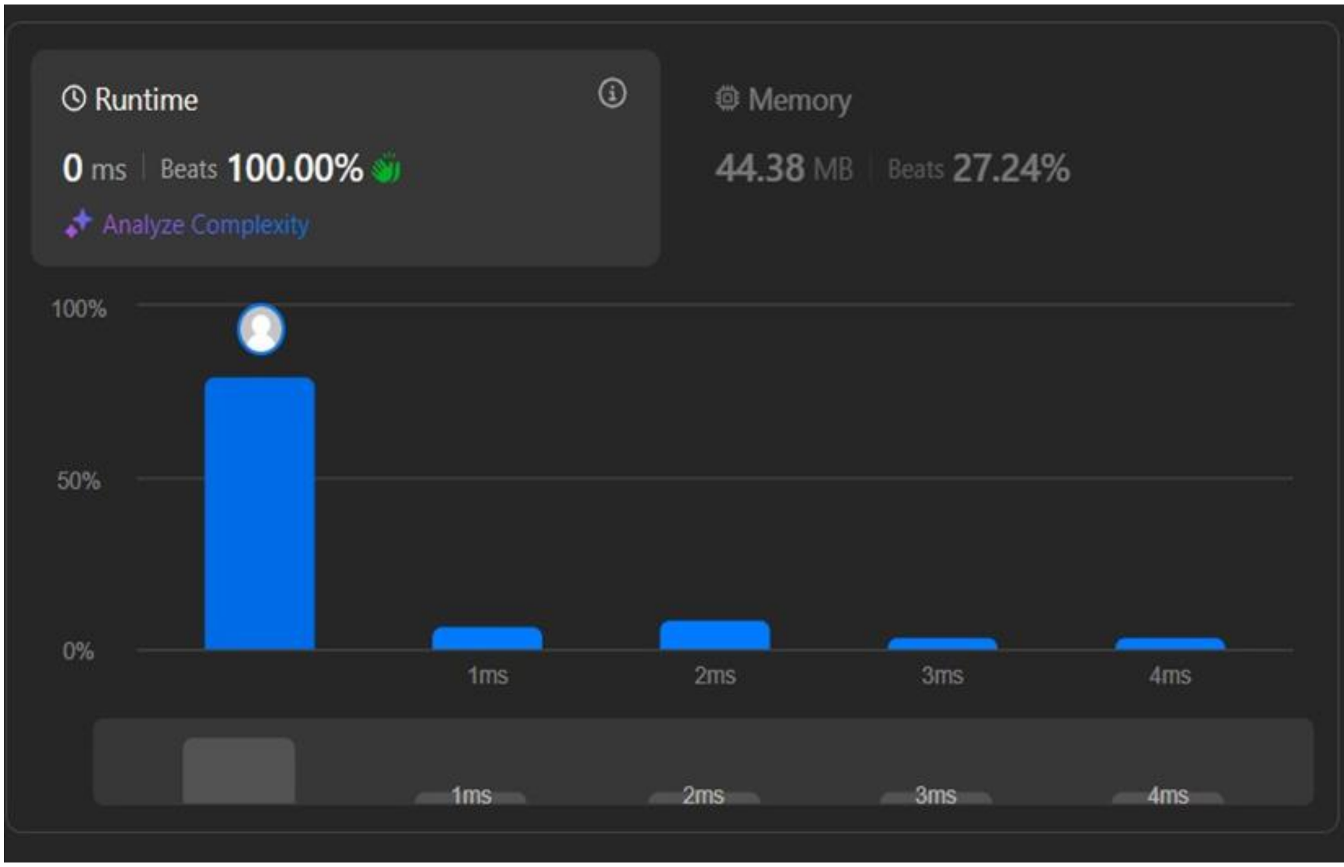
```
class Solution {
    public int maxDepth(TreeNode root) {
        if (root == null) {
            return 0;
        }
        int leftHeight = maxDepth(root.left);
        int rightHeight = maxDepth(root.right);
        return Math.max(leftHeight, rightHeight) + 1;
    }
}
```

Q2)ValidateBinarySearch Tree

- **Code:**

```
class Solution {
    public boolean helperFunction(TreeNode root, Integer lower, Integer upper) {
        if (root == null) {
            return true;
        }
        if ((lower != null && root.val <= lower) || (upper != null && root.val >= upper)) {
            return false;
        }
        return helperFunction(root.left, lower, root.val) && helperFunction(root.right, root.val, upper);
    }

    public boolean isValidBST(TreeNode root) {
        return helperFunction(root, null, null);
    }
}
```

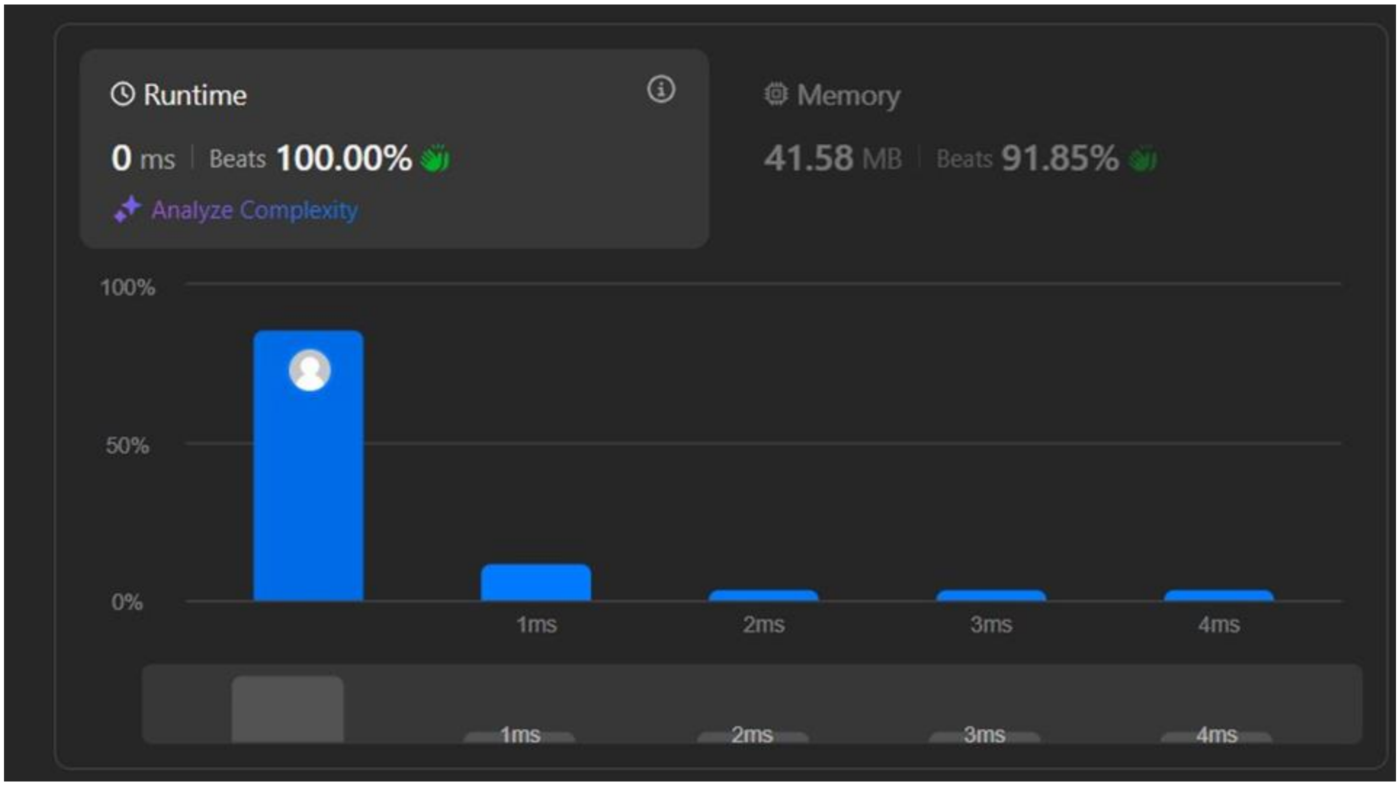
- **Screenshot:**


Runtime
0 ms | Beats 100.00%
Analyze Complexity
Memory
44.38 MB | Beats 27.24%

Q3)<u>Symmetric Tree</u>

- **Code:**
- class Solution {
-     public boolean isMirror(TreeNode t1, TreeNode t2) {
-         if (t1 == null && t2 == null) {
-             return true;
-         }
-         if (t1 == null || t2 == null) {
-             return false;
-         }
-         return (t1.val == t2.val)
-             && isMirror(t1.left, t2.right)
-             && isMirror(t1.right, t2.left);
-     }
-
-     public boolean isSymmetric(TreeNode root) {
-         if (root == null) {
-             return true;
-         }

- 	return isMirror(root.left, root.right);
-     }
- }**Screenshot:**



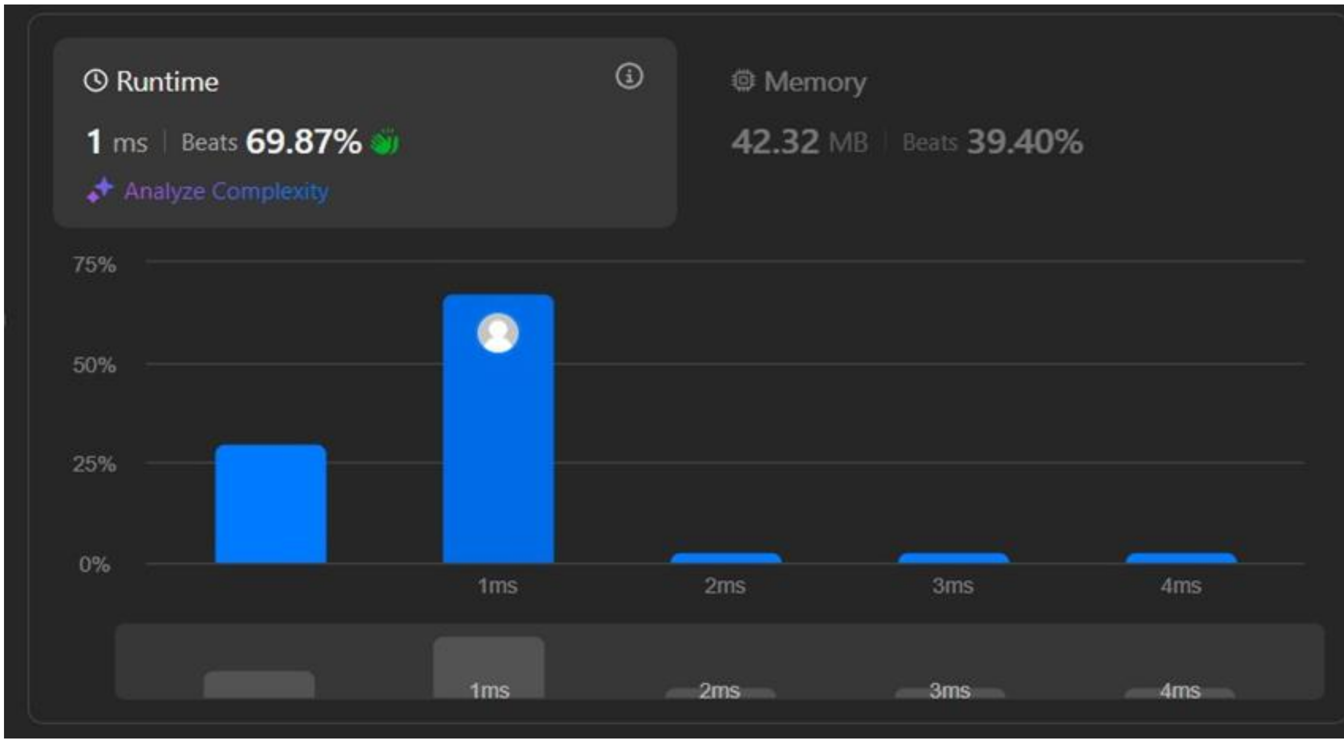
Q4)BinaryTreeZigzagLevelOrderTraversal

- **Code:**

```
class Solution {
   public List<List<Integer>> zigzagLevelOrder(TreeNode root) {
      List<List<Integer>> result = new ArrayList<>();
      if (root == null) return result;

      Queue<TreeNode> q = new LinkedList<>();
      q.add(root);
      int level = 0;

      while (!q.isEmpty()) {
         int size = q.size();
         List<Integer> ls = new LinkedList<>();

         for (int i = 0; i < size; i++) {
            TreeNode curr = q.poll();
            ls.add(curr.val);

            if (curr.left != null) q.add(curr.left);
            if (curr.right != null) q.add(curr.right);
         }

         if (level % 2 == 1) {
            Collections.reverse(ls);
         }
```

```
            result.add(new ArrayList<>(ls));
            level++;
        }
        return result;
    }
```

- **Screenshot:**

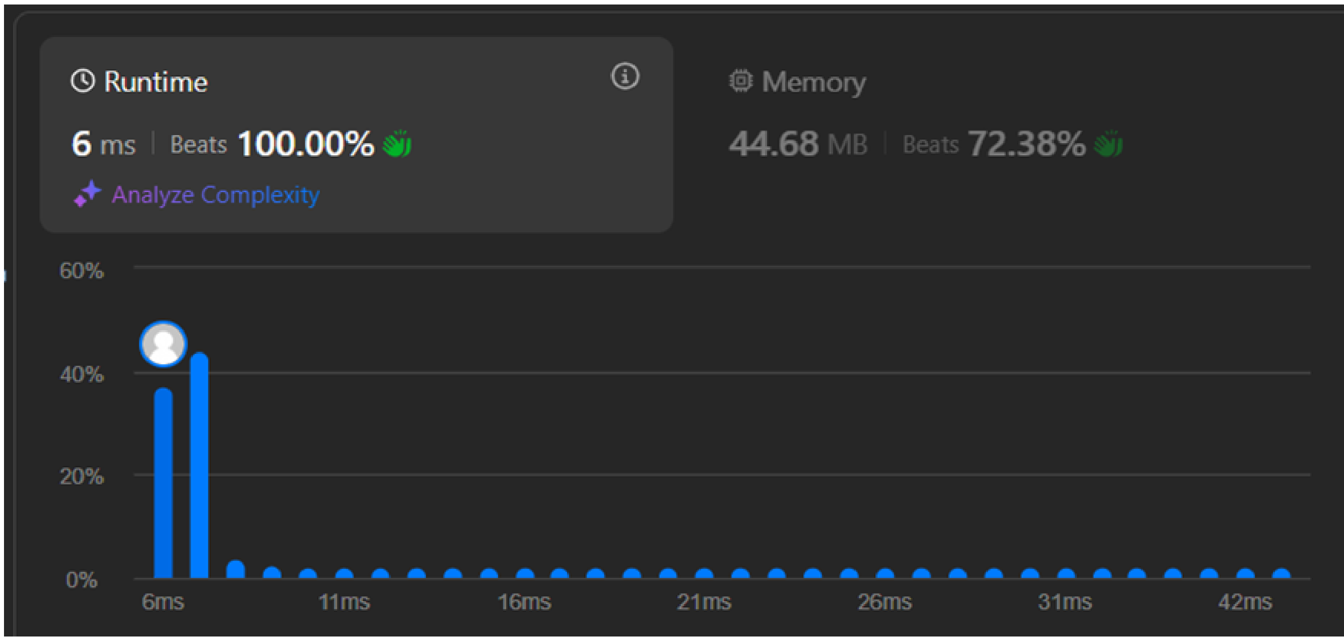


Q5)<u>LowestCommonAncestorofaBinaryTree</u>

- **Code:**

```
class Solution {
    public TreeNode lowestCommonAncestor(TreeNode root, TreeNode p, TreeNode q) {
        // Base case: null node
        if (root == null) {
            return null;
        }
        // If the current node is either p or q, return it
        if (root == p || root == q) {
            return root;
        }

        // Recur for left and right children
        TreeNode left = lowestCommonAncestor(root.left, p, q);
        TreeNode right = lowestCommonAncestor(root.right, p, q);

        // If both left and right return a non-null value, current node is LCA
        if (left != null && right != null) {
            return root;
        }

        // Otherwise, return the non-null child (or null if both are null)
        return left != null ? left : right;
    }
```

- }
-
- **Screenshot:**

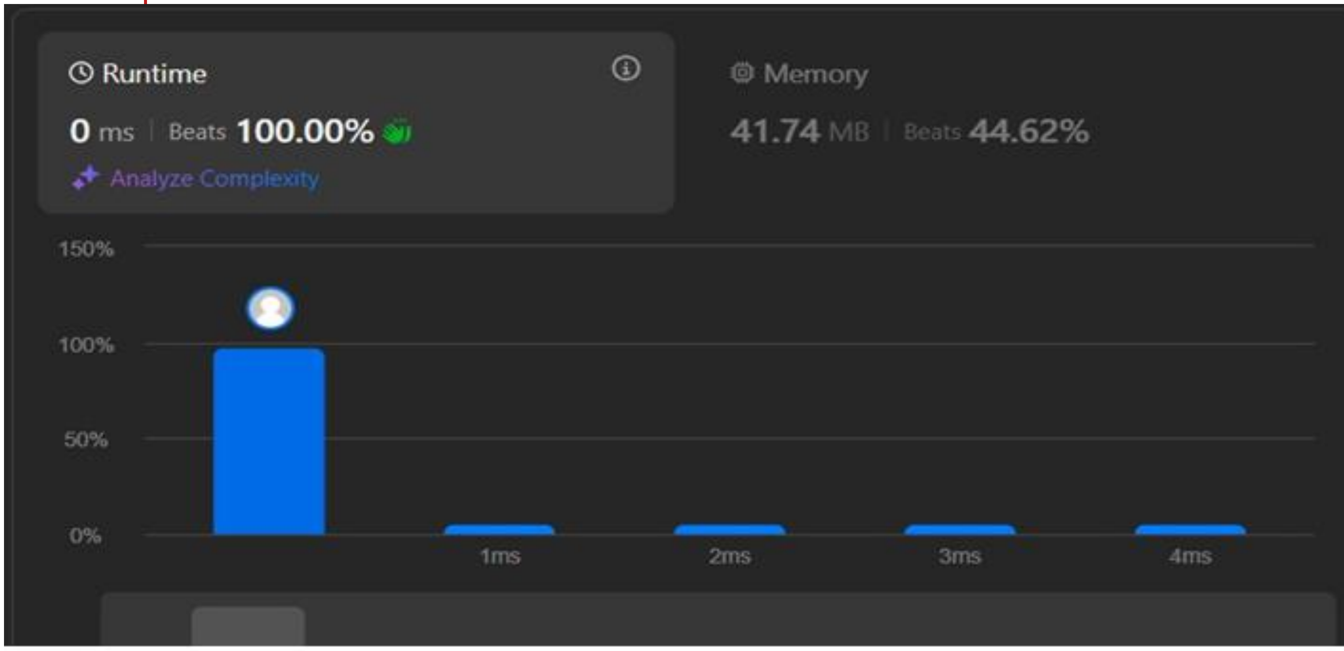


Q6)<u>BinaryTreeInorderTraversal</u>

- **Code:**

```
class Solution {
    public void traversal(TreeNode root, List<Integer> ans) {
        if (root == null) return;

        traversal(root.left, ans);
        ans.add(root.val);
        traversal(root.right, ans);
    }

    public List<Integer> inorderTraversal(TreeNode root) {
        List<Integer> ans = new ArrayList<>();
        traversal(root, ans);
        return ans;
    }
}
```

- **Screenshot:**

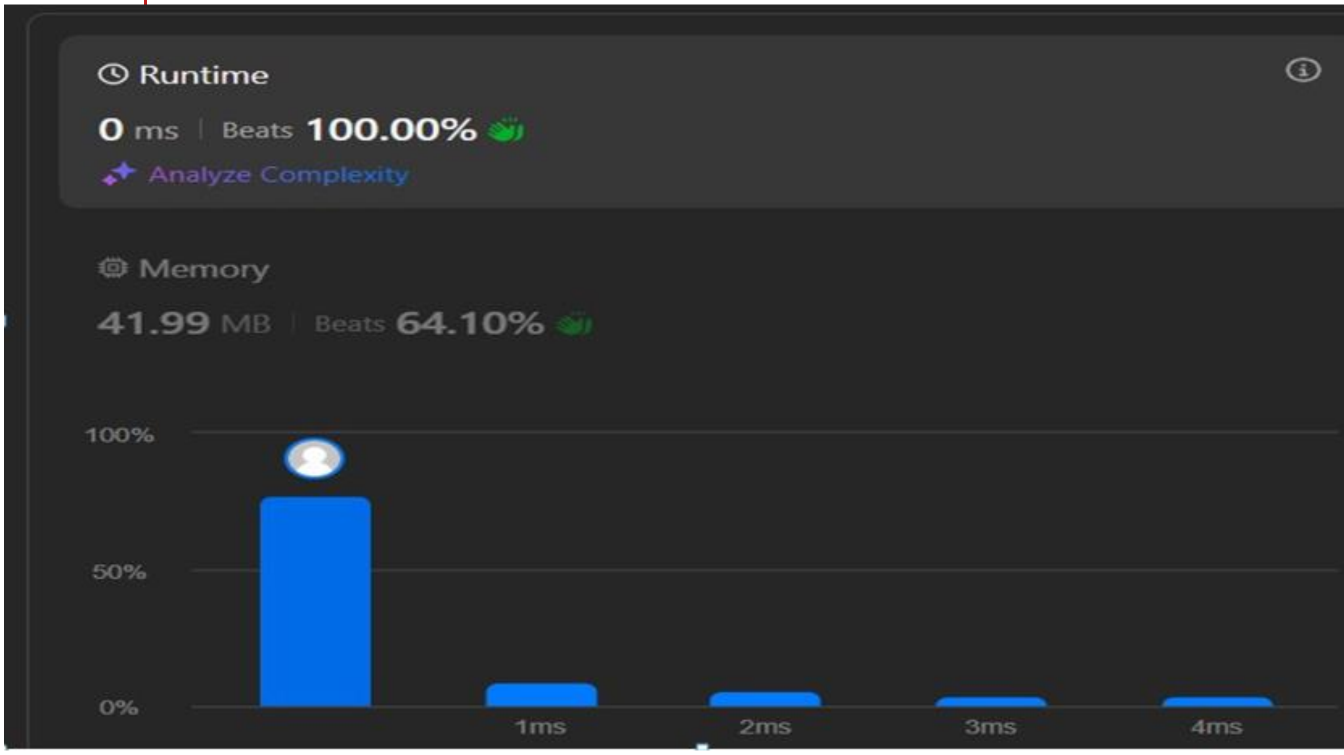

Runtime
0 ms | Beats 100.00%
Memory
41.74 MB | Beats 44.62%

Q7)BinaryTreeLevelOrder Traversal

- **Code:**

```
import java.util.*;

class Solution {
    public List<List<Integer>> levelOrder(TreeNode root) {
        List<List<Integer>> ans = new ArrayList<>();
        if (root == null) {
            return ans;
        }

        Queue<TreeNode> queue = new LinkedList<>();
        queue.add(root);

        while (!queue.isEmpty()) {
            int levelSize = queue.size();
            List<Integer> level = new ArrayList<>();

            for (int i = 0; i < levelSize; ++i) {
                TreeNode node = queue.poll();
                level.add(node.val);
                if (node.left != null) {
                    queue.add(node.left);
                }
                if (node.right != null) {
                    queue.add(node.right);
                }
            }
            ans.add(level);
        }
        return ans;
    }
}
```

- **Screenshot:**



Runtime

0 ms | Beats 100.00%

Analyze Complexity

Memory

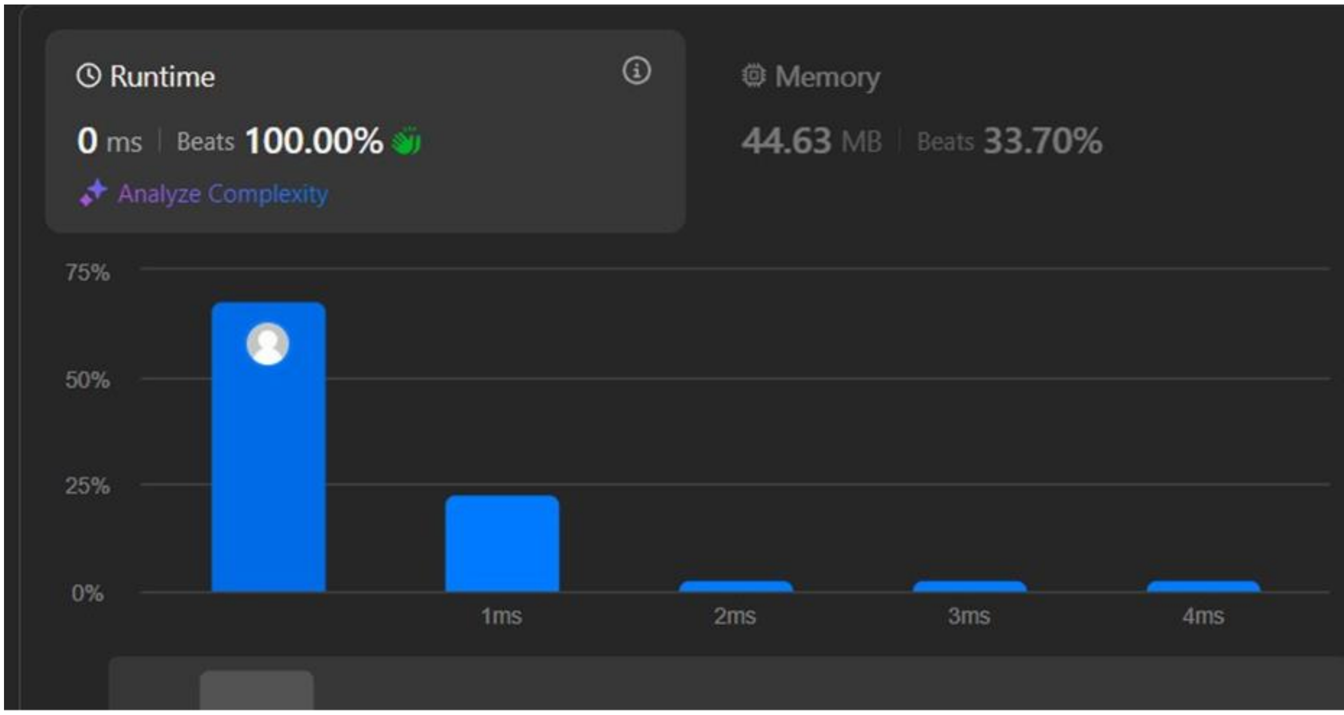
41.99 MB | Beats 64.10%

Q8)KthsmallestelementinaBST

- **Code:**

```
class Solution {
    private int count = 0;
    private int result = 0;

    public void inOrder(TreeNode root, int k) {
        if (root == null) {
            return;
        }
        inOrder(root.left, k);
        count++;
        if (count == k) {
            result = root.val;
            return;
        }
        inOrder(root.right, k);
    }

    public int kthSmallest(TreeNode root, int k) {
        inOrder(root, k);
        return result;
    }
}}
```

- **Screenshot:**

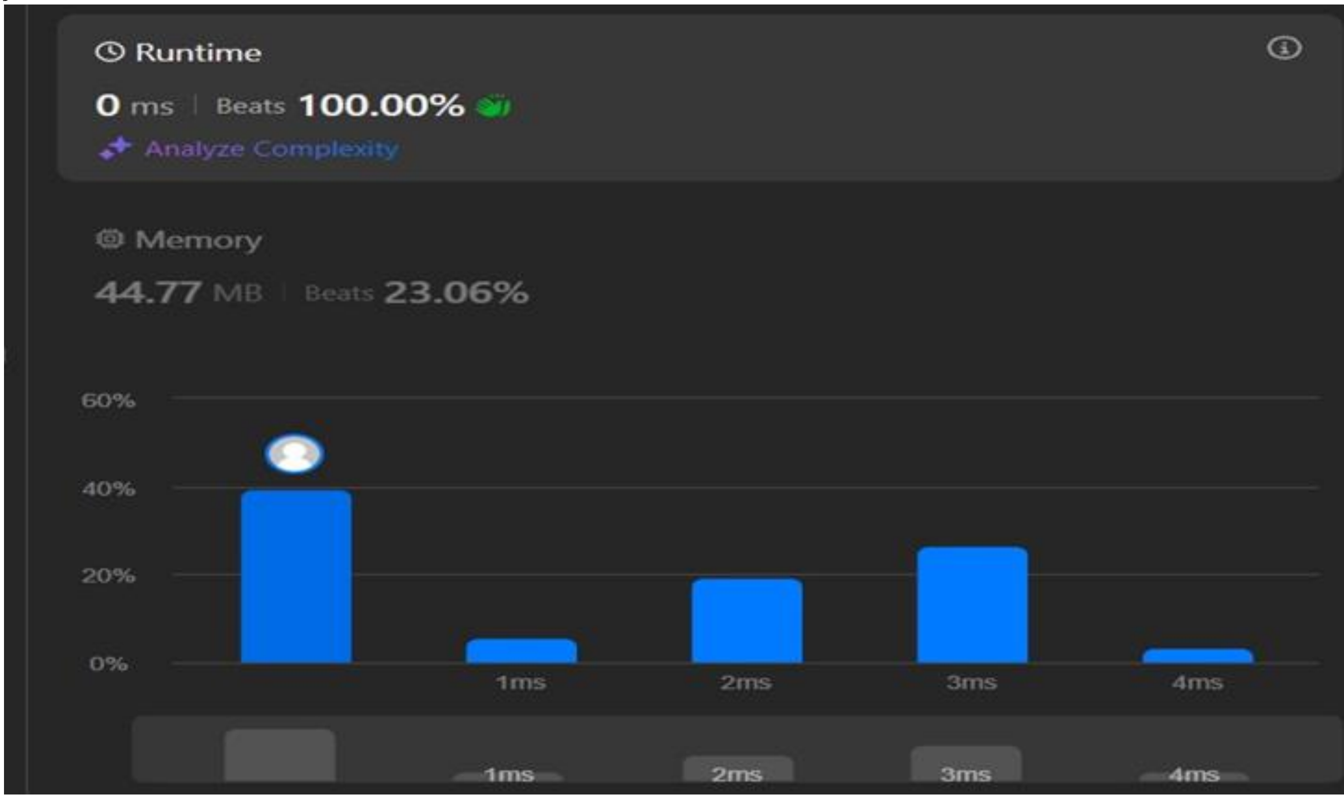

Runtime
0 ms | Beats 100.00%
Analyze Complexity
Memory
44.63 MB | Beats 33.70%

Q9)PopulatingNextRightPointersinEach Node

- **Code:**

```
class Solution {
    public Node connect(Node root) {
        if (root == null) {
            return null;
        }

        if (root.left != null) {
            root.left.next = root.right;
        }

        if (root.right != null && root.next != null) {
            root.right.next = root.next.left;
        }

        connect(root.left);
        connect(root.right);

        return root;
    }
}
```

- **Screenshot:**



Runtime
0 ms | Beats 100.00%
Analyze Complexity
Memory
44.77 MB | Beats 23.06%

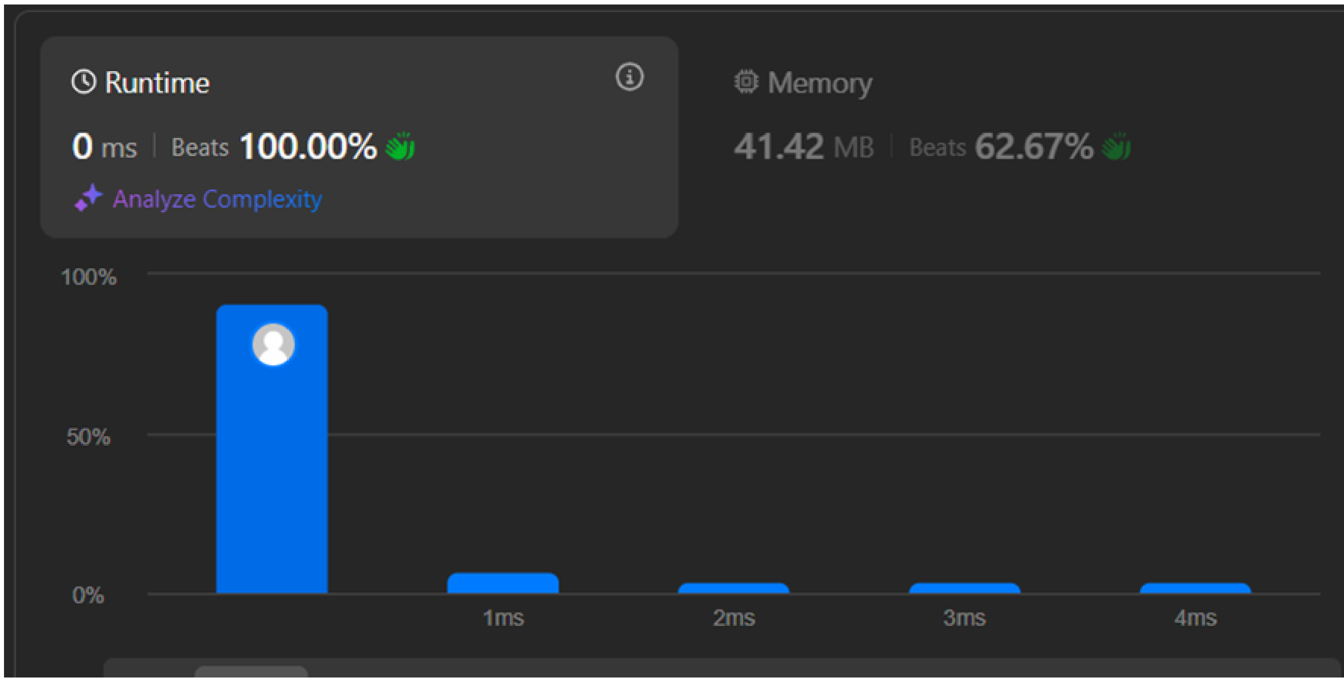
Q10)SumofLeft Leaves

- **Code:**

```
class Solution {
```

```
public int calSum(TreeNode node) {
    if (node == null) {
        return 0;
    }

    int sum = 0;
    if (node.left != null && node.left.left == null && node.left.right == null) {
        sum += node.left.val;
    }

    sum += calSum(node.left);
    sum += calSum(node.right);

    return sum;
}

public int sumOfLeftLeaves(TreeNode root) {
    return calSum(root);
}
```

Screenshot:


Runtime
0 ms | Beats 100.00%
Analyze Complexity
Memory
41.42 MB | Beats 62.67%