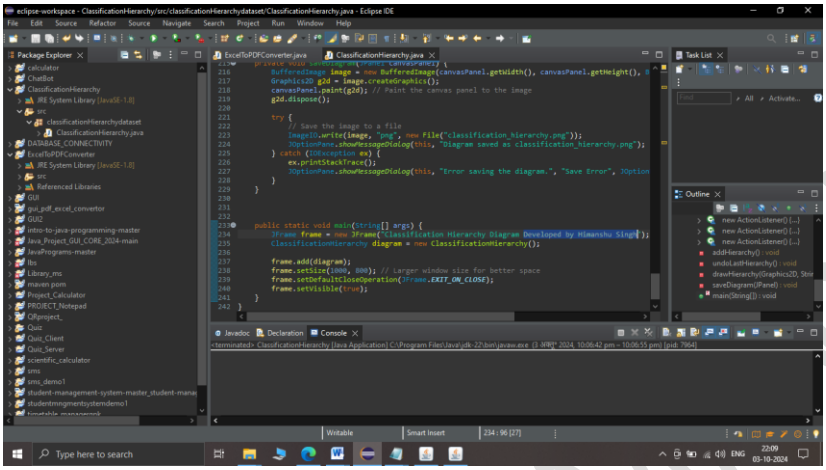
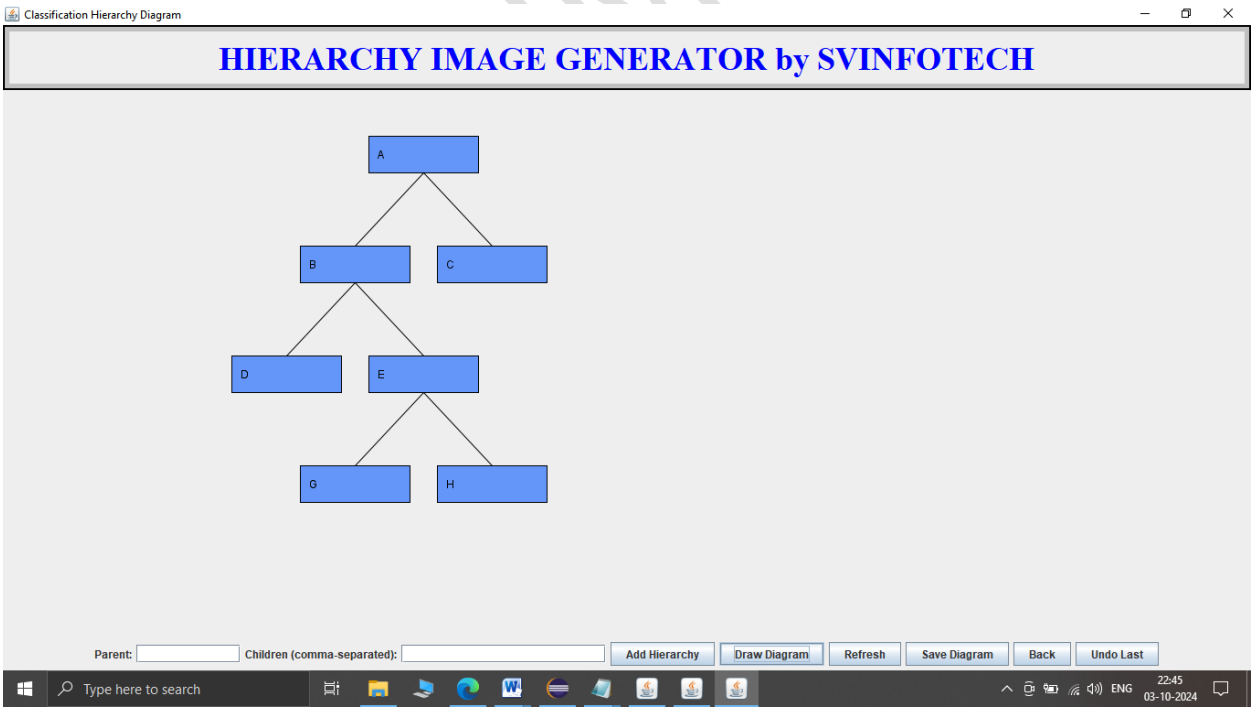
Classification of Dataset based on Hierarchy image generator using Java

Project name- ClasificationHierarchy

Src>> package_name-clasificationhierarchydataset

Package_name >>class_name-clasificationhierarchy.java





Source code:

```
package classificationHierarchydataset;


import javax.swing.*;
import javax.swing.border.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.awt.image.BufferedImage;
import java.io.File;
import java.io.IOException;
import java.util.HashMap;
import java.util.Map;
import java.util.Stack;
import javax.imageio.ImageIO;


public class ClassificationHierarchy extends JPanel {


   private Map<String, String[]> hierarchy = new HashMap<>();
```

```
    private Stack<String> undoStack = new Stack<>(); // Stack to track
hierarchy additions

    private JTextField parentField;

    private JTextField childrenField;

    private JButton addButton;

    private JButton drawButton;

    private JButton refreshButton;

    private JButton saveButton;

    private JButton backButton;

    private JButton undoButton;


    public ClassificationHierarchy() {

        setLayout(new BorderLayout());



        JPanel titlePanel = new JPanel();

        JLabel titleLabel = new JLabel("HIERARCHY IMAGE GENERATOR by
SVINFOTECH", SwingConstants.CENTER);

        titleLabel.setFont(new Font("Serif", Font.BOLD, 36));

// Set custom font and size
```

```
        titleLabel.setForeground(Color.BLUE);
 // Set title color


        // Create double-shaded border
        Border outerBorder = new LineBorder(Color.BLACK, 2);
// Outer black border
        Border innerBorder = new LineBorder(Color.LIGHT_GRAY, 5);
// Inner lighter border

titlePanel.setBorder(BorderFactory.createCompoundBorder(outerBorde
r, innerBorder));


        titlePanel.add(titleLabel); // Add label to the panel
        add(titlePanel, BorderLayout.NORTH);
 // Add title panel at the top









        // Input panel for parent and children fields
```

```
JPanel inputPanel = new JPanel();
inputPanel.setLayout(new FlowLayout());

parentField = new JTextField(10);
childrenField = new JTextField(20);

addButton = new JButton("Add Hierarchy");
drawButton = new JButton("Draw Diagram");
refreshButton = new JButton("Refresh");
saveButton = new JButton("Save Diagram");
backButton = new JButton("Back");
undoButton = new JButton("Undo Last");

inputPanel.add(new JLabel("Parent:"));
inputPanel.add(parentField);
inputPanel.add(new JLabel("Children (comma-separated):"));
inputPanel.add(childrenField);
inputPanel.add(addButton);
inputPanel.add(drawButton);
inputPanel.add(refreshButton);
```

```
        inputPanel.add(saveButton);
        inputPanel.add(backButton);
        inputPanel.add(undoButton);

        add(inputPanel, BorderLayout.SOUTH);

        // Canvas panel for drawing the hierarchy diagram
        JPanel canvasPanel = new JPanel(true) {
            @Override
            protected void paintComponent(Graphics g) {
                super.paintComponent(g);
                Graphics2D g2d = (Graphics2D) g;

                // Enable anti-aliasing for smoother lines and shapes
                g2d.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);

                // Draw the hierarchy starting from the first root
                if (hierarchy.size() > 0) {
                    for (String root : hierarchy.keySet()) {
```

```
                drawHierarchy(g2d, root, 400, 50, 120, 40); // Centering root at 400
                break; // Draw only one root for now
            }
        }
    }
};

add(canvasPanel, BorderLayout.CENTER);

// Button to add hierarchy data
addButton.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        addHierarchy();
    }
});

// Button to redraw the diagram
drawButton.addActionListener(new ActionListener() {
```

```
    @Override
    public void actionPerformed(ActionEvent e) {
        canvasPanel.repaint();
    }
});

// Refresh button to clear the diagram
refreshButton.addActionListener(new ActionListener() {
    @Override
    public void actionPerformed(ActionEvent e) {
        hierarchy.clear(); // Clear the hierarchy map
        canvasPanel.repaint(); // Redraw the canvas
        parentField.setText(""); // Clear the input fields
        childrenField.setText("");
        undoStack.clear(); // Clear the undo stack
    }
});

// Save button to save the diagram as an image
saveButton.addActionListener(new ActionListener() {
```

```
        @Override
        public void actionPerformed(ActionEvent e) {
            saveDiagram(canvasPanel); // Call method to save the diagram
        }
    });

    // Back button to clear input fields
    backButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            parentField.setText(""); // Clear parent field
            childrenField.setText(""); // Clear children field
            JOptionPane.showMessageDialog(ClassificationHierarchy.this,
"Input fields cleared. You can enter new data."); // Notify the user
        }
    });

    // Undo button to undo the last added hierarchy
    undoButton.addActionListener(new ActionListener() {
        @Override
```

```
        public void actionPerformed(ActionEvent e) {
            undoLastHierarchy();
            canvasPanel.repaint(); // Redraw the canvas
        }
    });
}

// Method to add hierarchy based on user input
private void addHierarchy() {
    String parent = parentField.getText().trim();
    String children = childrenField.getText().trim();
    if (parent.isEmpty() || children.isEmpty()) {
        JOptionPane.showMessageDialog(this, "Both parent and children
fields must be filled!",
            "Input Error", JOptionPane.ERROR_MESSAGE);
        return;
    }

    String[] childrenArray = children.split(",");
    for (int i = 0; i < childrenArray.length; i++) {
```

```
            childrenArray[i] = childrenArray[i].trim();
        }
        hierarchy.put(parent, childrenArray);
        undoStack.push(parent); // Store the parent in undo stack
        parentField.setText("");
        childrenField.setText("");
    }

    // Method to undo the last added hierarchy
    private void undoLastHierarchy() {
        if (!undoStack.isEmpty()) {
            String lastAddedParent = undoStack.pop();
            hierarchy.remove(lastAddedParent); // Remove the last added
hierarchy
            JOptionPane.showMessageDialog(this, "Last hierarchy removed:
" + lastAddedParent);
        } else {
            JOptionPane.showMessageDialog(this, "No hierarchy to undo!",
"Undo Error", JOptionPane.WARNING_MESSAGE);
        }
    }
```

```
// Recursive method to draw the classification hierarchy
private void drawHierarchy(Graphics2D g2d, String parent, int x, int y, int width, int height) {
    // Set color for parent node
    g2d.setColor(new Color(100, 150, 250)); // Blue for parent
    g2d.fillRect(x, y, width, height); // Fill the rectangle for parent
    g2d.setColor(Color.BLACK); // Set border color
    g2d.drawRect(x, y, width, height); // Draw border for parent
    g2d.drawString(parent, x + 10, y + 25); // Draw parent label

    String[] children = hierarchy.get(parent);
    if (children != null) {
        int numChildren = children.length;
        int childXStart = x - (numChildren - 1) * 150 / 2; // Center children under the parent
        int childY = y + height + 80; // Increased space below parent for children

        for (int i = 0; i < numChildren; i++) {
            int childX = childXStart + i * 150; // Space children evenly
```

```
            g2d.drawLine(x + width / 2, y + height, childX + width / 2,
childY); // Draw line to child


            // Set color for child node
            g2d.setColor(new Color(200, 250, 100)); // Green for children
            g2d.fillRect(childX, childY, width, height); // Fill the rectangle
for child
            g2d.setColor(Color.BLACK); // Set border color
            g2d.drawRect(childX, childY, width, height); // Draw border for
child
            g2d.drawString(children[i], childX + 10, childY + 25); // Draw
child label


            drawHierarchy(g2d, children[i], childX, childY, width, height);
// Recursively draw children
        }
    }
  }

  // Method to save the diagram as an image
  private void saveDiagram(JPanel canvasPanel) {
```

```
        BufferedImage image = new
BufferedImage(canvasPanel.getWidth(), canvasPanel.getHeight(),
BufferedImage.TYPE_INT_RGB);

        Graphics2D g2d = image.createGraphics();

        canvasPanel.paint(g2d); // Paint the canvas into the BufferedImage

        g2d.dispose(); // Dispose graphics context


        try {

            // Specify the file path and format

            File outputfile = new
File("classification_hierarchy_diagram.png");

            ImageIO.write(image, "png", outputfile); // Save the image as
PNG

            JOptionPane.showMessageDialog(this, "Diagram saved as " +
outputfile.getAbsolutePath());

        } catch (IOException e) {

            e.printStackTrace();

            JOptionPane.showMessageDialog(this, "Error saving diagram: " +
e.getMessage(),

                "Save Error", JOptionPane.ERROR_MESSAGE);

        }

    }
```

```
    public static void main(String[] args) {
        JFrame frame = new JFrame("Classification Hierarchy Diagram");
        ClassificationHierarchy diagram = new ClassificationHierarchy();

        frame.add(diagram);
        frame.setSize(1200, 800); // Larger canvas size
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setVisible(true);
    }
}
```


TESTING CODE:

```
package classificationHierarchydataset;


import javax.swing.*;
import javax.swing.border.*;
import java.awt.*;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.awt.image.BufferedImage;
import java.io.File;
import java.io.IOException;
import java.util.HashMap;
import java.util.Map;
import java.util.Stack;
import javax.imageio.ImageIO;


public class ClassificationHierarchy extends JPanel {


    private Map<String, String[]> hierarchy = new HashMap<>();
    private Stack<String> undoStack = new Stack<>();
// Stack to track hierarchy additions
```

```
    private JTextField parentField;
    private JTextField childrenField;
    private JButton addButton;
    private JButton drawButton;
    private JButton refreshButton;
    private JButton saveButton;
    private JButton backButton;
    private JButton undoButton;

    public ClassificationHierarchy() {
        setLayout(new BorderLayout());
```

```
        // Create the title panel with double-shaded border and custom
        //font
```

```
        JPanel titlePanel = new JPanel();
        JLabel titleLabel = new JLabel("HIERARCHY IMAGE GENERATOR by
SVINFOTECH", SwingConstants.CENTER);
        titleLabel.setFont(new Font("Serif", Font.BOLD, 36));
// Set custom font and size
        titleLabel.setForeground(Color.BLUE);
```

```
// Set title color


    // Create double-shaded border
    Border outerBorder = new LineBorder(Color.BLACK, 2);
// Outer black border
    Border innerBorder = new LineBorder(Color.LIGHT_GRAY, 5);
// Inner lighter border

titlePanel.setBorder(BorderFactory.createCompoundBorder(outerBorder, innerBorder));


    titlePanel.add(titleLabel); // Add label to the panel
    add(titlePanel, BorderLayout.NORTH);
// Add title panel at the top


    // Input panel for parent and children fields and buttons
    JPanel inputPanel = new JPanel();
    inputPanel.setLayout(new FlowLayout());
// You can use GridLayout or BoxLayout for a different arrangement
```

```
parentField = new JTextField(10);
childrenField = new JTextField(20);

addButton = new JButton("Add Hierarchy");
drawButton = new JButton("Draw Diagram");
refreshButton = new JButton("Refresh");
saveButton = new JButton("Save Diagram");
backButton = new JButton("Back");
undoButton = new JButton("Undo Last");

inputPanel.add(new JLabel("Parent:"));
inputPanel.add(parentField);
inputPanel.add(new JLabel("Children (comma-separated):"));
inputPanel.add(childrenField);
inputPanel.add(addButton);
inputPanel.add(drawButton);
inputPanel.add(refreshButton);
inputPanel.add(saveButton);
inputPanel.add(backButton);
inputPanel.add(undoButton);
```

```
        // Add the input panel directly below the title
        add(inputPanel, BorderLayout.CENTER);
    // Center position, right under the title panel


        // Canvas panel for drawing the hierarchy diagram
        JPanel canvasPanel = new JPanel(true) {
            @Override
            protected void paintComponent(Graphics g) {
                super.paintComponent(g);
                Graphics2D g2d = (Graphics2D) g;


                // Enable anti-aliasing for smoother lines and shapes
                g2d.setRenderingHint(RenderingHints.KEY_ANTIALIASING,
RenderingHints.VALUE_ANTIALIAS_ON);


                // Draw the hierarchy starting from the first root
                if (hierarchy.size() > 0) {
                    for (String root : hierarchy.keySet()) {
                        drawHierarchy(g2d, root, 400, 50, 120, 40);
```

```
// Centering root at 400
                    break;
// Draw only one root for now
                }
            }
        }
    };

    add(canvasPanel, BorderLayout.SOUTH);
// Below the input panel

    // Button to add hierarchy data
    addButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            addHierarchy();
        }
    });

    // Button to redraw the diagram
```

```
        drawButton.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                canvasPanel.repaint();
            }
        });

        // Refresh button to clear the diagram
        refreshButton.addActionListener(new ActionListener() {
            @Override
            public void actionPerformed(ActionEvent e) {
                hierarchy.clear();
 // Clear the hierarchy map
                canvasPanel.repaint();
// Redraw the canvas
                parentField.setText("");
// Clear the input fields
                childrenField.setText("");
                undoStack.clear();
 // Clear the undo stack
```

```
        }
    });

    // Save button to save the diagram as an image
    saveButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            saveDiagram(canvasPanel);
// Call method to save the diagram
        }
    });

    // Back button to clear input fields
    backButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            parentField.setText("");
// Clear parent field
            childrenField.setText("");
// Clear children field
```

```
            JOptionPane.showMessageDialog(ClassificationHierarchy.this,
"Input fields cleared. You can enter new data."); // Notify the user
        }
    });

    // Undo button to undo the last added hierarchy
    undoButton.addActionListener(new ActionListener() {
        @Override
        public void actionPerformed(ActionEvent e) {
            undoLastHierarchy();
            canvasPanel.repaint(); // Redraw the canvas
        }
    });
}

// Method to add hierarchy based on user input
private void addHierarchy() {
    String parent = parentField.getText().trim();
    String children = childrenField.getText().trim();
    if (parent.isEmpty() || children.isEmpty()) {
```

```
            JOptionPane.showMessageDialog(this, "Both parent and children
fields must be filled!",
                "Input Error", JOptionPane.ERROR_MESSAGE);
            return;
        }

        String[] childrenArray = children.split(",");
        for (int i = 0; i < childrenArray.length; i++) {
            childrenArray[i] = childrenArray[i].trim();
        }
        hierarchy.put(parent, childrenArray);
        undoStack.push(parent); // Store the parent in undo stack
        parentField.setText("");
        childrenField.setText("");
    }

    // Method to undo the last added hierarchy
    private void undoLastHierarchy() {
        if (!undoStack.isEmpty()) {
            String lastAddedParent = undoStack.pop();
```

```
            hierarchy.remove(lastAddedParent);
 // Remove the last added hierarchy
            JOptionPane.showMessageDialog(this, "Last hierarchy removed:
" + lastAddedParent);
        } else {
            JOptionPane.showMessageDialog(this, "No hierarchy to undo!",
"Undo Error", JOptionPane.WARNING_MESSAGE);
        }
    }

    // Recursive method to draw the classification hierarchy
    private void drawHierarchy(Graphics2D g2d, String parent, int x, int y,
int width, int height) {
        // Set color for parent node
        g2d.setColor(new Color(100, 150, 250));
// Blue for parent
        g2d.fillRect(x, y, width, height);
 // Fill the rectangle for parent
        g2d.setColor(Color.BLACK);
 // Set border color
        g2d.drawRect(x, y, width, height);
```

```
// Draw border for parent
        g2d.drawString(parent, x + 10, y + 25);
// Draw parent label


        String[] children = hierarchy.get(parent);
        if (children != null) {
            int numChildren = children.length;
            int childXStart = x - (numChildren - 1) * 150 / 2;
// Center children under the parent
            int childY = y + height + 80;
// Increased space below parent for children


            for (int i = 0; i < numChildren; i++) {
                int childX = childXStart + i * 150;
// Space children evenly
                g2d.drawLine(x + width / 2, y + height, childX + width / 2,
childY);
// Draw line to child


                // Set color for child node
```

```
            g2d.setColor(new Color(200, 250, 100));
// Green for children
            g2d.fillRect(childX, childY, width, height);
 // Fill the rectangle for child
            g2d.setColor(Color.BLACK);
// Set border color
            g2d.drawRect(childX, childY, width, height);
 // Draw border for child
            g2d.drawString(children[i], childX + 10, childY + 25);
// Draw child label


            drawHierarchy(g2d, children[i], childX, childY, width, height);
// Recursively draw children
        }
    }
  }

  // Method to save the diagram as an image
  private void saveDiagram(JPanel canvasPanel) {
```

```
        BufferedImage image = new
BufferedImage(canvasPanel.getWidth(), canvasPanel.getHeight(),
BufferedImage.TYPE_INT_RGB);

        Graphics2D g2d = image.createGraphics();

        canvasPanel.paint(g2d);

 // Paint the canvas panel to the image

        g2d.dispose();


        try {

            // Save the image to a file

            ImageIO.write(image, "png", new
File("classification_hierarchy.png"));

            JOptionPane.showMessageDialog(this, "Diagram saved as
classification_hierarchy.png");

        } catch (IOException ex) {

            ex.printStackTrace();

            JOptionPane.showMessageDialog(this, "Error saving the
diagram.", "Save Error", JOptionPane.ERROR_MESSAGE);

        }

    }
```

```
    public static void main(String[] args) {
        JFrame frame = new JFrame("Classification Hierarchy Diagram Developed by Himanshu Singh");
        ClassificationHierarchy diagram = new ClassificationHierarchy();

        frame.add(diagram);
        frame.setSize(1000, 800);
// Larger window size for better space
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setVisible(true);
    }
}
```

Create this project in eclipse ide:

Run this project with alt+shift+x

Project Report: Classification Hierarchy Diagram

1. Introduction

The Classification Hierarchy Diagram project aims to create an interactive Java Swing application that allows users to visualize hierarchical relationships among various classifications. The program provides a user-friendly interface for entering parent-child relationships, drawing a diagram to represent these relationships, and managing the hierarchy through various features.

2. Objectives

- To develop a graphical user interface (GUI) that allows users to input hierarchical data.
- To visualize the entered data as a hierarchical diagram with arrows indicating relationships.
- To implement functionality for adding, undoing, refreshing, saving, and displaying the hierarchy.

3. Tools and Technologies

- **Programming Language**: Java
- **Framework**: Java Swing
- **Development Environment**: Eclipse IDE
- **Graphics**: AWT and Swing for rendering graphics
- **Image Handling**: Java ImageIO for saving diagrams

4. Features

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4.1 User Input

- **Parent Input Field**: A text field for entering the parent classification.

- **Children Input Field**: A text field for entering children classifications in a comma-separated format.
- **Add Button**: To add the hierarchy based on user inputs.
- **Undo Button**: To remove the last added hierarchy entry.
- **Refresh Button**: To clear the current diagram and input fields.
- **Save Button**: To save the diagram as a PNG image.
- **Back Button**: To clear the input fields for new entries.

4.2 Visualization

- The program visually represents the hierarchy using rectangles for nodes (parent and child) with arrows connecting them.
- Different colors are used for parent and child nodes to enhance clarity.
- A title "SVINFOTECH" at the top with customized color styling.

4.3 Diagram Management

- **Drawing Logic**: The program uses recursive methods to render hierarchical structures, accommodating multi-level hierarchies.
- **Undo Functionality**: Users can undo the last entry, enhancing flexibility and ease of use.

5. Implementation

The project was implemented as follows:

5.1 Project Structure

- **Main Class**: ClassificationHierarchy
- **Components**:
  - Input fields for parent and children.
  - Buttons for adding, undoing, refreshing, saving, and back functionality.
  - A drawing area for rendering the hierarchy.

5.2 Code Overview

```
java
// Main class
public class ClassificationHierarchy extends JPanel {
   // Define components
   private Map<String, String[]> hierarchy = new HashMap<>();
   private Stack<String> undoStack = new Stack<>();
   private JTextField parentField;
   private JTextField childrenField;
   private JButton addButton, drawButton, refreshButton, saveButton, backButton, undoButton;
```

```
    public ClassificationHierarchy() {
        // GUI setup and layout
        ...
    }

    // Add hierarchy method
    private void addHierarchy() {
        ...
    }

    // Undo last hierarchy
    private void undoLastHierarchy() {
        ...
    }

    // Drawing the hierarchy
    private void drawHierarchy(Graphics2D g2d, String parent, int x, int y, int width, int height) {
        ...
    }

    // Save diagram as image
    private void saveDiagram(JPanel canvasPanel) {
        ...
    }

    public static void main(String[] args) {
        ...
    }
}
```

6. Results

The application successfully allows users to input and visualize hierarchical relationships. Users can interact with the application by adding classifications, undoing entries, refreshing the canvas, and saving diagrams. The GUI is intuitive and responsive, enhancing user experience.

7. Conclusion

The Classification Hierarchy Diagram project meets its objectives of providing an interactive tool for visualizing hierarchical data. The use of Java Swing allowed for the creation of a responsive and user-friendly interface, while the graphics handling enabled clear visualization of relationships.

8. Future Work

Potential improvements include:

- Adding features for editing existing entries.
- Implementing functionality for exporting diagrams in various formats (e.g., JPEG, SVG).
- Enhancing the GUI design with more visual customization options.

9. References

- Java Swing Documentation
- Java ImageIO Documentation
- Java AWT Graphics Documentation

Feel free to modify or expand on any sections according to your specific project needs or to include additional details such as screenshots, flowcharts, or user feedback.