Experiment - 9

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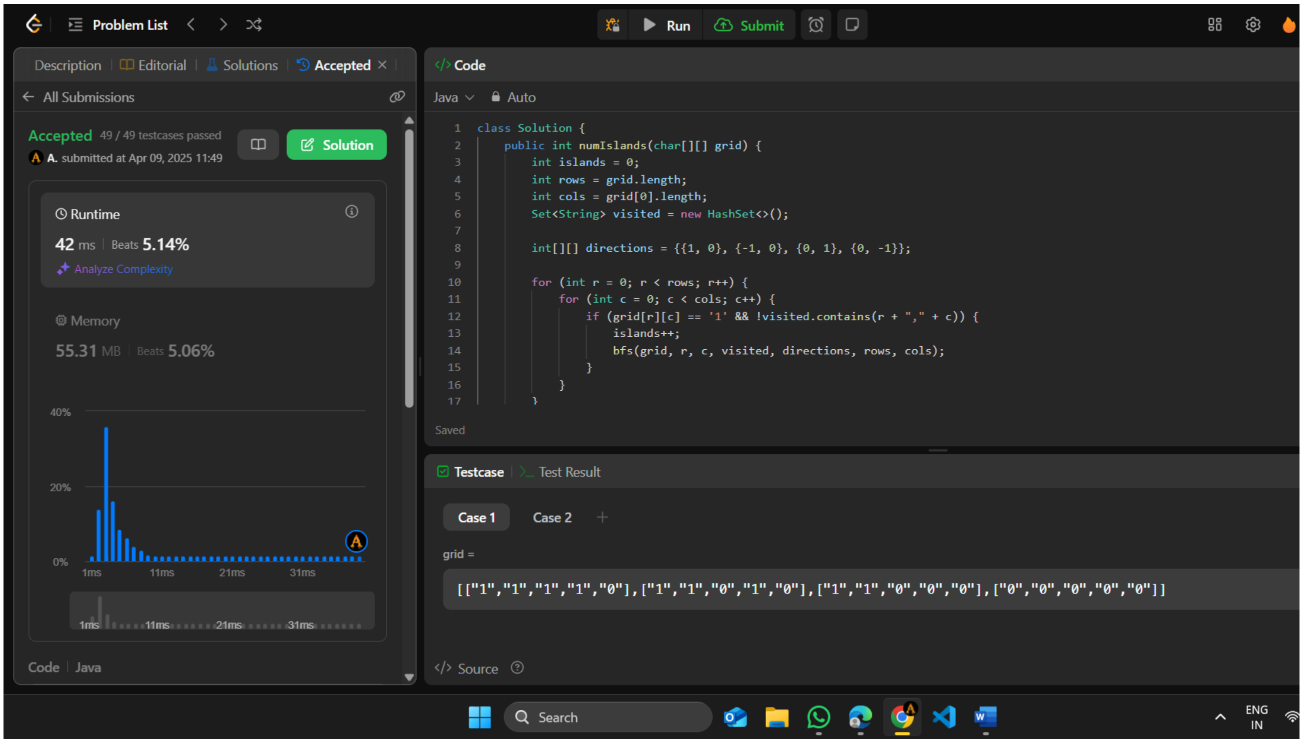
Aim: To solve leet code problems

1. Problem : Number of Islands

   Code:

```
class Solution {
    public int numIslands(char[][] grid) {
        int islands = 0;
        int rows = grid.length;
        int cols = grid[0].length;
        Set<String> visited = new HashSet<>();

        int[][] directions = {{1, 0}, {-1, 0}, {0, 1}, {0, -1}};

        for (int r = 0; r < rows; r++) {
            for (int c = 0; c < cols; c++) {
                if (grid[r][c] == '1' && !visited.contains(r + "," + c)) {
                    islands++;
                    bfs(grid, r, c, visited, directions, rows, cols);
                }
            }
        }

        return islands;
    }

    private void bfs(char[][] grid, int r, int c, Set<String> visited, int[][] directions, int rows, int cols) {
        Queue<int[]> q = new LinkedList<>();
        visited.add(r + "," + c);
        q.add(new int[]{r, c});

        while (!q.isEmpty()) {
            int[] point = q.poll();
            int row = point[0], col = point[1];

            for (int[] direction : directions) {
                int nr = row + direction[0], nc = col + direction[1];
                if (nr >= 0 && nr < rows && nc >= 0 && nc < cols && grid[nr][nc] == '1' &&
!visited.contains(nr + "," + nc)) {
                    q.add(new int[]{nr, nc});
                    visited.add(nr + "," + nc);
                }
            }
        }
    }
}
```

Output :



Accepted 49 / 49 testcases passed
A. submitted at Apr 09, 2025 11:49

Runtime
42 ms | Beats 5.14%

Memory
55.31 MB | Beats 5.06%

```
class Solution {
    public int numIslands(char[][] grid) {
        int islands = 0;
        int rows = grid.length;
        int cols = grid[0].length;
        Set<String> visited = new HashSet<>();

        int[][] directions = {{1, 0}, {-1, 0}, {0, 1}, {0, -1}};

        for (int r = 0; r < rows; r++) {
            for (int c = 0; c < cols; c++) {
                if (grid[r][c] == '1' && !visited.contains(r + "," + c)) {
                    islands++;
                    bfs(grid, r, c, visited, directions, rows, cols);
                }
            }
        }
```

grid =

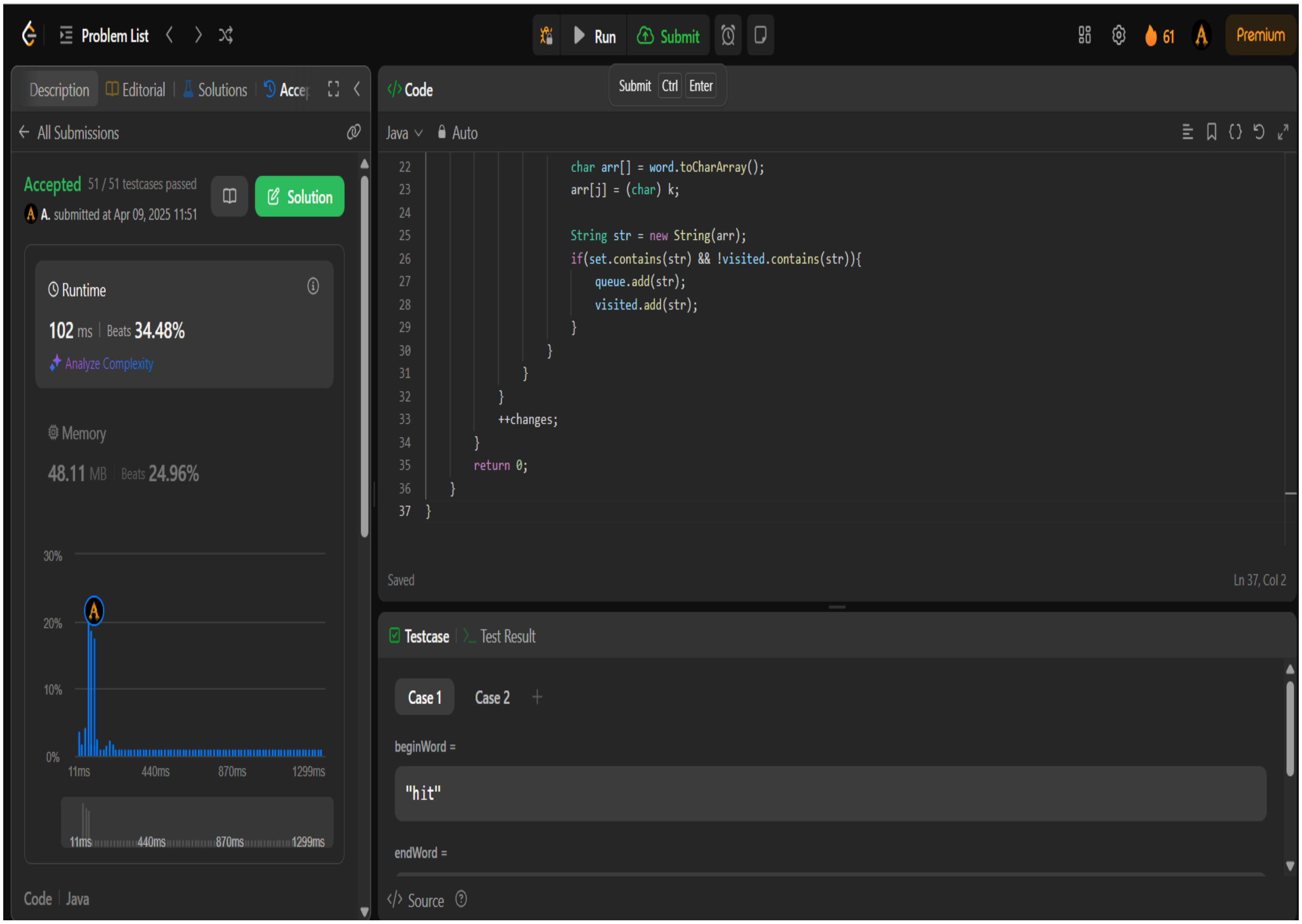
```
[["1","1","1","1","0"],["1","1","0","1","0"],["1","1","0","0","0"],["0","0","0","0","0"]]
```

2. Problem: Word Ladder

Code:

```
class Solution {
    public int ladderLength(String beginWord, String endWord, List<String> wordList) {
        Set<String> set = new HashSet<>(wordList);
        if(!set.contains(endWord)) return 0;

        Queue<String> queue = new LinkedList<>();
        queue.add(beginWord);

        Set<String> visited = new HashSet<>();
        queue.add(beginWord);

        int changes = 1;

        while(!queue.isEmpty()){
            int size = queue.size();
            for(int i = 0; i < size; i++){
                String word = queue.poll();
                if(word.equals(endWord)) return changes;

                for(int j = 0; j < word.length(); j++){
                    for(int k = 'a'; k <= 'z'; k++){
                        char arr[] = word.toCharArray();
                        arr[j] = (char) k;
                        String str = new String(arr);
                        if(set.contains(str) && !visited.contains(str)){
                            queue.add(str);
                            visited.add(str);
                        }
                    }
                }
            }
            ++changes;
        }
        return 0;
    }
}
```

Output:



Accepted 51 / 51 testcases passed

A. submitted at Apr 09, 2025 11:51

Runtime

102 ms | Beats 34.48%

Memory

48.11 MB | Beats 24.96%

```
                char arr[] = word.toCharArray();
                arr[j] = (char) k;

                String str = new String(arr);
                if(set.contains(str) && !visited.contains(str)){
                    queue.add(str);
                    visited.add(str);
                }
            }
        }
    }
    ++changes;
  }
  return 0;
 }
}
```

beginWord =

"hit"

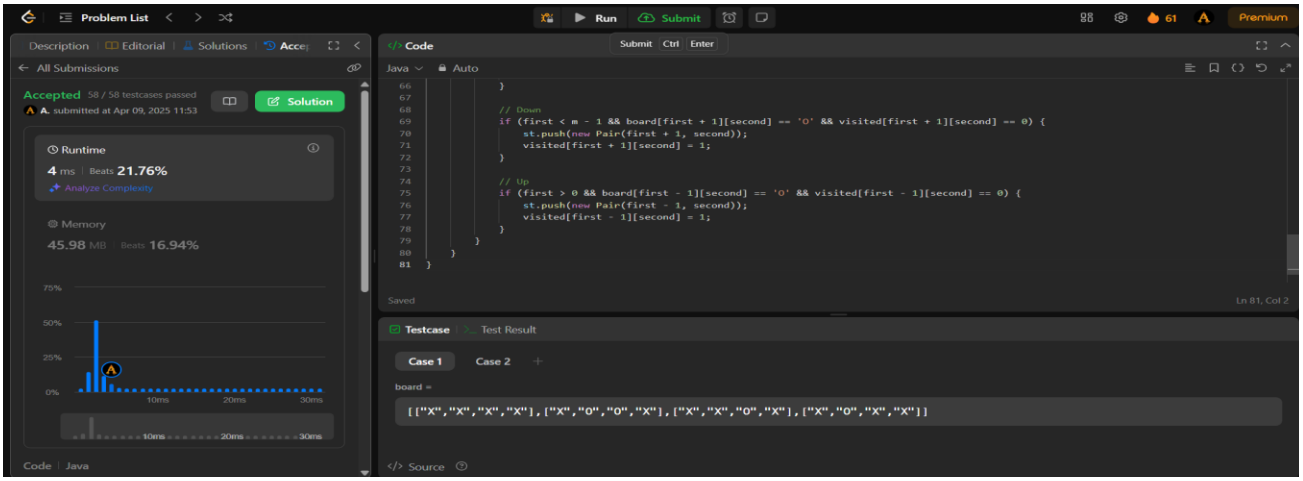
endWord =

3. Problem: Surrounded Regions

Code:

```
class Solution {
    class Pair {
        int first;
        int second;

        Pair(int first, int second) {
            this.first = first;
            this.second = second;
        }
    }

    public void solve(char[][] board) {
        int n = board[0].length;
        int m = board.length;
        int visited[][] = new int[m][n];

        // i would like to start dfs traversal from boundry if getting O and mark
        // visited, with this tech be visited all vertex of graph which can not be crossed(X).

        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                if (i == 0 && board[i][j] == 'O' && visited[i][j] == 0) {
                    DFS(board, i, j, visited);
                }
                if (i == m - 1 && board[i][j] == 'O' && visited[i][j] == 0) {
                    DFS(board, i, j, visited);
                }
                if (j == 0 && board[i][j] == 'O' && visited[i][j] == 0) {
                    DFS(board, i, j, visited);
                }
                if (j == n - 1 && board[i][j] == 'O' && visited[i][j] == 0) {
                    DFS(board, i, j, visited);
                }
            }
        }
        for (int i = 0; i < m; i++) {
            for (int j = 0; j < n; j++) {
                if (board[i][j] == 'O' && visited[i][j] == 0) {
                    board[i][j] = 'X';
                }
            }
        }
    }

    public void DFS(char board[][], int i, int j, int visited[][]) {
        int n = board[0].length;
        int m = board.length;
        Stack<Pair> st = new Stack<>();
        st.push(new Pair(i, j));
        while (!st.isEmpty()) {
            Pair node = st.pop();
            int first = node.first;
            int second = node.second;

            visited[first][second] = 1;

            if (second < n - 1 && board[first][second + 1] == 'O' && visited[first][second + 1] == 0) {
                st.push(new Pair(first, second + 1));
                visited[first][second + 1] = 1;
            }

            // Left
            if (second > 0 && board[first][second - 1] == 'O' && visited[first][second - 1] == 0) {
                st.push(new Pair(first, second - 1));
                visited[first][second - 1] = 1;
            }

            // Down
            if (first < m - 1 && board[first + 1][second] == 'O' && visited[first + 1][second] == 0) {
                st.push(new Pair(first + 1, second));
                visited[first + 1][second] = 1;
            }

            // Up
            if (first > 0 && board[first - 1][second] == 'O' && visited[first - 1][second] == 0) {
                st.push(new Pair(first - 1, second));
                visited[first - 1][second] = 1;
            }
        }
    }
}
```

Output:



Accepted 58 / 58 testcases passed
A. submitted at Apr 09, 2025 11:53

Runtime
4 ms | Beats 21.76%

Memory
45.98 MB | Beats 16.94%

```
                }

                // Down
                if (first < m - 1 && board[first + 1][second] == 'O' && visited[first + 1][second] == 0) {
                    st.push(new Pair(first + 1, second));
                    visited[first + 1][second] = 1;
                }

                // Up
                if (first > 0 && board[first - 1][second] == 'O' && visited[first - 1][second] == 0) {
                    st.push(new Pair(first - 1, second));
                    visited[first - 1][second] = 1;
                }
            }
        }
}
```

Saved
Ln 81, Col 2

board =

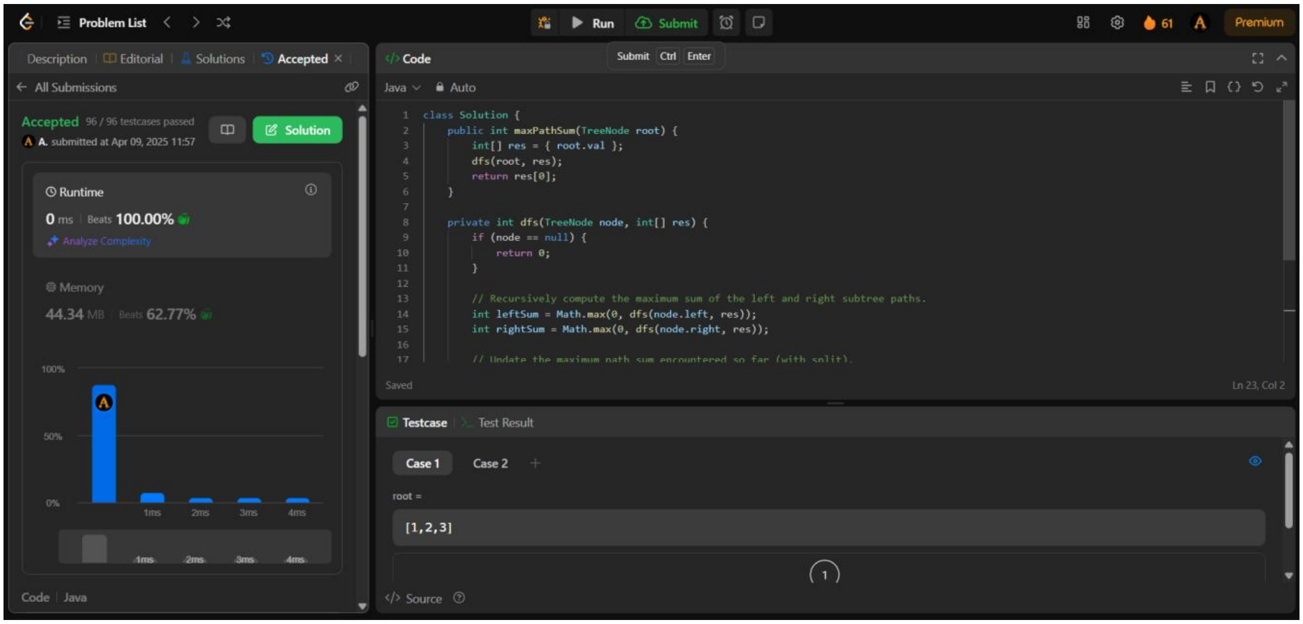
```
[["X","X","X","X"],["X","O","O","X"],["X","X","O","X"],["X","O","X","X"]]
```

4. Problem: Binary Tree Maximum Path Sum

Code:

```
class Solution {
    public int maxPathSum(TreeNode root) {
        int[] res = { root.val };
        dfs(root, res);
        return res[0];
    }

    private int dfs(TreeNode node, int[] res) {
        if (node == null) {
            return 0;
        }

        // Recursively compute the maximum sum of the left and right subtree paths.
        int leftSum = Math.max(0, dfs(node.left, res));
        int rightSum = Math.max(0, dfs(node.right, res));

        // Update the maximum path sum encountered so far (with split).
        res[0] = Math.max(res[0], leftSum + rightSum + node.val);

        // Return the maximum sum of the path (without split).
        return Math.max(leftSum, rightSum) + node.val;
    }
}
```

Output:



Accepted 96 / 96 testcases passed

A. submitted at Apr 09, 2025 11:57

Runtime

0 ms | Beats 100.00%

Memory

44.34 MB | Beats 62.77%

```
class Solution {
    public int maxPathSum(TreeNode root) {
        int[] res = { root.val };
        dfs(root, res);
        return res[0];
    }

    private int dfs(TreeNode node, int[] res) {
        if (node == null) {
            return 0;
        }

        // Recursively compute the maximum sum of the left and right subtree paths.
        int leftSum = Math.max(0, dfs(node.left, res));
        int rightSum = Math.max(0, dfs(node.right, res));

        // Update the maximum path sum encountered so far (with split).
```

Saved

Ln 23, Col 2

root =

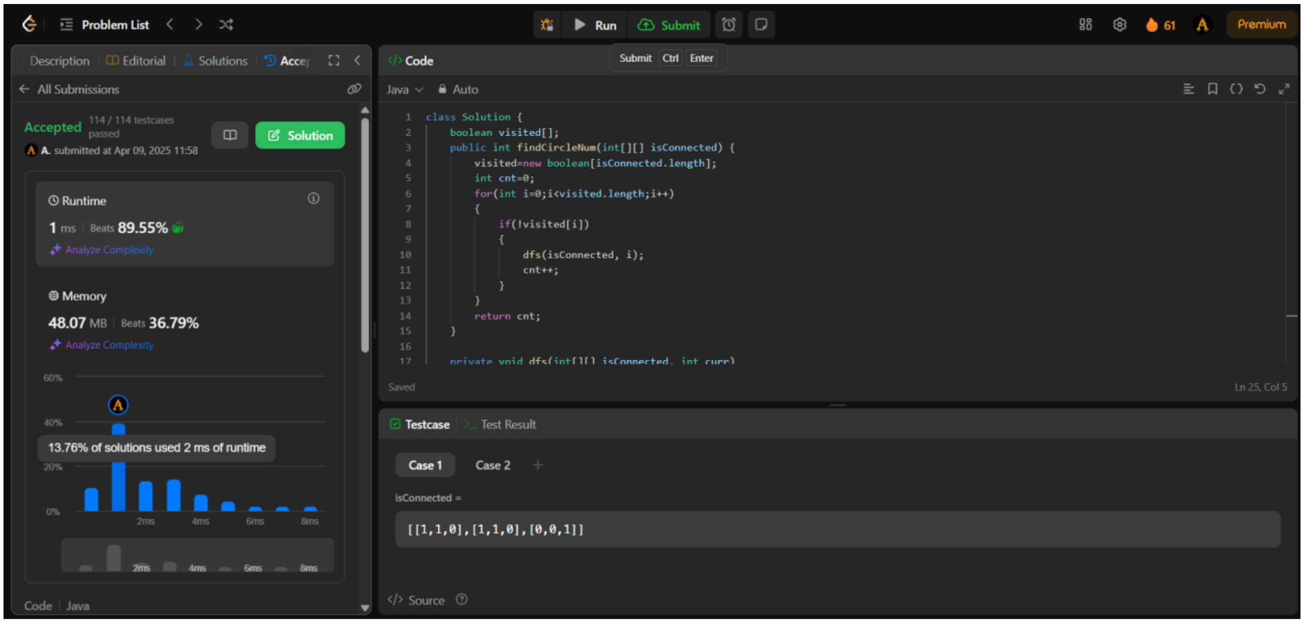
[1,2,3]

5. Problem: Friend Circles

Code:

```
class Solution {
    boolean visited[];
    public int findCircleNum(int[][] isConnected) {
        visited=new boolean[isConnected.length];
        int cnt=0;
        for(int i=0;i<visited.length;i++)
        {
            if(!visited[i])
            {
                dfs(isConnected, i);
                cnt++;
            }
        }
        return cnt;
    }

    private void dfs(int[][] isConnected, int curr)
    {
        visited[curr]=true;
        for(int i=0;i<isConnected[curr].length;i++)
        {
            if(isConnected[curr][i]==1 && !visited[i]) dfs(isConnected, i);
        }
    }
  }
```

Output:



Accepted 114 / 114 testcases passed

A. submitted at Apr 09, 2025 11:58

Runtime

1 ms | Beats 89.55%

Analyze Complexity

Memory

48.07 MB | Beats 36.79%

Analyze Complexity

13.76% of solutions used 2 ms of runtime

```
class Solution {
    boolean visited[];
    public int findCircleNum(int[][] isConnected) {
        visited=new boolean[isConnected.length];
        int cnt=0;
        for(int i=0;i<visited.length;i++)
        {
            if(!visited[i])
            {
                dfs(isConnected, i);
                cnt++;
            }
        }
        return cnt;
    }

    private void dfs(int[][] isConnected, int curr)
```

Saved

Ln 25, Col 5

isConnected =

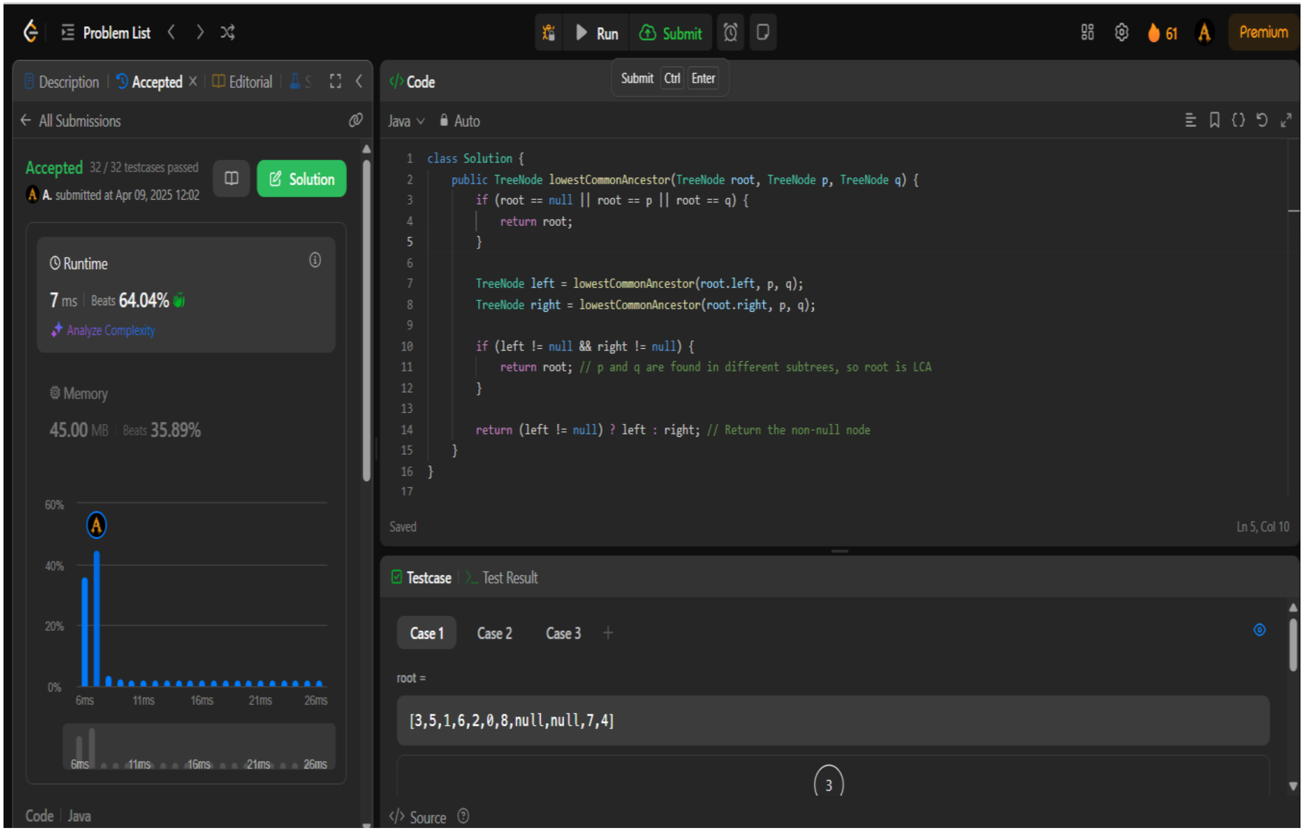
```
[[1,1,0],[1,1,0],[0,0,1]]
```

6. Problem : Lowest common ancestor of a binary tree

Code:

```
class Solution {
    public TreeNode lowestCommonAncestor(TreeNode root, TreeNode p, TreeNode q) {
        if (root == null || root == p || root == q) {
            return root;
        }

        TreeNode left = lowestCommonAncestor(root.left, p, q);
        TreeNode right = lowestCommonAncestor(root.right, p, q);

        if (left != null && right != null) {
            return root; // p and q are found in different subtrees, so root is LCA
        }

        return (left != null) ? left : right; // Return the non-null node
    }
}
```

Output:



Accepted 32 / 32 testcases passed
A. submitted at Apr 09, 2025 12:02

Runtime
7 ms | Beats 64.04%

Memory
45.00 MB | Beats 35.89%

```
class Solution {
    public TreeNode lowestCommonAncestor(TreeNode root, TreeNode p, TreeNode q) {
        if (root == null || root == p || root == q) {
            return root;
        }

        TreeNode left = lowestCommonAncestor(root.left, p, q);
        TreeNode right = lowestCommonAncestor(root.right, p, q);

        if (left != null && right != null) {
            return root; // p and q are found in different subtrees, so root is LCA
        }

        return (left != null) ? left : right; // Return the non-null node
    }
}
```

Saved
Ln 5, Col 10

root =

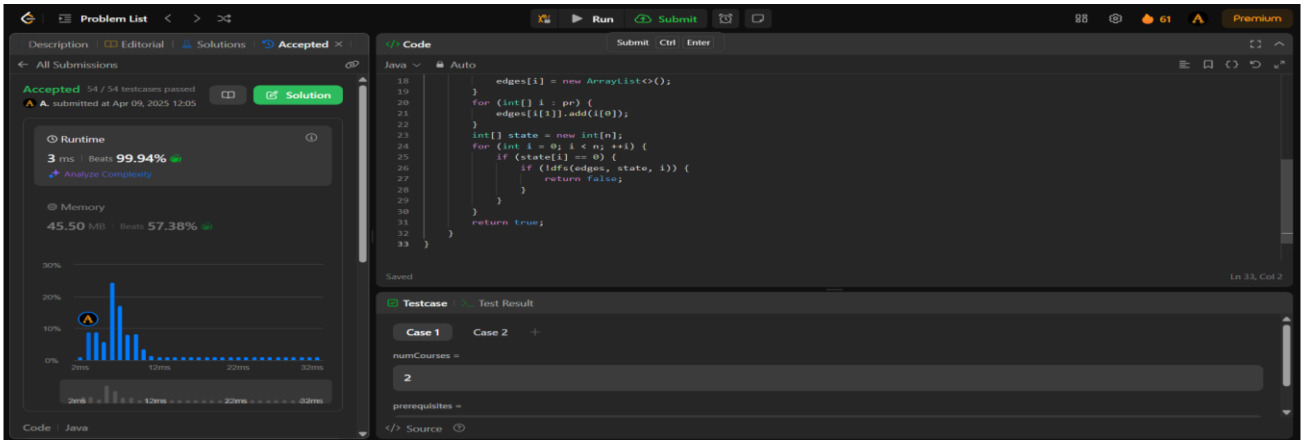
```
[3,5,1,6,2,0,8,null,null,7,4]
```

7. Problem: Course Schedule

Code:

```
class Solution {
    public boolean dfs(ArrayList<Integer>[] edges, int[] state, int in) {
        if (state[in] == 1) return false;
        if (state[in] == 2) return true;
        state[in] = 1;
        for (int i : edges[in]) {
            if (!dfs(edges, state, i)) {
                return false;
            }
        }
        state[in] = 2;
        return true;
    }

    public boolean canFinish(int n, int[][] pr) {
        ArrayList<Integer>[] edges = new ArrayList[n];
        for (int i = 0; i < n; ++i) {
            edges[i] = new ArrayList<>();
        }
        for (int[] i : pr) {
            edges[i[1]].add(i[0]);
        }
        int[] state = new int[n];
        for (int i = 0; i < n; ++i) {
            if (state[i] == 0) {
                if (!dfs(edges, state, i)) {
                    return false;
                }
            }
        }
        return true;
    }
}
```

Output:



Accepted 54 / 54 testcases passed
A. submitted at Apr 09, 2025 12:05

Runtime
3 ms | Beats 99.94%

Memory
45.50 MB | Beats 57.38%

```
            edges[i] = new ArrayList<>();
        }
        for (int[] i : pr) {
            edges[i[1]].add(i[0]);
        }
        int[] state = new int[n];
        for (int i = 0; i < n; ++i) {
            if (state[i] == 0) {
                if (!dfs(edges, state, i)) {
                    return false;
                }
            }
        }
        return true;
    }
}
```

Saved
Ln 33, Col 2

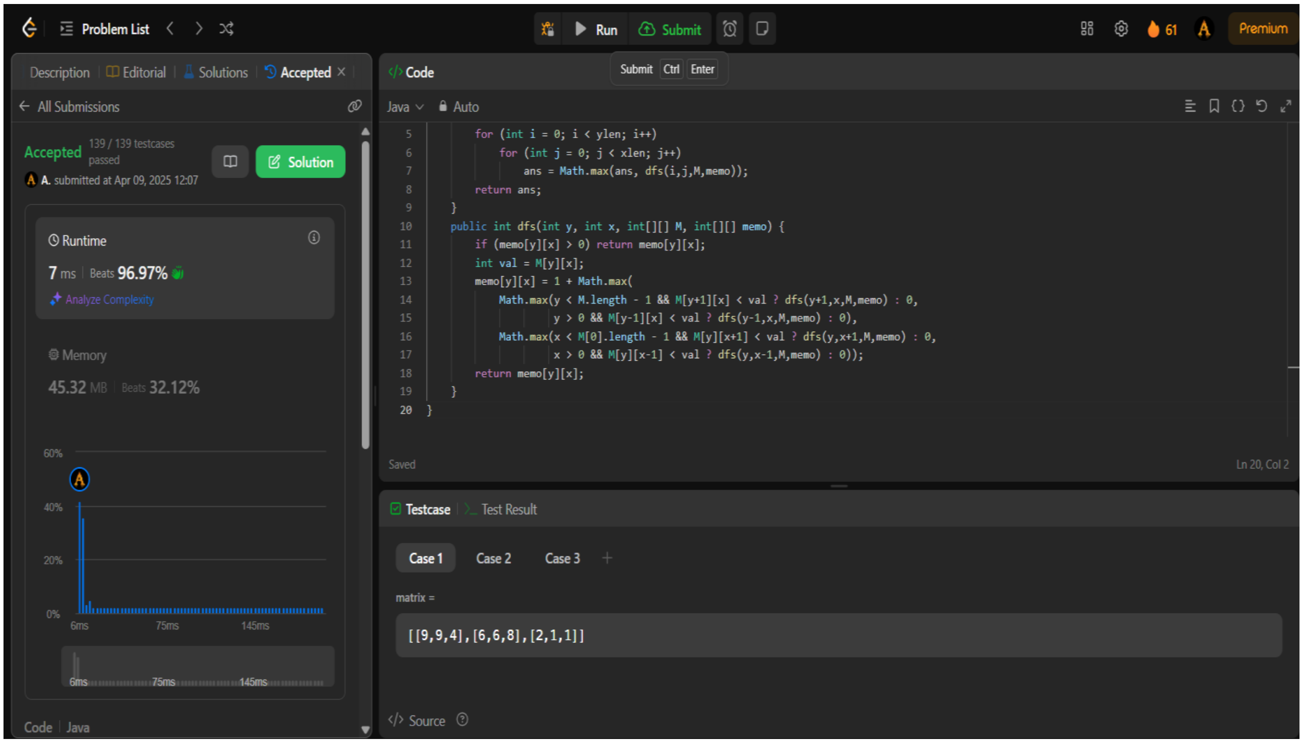
numCourses =
2
prerequisites =

8. Problem: Longest Increasing Path in a Matrix

Code:

```
class Solution {
    public int longestIncreasingPath(int[][] M) {
        int ylen = M.length, xlen = M[0].length, ans = 0;
        int[][] memo = new int[ylen][xlen];
        for (int i = 0; i < ylen; i++)
            for (int j = 0; j < xlen; j++)
                ans = Math.max(ans, dfs(i,j,M,memo));
        return ans;
    }
    public int dfs(int y, int x, int[][] M, int[][] memo) {
        if (memo[y][x] > 0) return memo[y][x];
        int val = M[y][x];
        memo[y][x] = 1 + Math.max(
            Math.max(y < M.length - 1 && M[y+1][x] < val ? dfs(y+1,x,M,memo) : 0,
                    y > 0 && M[y-1][x] < val ? dfs(y-1,x,M,memo) : 0),
            Math.max(x < M[0].length - 1 && M[y][x+1] < val ? dfs(y,x+1,M,memo) : 0,
                    x > 0 && M[y][x-1] < val ? dfs(y,x-1,M,memo) : 0));
        return memo[y][x];
    }
}
```

Output:



Accepted 139 / 139 testcases passed

A. submitted at Apr 09, 2025 12:07

Runtime

7 ms | Beats 96.97%

Memory

45.32 MB | Beats 32.12%

```
        for (int i = 0; i < ylen; i++)
            for (int j = 0; j < xlen; j++)
                ans = Math.max(ans, dfs(i,j,M,memo));
        return ans;
    }
    public int dfs(int y, int x, int[][] M, int[][] memo) {
        if (memo[y][x] > 0) return memo[y][x];
        int val = M[y][x];
        memo[y][x] = 1 + Math.max(
            Math.max(y < M.length - 1 && M[y+1][x] < val ? dfs(y+1,x,M,memo) : 0,
                     y > 0 && M[y-1][x] < val ? dfs(y-1,x,M,memo) : 0),
            Math.max(x < M[0].length - 1 && M[y][x+1] < val ? dfs(y,x+1,M,memo) : 0,
                     x > 0 && M[y][x-1] < val ? dfs(y,x-1,M,memo) : 0));
        return memo[y][x];
    }
}
```

Saved

Ln 20, Col 2

matrix =

```
[[9,9,4],[6,6,8],[2,1,1]]
```