Lab Assignment NO :8

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Subject: OOP&CG

Flood fill

```
import java.awt.*;
import java.awt.event.*;

public class FloodFillDemo extends Frame implements MouseListener {
   int width = 400, height = 400;
   int[][] pixels = new int[width][height]; // 0=empty, 1=filled (boundary), 2=filled (color)

   public FloodFillDemo() {
      setTitle("Flood Fill Demo");
      setSize(width, height);
      addMouseListener(this);

      // Create a simple rectangle boundary
      for (int x = 100; x <= 300; x++) {
         pixels[x][100] = 1;
         pixels[x][300] = 1;
      }
      for (int y = 100; y <= 300; y++) {
```

```
        pixels[100][y] = 1;
        pixels[300][y] = 1;
    }

    setVisible(true);
}

@Override
public void paint(Graphics g) {
    for (int x = 0; x < width; x++) {
        for (int y = 0; y < height; y++) {
            if (pixels[x][y] == 1) {
                g.setColor(Color.BLACK); // boundary
                g.drawLine(x, y, x, y);
            } else if (pixels[x][y] == 2) {
                g.setColor(Color.RED); // filled
                g.drawLine(x, y, x, y);
            }
        }
    }
}

// Flood fill algorithm (4-connected)
public void floodFill(int x, int y) {
    if (x < 0 || x >= width || y < 0 || y >= height)
        return;
    if (pixels[x][y] != 0)
        return;

    pixels[x][y] = 2; // fill color
```

```
        floodFill(x + 1, y);
        floodFill(x - 1, y);
        floodFill(x, y + 1);
        floodFill(x, y - 1);
    }

    @Override
    public void mouseClicked(MouseEvent e) {
        int x = e.getX();
        int y = e.getY();
        floodFill(x, y);
        repaint();
    }

    public void mousePressed(MouseEvent e) {}
    public void mouseReleased(MouseEvent e) {}
    public void mouseEntered(MouseEvent e) {}
    public void mouseExited(MouseEvent e) {}

    public static void main(String[] args) {
        new FloodFillDemo();
    }
}
```

Boundary Fill

```
import java.awt.*;
import java.awt.event.*;

public class BoundaryFillDemo extends Frame implements MouseListener {
```

```
int width = 400, height = 400;
int[][] pixels = new int[width][height]; // 0=empty, 1=boundary, 2=filled

public BoundaryFillDemo() {
    setTitle("Boundary Fill Demo");
    setSize(width, height);
    addMouseListener(this);

    // Create a simple rectangle boundary
    for (int x = 100; x <= 300; x++) {
        pixels[x][100] = 1;
        pixels[x][300] = 1;
    }
    for (int y = 100; y <= 300; y++) {
        pixels[100][y] = 1;
        pixels[300][y] = 1;
    }

    setVisible(true);
}

@Override
public void paint(Graphics g) {
    for (int x = 0; x < width; x++) {
        for (int y = 0; y < height; y++) {
            if (pixels[x][y] == 1) {
                g.setColor(Color.BLACK); // boundary
                g.drawLine(x, y, x, y);
            } else if (pixels[x][y] == 2) {
                g.setColor(Color.BLUE); // filled
                g.drawLine(x, y, x, y);
```

```
        }
      }
    }
}

// Boundary fill (4-connected)
public void boundaryFill(int x, int y, int fillColor, int boundaryColor) {
    if (x < 0 || x >= width || y < 0 || y >= height)
        return;
    if (pixels[x][y] == boundaryColor || pixels[x][y] == fillColor)
        return;

    pixels[x][y] = fillColor;

    boundaryFill(x + 1, y, fillColor, boundaryColor);
    boundaryFill(x - 1, y, fillColor, boundaryColor);
    boundaryFill(x, y + 1, fillColor, boundaryColor);
    boundaryFill(x, y - 1, fillColor, boundaryColor);
}

@Override
public void mouseClicked(MouseEvent e) {
    int x = e.getX();
    int y = e.getY();
    boundaryFill(x, y, 2, 1);
    repaint();
}

public void mousePressed(MouseEvent e) {}
public void mouseReleased(MouseEvent e) {}
public void mouseEntered(MouseEvent e) {}
```

```
    public void mouseExited(MouseEvent e) {}

    public static void main(String[] args) {
        new BoundaryFillDemo();
    }
}
```

Scanline fill Interactive

```
import java.awt.*;
import java.awt.event.*;
import java.util.ArrayList;

public class InteractiveScanlineFill extends Frame implements MouseListener, KeyListener {
    ArrayList<Point> points = new ArrayList<>();
    boolean fill = false;

    public InteractiveScanlineFill() {
        super("Interactive Scanline Fill");
        setSize(500, 500);
        setLocationRelativeTo(null);

        addMouseListener(this);
        addKeyListener(this);

        addWindowListener(new WindowAdapter() {
            public void windowClosing(WindowEvent e) {
                dispose();
                System.exit(0);
            }
```

```
    });

    setVisible(true);
}

@Override
public void paint(Graphics g) {
    if (points.size() > 1) {
        // Draw polygon outline
        g.setColor(Color.BLACK);
        for (int i = 0; i < points.size(); i++) {
            Point p1 = points.get(i);
            Point p2 = points.get((i + 1) % points.size());
            g.drawLine(p1.x, p1.y, p2.x, p2.y);
        }
    }

    if (fill && points.size() >= 3) {
        scanlineFill(g);
    }
}

private void scanlineFill(Graphics g) {
    int n = points.size();
    int[] px = new int[n];
    int[] py = new int[n];
    for (int i = 0; i < n; i++) {
        px[i] = points.get(i).x;
        py[i] = points.get(i).y;
    }
```

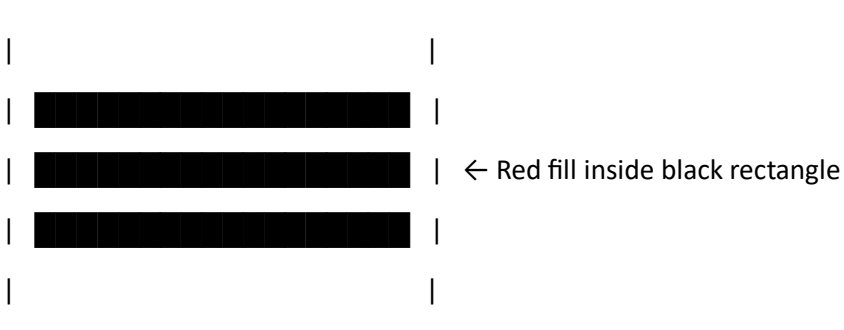
```
int ymin = py[0], ymax = py[0];
for (int i = 1; i < n; i++) {
   if (py[i] < ymin) ymin = py[i];
   if (py[i] > ymax) ymax = py[i];
}

g.setColor(Color.ORANGE);

for (int y = ymin; y <= ymax; y++) {
   int[] nodes = new int[n];
   int nodesCount = 0;

   int j = n - 1;
   for (int i = 0; i < n; i++) {
      if ((py[i] < y && py[j] >= y) || (py[j] < y && py[i] >= y)) {
         nodes[nodesCount++] = px[i] + (y - py[i]) * (px[j] - px[i]) / (py[j] - py[i]);
      }
      j = i;
   }

   // sort intersections
   for (int i = 0; i < nodesCount - 1; i++) {
      for (int k = i + 1; k < nodesCount; k++) {
         if (nodes[i] > nodes[k]) {
            int temp = nodes[i];
            nodes[i] = nodes[k];
            nodes[k] = temp;
         }
      }
   }
```

```
        // draw horizontal lines between pairs of intersections
        for (int i = 0; i < nodesCount; i += 2) {
            if (i + 1 < nodesCount) {
                g.drawLine(nodes[i], y, nodes[i + 1], y);
            }
        }
    }
}

// Mouse: add point on click
@Override
public void mouseClicked(MouseEvent e) {
    if (!fill) {
        points.add(e.getPoint());
        repaint();
    }
}

public void mousePressed(MouseEvent e) {}
public void mouseReleased(MouseEvent e) {}
public void mouseEntered(MouseEvent e) {}
public void mouseExited(MouseEvent e) {}

// Key: press F to fill
@Override
public void keyPressed(KeyEvent e) {
    if (e.getKeyCode() == KeyEvent.VK_F && points.size() >= 3) {
        fill = true;
        repaint();
    }
}
```

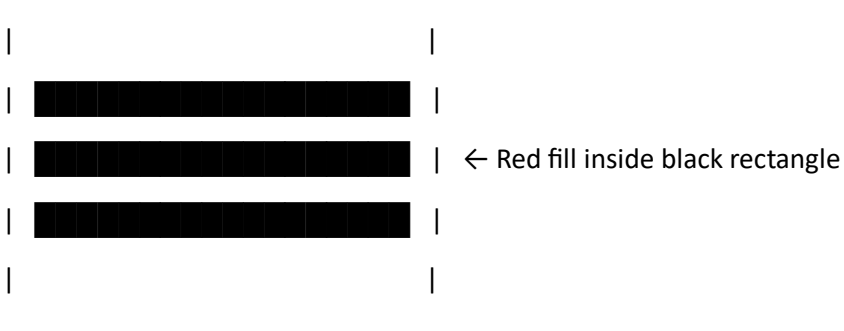
```
    public void keyTyped(KeyEvent e) {}
    public void keyReleased(KeyEvent e) {}

    public static void main(String[] args) {
        new InteractiveScanlineFill();
    }
}
```

OUTPUT:

a)Flood Fill Algorithm:



b)Boundary Fill Algorithm:



c)Interactive Scanline Fill Algorithm:

Before pressing F:

After pressing F:

(Polygon filled with Orange color)