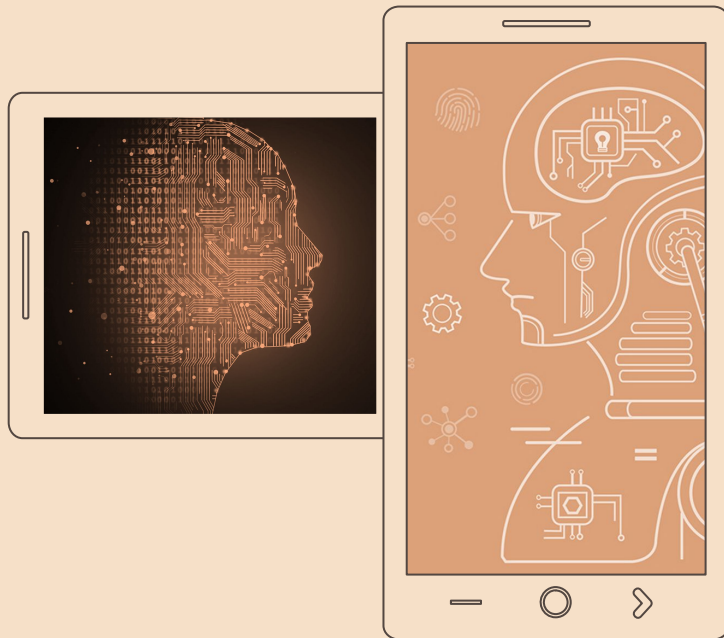


Machine



Linear Regression With Java

Machine Learning

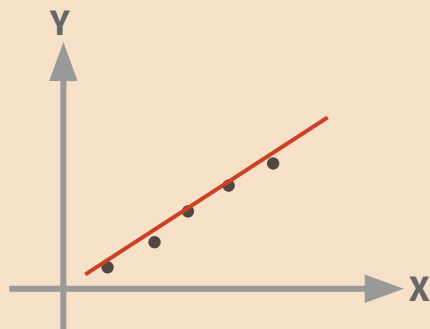
Learning

Project Explanation:

Give X for making a prediction of Y by using Regression Formula calculating the data set:

Data Set:

X Values	Y Values
60	3.1
61	3.6
62	3.8
63	4
65	4.1



Make a prediction of X = 64.

Regression Formula

Regression Equation(y) = a + bx

Slope(b) = $(N\Sigma XY - (\Sigma X)(\Sigma Y)) / (N\Sigma X^2 - (\Sigma X)^2)$

Intercept(a) = $(\Sigma Y - b(\Sigma X)) / N$

Step 1: Find N

Step 2: Find X * Y, X²

Step 3: Find ΣX , ΣY , ΣXY , ΣX^2

Step 4: Find Slope(b)

Step 5: Find Intercept(a)

Step 6: Find Y

```

public static void step1(String fileName) {
    ArrayList<Double> x = new ArrayList();
    ArrayList<Double> y = new ArrayList();
    try {
        FileInputStream fis = new FileInputStream(fileName);
        int n;
        while ((n = fis.available()) > 0) {
            byte[] b = new byte[n];
            int result = fis.read(b);
            if (result == -1) break;
            String s = new String(b);
            s = s.replaceAll("\n", " ");
            String[] s2 = s.split(" ");
            for(int j = 0; j < s2.length ; j+=2){
                x.add(Double.parseDouble(s2[j]));
                y.add(Double.parseDouble(s2[j+1]));
            }
        }
    } catch (FileNotFoundException e) {
        System.err.println("Could not find file " + fileName);
    } catch (IOException e) {
        System.err.println(e);
    }
    step2(x,y,x.size()); // N = x.size
}

```

1

Find N

Get Date Set from file

```
public static void step2(ArrayList<Double> x,  
                        ArrayList<Double> y,  
                        int n){  
    ArrayList<Double> xy = new ArrayList();  
    ArrayList<Double> xx = new ArrayList();  
    for(int i = 0; i < n; i++){  
        xy.add(x.get(i)*y.get(i));  
        xx.add(x.get(i)*x.get(i));  
    }  
    step3(x, y, xx, xy, n); //X^2 = xx, X*Y = xy  
}
```

2

Find
 $X * Y, X^2$

```

public static void step3(ArrayList<Double> x,
                        ArrayList<Double> y,
                        ArrayList<Double> xx,
                        ArrayList<Double> xy,
                        int n){
    Double sum_x = 0.0, sum_y = 0.0, sum_xx = 0.0, sum_xy = 0.0;
    for(int i = 0; i < n; i++){
        sum_x += x.get(i);
        sum_y += y.get(i);
        sum_xx += xx.get(i);
        sum_xy += xy.get(i);
    }
    step4(sum_x, sum_y, sum_xx, sum_xy, n);
} //  $\Sigma X = \text{sum\_x}$ ,  $\Sigma Y = \text{sum\_y}$ ,  $\Sigma XY = \text{sum\_xy}$ ,  $\Sigma X^2 = \text{sum\_xx}$ 

```

3

Find
 ΣX , ΣY ,
 ΣXY , ΣX^2

```
public static void step4(Double sum_x,  
                        Double sum_y,  
                        Double sum_xx,  
                        Double sum_xy,  
                        int n){  
    Double b = (n*sum_xy-(sum_x*sum_y))/(n*sum_xx-(sum_x*sum_x));  
    step5(sum_x,sum_y,b,n); // Slope(b) = b  
}
```

4

Find Slope(b)

```
public static void step5(Double sum_x,  
                        Double sum_y,  
                        Double b,  
                        int n){  
    Double a = (sum_y-(b*sum_x))/n;  
    step6(a,b,n); // Intercept(a) = a  
}
```

5

Find Intercept(a)


```
public static void step6(Double a, Double b, int n){  
    Double Y = a+b*64; // X = 64, Y = y  
    System.out.println("X = 64, Y = "+Y);  
}
```

6

Find
Y

Java code

Main Code

```
public static void main(String args[]) {  
    step1("input.txt");  
}
```

Input.txt

```
60 3.1  
61 3.6  
62 3.8  
63 4  
65 4.1
```

Output

X = 64, Y = 4.058108108108099

THANKS!

