

# 15Z332 Ex5 - Regression

October 17, 2018

## 1 Exercise 5

### 1.1 Linear Regression

#### 1.1.1 Step 1:

Read (x,y) values from user

```
In [2]: n = int(input("Enter the number of values"))
        points = []
        print("Enter (x,y):")
        for i in range(n):
            points.append([])
            points[i].append(float(input("Xval = ")))
            points[i].append(float(input("Yval = ")))
```

Enter the number of values5

Enter (x,y):

Xval = 1

Yval = 1

Xval = 2

Yval = 2

Xval = 3

Yval = 1.3

Xval = 4

Yval = 3.75

Xval = 5

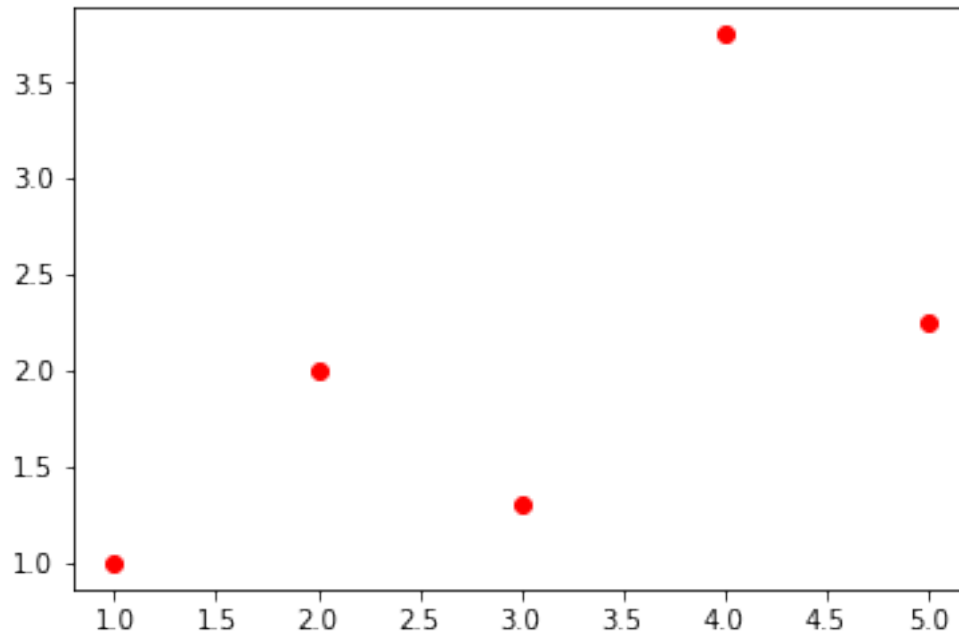
Yval = 2.25

#### 1.1.2 Step 1a:

Plot the values in a graph (scatter plot)

```
In [4]: import matplotlib.pyplot as plt
        plt.plot([group[0] for group in points], [group[1] for group in points], 'ro')
```

```
Out[4]: [<matplotlib.lines.Line2D at 0x115d5ce10>]
```



### 1.1.3 Step 2: Find alpha and beta in $y = (\text{beta})x + (\text{alpha})$

Formula:  $\alpha = \text{mean}(y) - (\text{beta}) * \text{mean}(x)$   $\text{beta} = \text{covariance}(x,y) / \text{variance}(x)$

1) Calculate mean of X and Y

```
In [5]: xMean = sum([group[0] for group in points])/n
        yMean = sum([group[1] for group in points])/n
        print("X Mean = "+str(xMean))
        print("Y Mean = "+str(yMean))
```

X Mean = 3.0

Y Mean = 2.06

2) Calculate sum( $x*y$ )

```
In [6]: xy = 0
        for i in range(n):
            xy = xy + points[i][0]*points[i][1]
        print('XY = ',xy)
```

XY = 35.15

3) Compute alpha and beta and write the line formula

```
In [8]: beta = (xy - n*xMean*yMean)/((sum([group[0]**2 for group in points])) - n*(xMean**2))
        alpha = yMean - beta*xMean
        print("y = "+str(round(beta,3))+ "x + "+str(round(alpha,3)))
```

y = 0.425x + 0.785

Plot the line-of-best-fit alongside scatter plot

```
In [9]: import numpy as np
        x = np.array([group[0] for group in points])
        y = np.array([group[1] for group in points])
        plt.plot(x, y, 'ro')
        plt.plot(x,a*x+b )
```

Out[9]: [<matplotlib.lines.Line2D at 0x115da0828>]

