

Assignment 2

AI1110: Probability and Random Variables

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PROBLEM 2(A)

The following results were obtained with respect to two variable x and y

$$\sum x = 15, \sum y = 25, \sum xy = 83$$

$$\sum x^2 = 55, \sum y^2 = 135, \sum n = 5$$

- 1) Find the regression coefficient b_{xy}
- 2) Find the regression equation of x on y

SOLUTION

we are already given the

$$\sum x = 15, \sum y = 25, \sum xy = 83$$

$$\sum x^2 = 55, \sum y^2 = 135, \sum n = 5$$

so let's start the part wise solutions

Part 1

in this part we need to find the regression coefficient b_{xy}
the formulae for calculating b_{xy} is

$$b_{xy} = \frac{\sum xy - \frac{\sum x \times \sum y}{n}}{\sum y^2 - \frac{(\sum y)^2}{n}} \quad (1)$$

on substituting the values in eq(1) and simplifying we get

$$b_{xy} = \frac{83 - \frac{15 \times 25}{5}}{135 - \frac{(25)^2}{5}} = \frac{4}{5} = 0.8 \quad (2)$$

\therefore the value of b_{xy} is 0.8

Part 2

in this part we need to find the regression equation of x on y
formulae for that is

$$x - \bar{x} = b_{xy}(y - \bar{y}) \quad (3)$$

where \bar{x}, \bar{y} are average of x and y

$$\bar{x} = \frac{\sum x}{n} = \frac{15}{5} = 3 \quad (4)$$

$$\bar{y} = \frac{\sum y}{n} = \frac{25}{5} = 5 \quad (5)$$

substituting values in eq(3) we get

$$x - 3 = \frac{4}{5}(y - 5) \quad (6)$$

$$5x - 15 = 4y - 20 \quad (7)$$

final simplified equation is

$$5x - 4y + 5 = 0 \quad (8)$$

\therefore regression equation of x on y is $5x - 4y + 5 = 0$ and the plot of eq(8) is down below

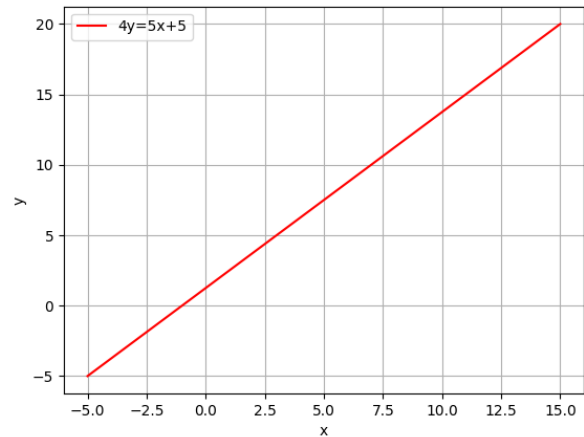


Fig. 1. graph of regression equation of x on y