

PROGRAM TITLE:Perform Zooming or Shrinking of an Image using Bilinear Method.**PROGRAM CODE:**

```
import java.io.*;
import java.util.*;
import java.awt.Color;
import java.awt.image.*;
import javax.imageio.*;

class Bilinear {
    String meta = "";
    int width, height;
    int image[][];

    public Bilinear(String imgLoc) {

        try {
            BufferedReader br = new BufferedReader(new
            FileReader(imgLoc));
            meta += br.readLine() + "\n";
            meta += br.readLine() + "\n";

            String rc = br.readLine();
            width = Integer.parseInt(rc.split(" ")[0]);
            System.out.println("Width = " + width);
            height = Integer.parseInt(rc.split(" ")[1]);
            System.out.println("Height = " + height);

            meta += br.readLine() + "\n";
            image = new int[height][width];

            for (int i = 0; i < height; i++)
                for (int j = 0; j < width; j++)
                    image[i][j] = Integer.parseInt(br.readLine());

            br.close();
        } catch (Exception e) {
            System.out.println(e);
        }
    }

    public void zoomByFactor(double x, double y) {
        int newWidth = (int) ((double) width * x);
        int newHeight = (int) ((double) height * y);

        int newImage[][] = new int[newHeight][newWidth];

        int q11, q12, q21, q22, pixelValue;
        double x_top, x_bottom, X, Y;

        for (int i = 0; i < newHeight; i++) {
            for (int j = 0; j < newWidth; j++) {
                if (i % y == 0 && j % x == 0) {
```

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        newImage[i][j] = image[(int) (i / y)][(int) (j / x)];
    } else {
        try {
            //getting the 4 known points:
            q11 = image[(int) (i / y)][(int) (j / x)]; //top left
            q12 = image[(int) (i / y)][(int) (j / x + 1)]; //top
right
            q21 = image[(int) (i / y + 1)][(int) (j / x)]; //bottom
left
            q22 = image[(int) (i / y + 1)][(int) (j / x +
1)]; //bottom right

            //getting distance from nearest points
            X = (double) ((j%x) / x);
            Y = (double) ((i%y) / y);

            //interpolation:
            x_top = q11 * X + q12 * (1 - X);
            x_bottom = q21 * X + q22 * (1 - X);

            pixelValue = (int) (x_top * Y + x_bottom * (1 - Y));

            newImage[(int) i][(int) j] = pixelValue;
        } catch (Exception e) {
            continue;
        }
    }
}

width = newWidth;
height = newHeight;
image = newImage;
}

public void output() {
    try {
        PrintWriter printer = new PrintWriter(new
FileWriter("./img/o-zoom-bilinear.pgm"));
        printer.println(meta.split("\n")[0]);
        printer.println(meta.split("\n")[1]);
        printer.println(width + " " + height);
        printer.println(meta.split("\n")[2]);

        for (int i = 0; i < height; i++) {
            for (int j = 0; j < width; j++) {
                printer.println(image[i][j]);
            }
        }
        printer.close();
        System.out.println("Image has been written to file");
    } catch (Exception e) {
        System.out.println(e);
    }
}

public static void main(String args[]) {
    Bilinear nr = new Bilinear("./img/input.pgm");

```

```

Scanner sc = new Scanner(System.in);
System.out.print("Enter width factor: ");
double x = sc.nextDouble();
System.out.print("Enter height factor: ");
double y = sc.nextDouble();

sc.close();

nr.zoomByFactor(x, y); // width, height zoom factors
nr.output();
}
}

```

OUTPUT :



Original Image



Image after Zooming by factors 1.25 and .75