

# Machine Learning

## Linear Regression

→ mathematic-basic fund of ML

→ LR is 2 variable → dependent } find  
Independent } relationship

\* on this basis prediction made.

→ LR equation

$$y = mx + b$$

y - dependent → prediction

x - Independent → on which basis prediction made.

m - slope (How much 'y' changes for a unit change in 'x')

If I change one unit in 'x' how many 'y' changes.

b - intercept (if  $x = 0$ , what will be 'y' value)

# Prediction Pizza Prices

1) Data collection - Data info, clean.

Diameter (x) in inches	Prices (y) in \$	mean(x)	mean(y)
8	10	10	13
10	13		
12	16		

Deviations (x)	Devi (y)	Product of Deviation	Sum of Prod of Deviation	Square
-2	-3	6	12	4
0	0	0		0
2	3	6		4

$$y = mx + b$$

$\downarrow$  data given       $\downarrow$  data given

$$\text{mean} = \frac{8+10+12}{3} = 10$$

(x)

$$\text{mean} = \frac{10+13+16}{3} = 13$$

y

$$\text{deviation} \Rightarrow \text{mean } x - \text{mean.}$$

(x)

$$\text{deviation} \Rightarrow y - \text{mean.}$$

(y)

$$\text{Product of Deviation} = \text{Dev}(x) * \text{Dev}(y)$$

Sum of product of Dev = add (prod. of Dev)

$$\text{Square of Dev}(x) = \text{Dev}(x)^2$$


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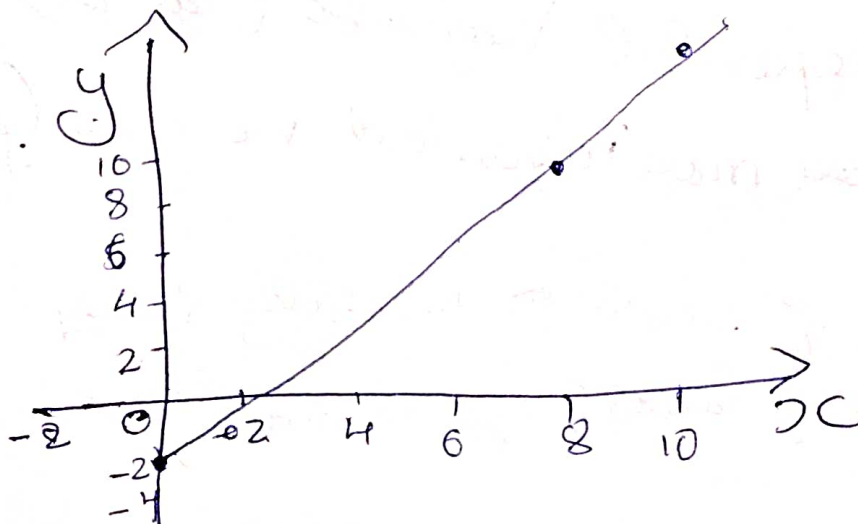
$$\text{Calculate } (m) = \frac{\text{sum of product of Deviation}}{\text{Sum of Square of deviation of } x}$$

$$= \frac{12}{4+0+4} = \frac{12}{8} = 1.5 = m$$

∴ If I change 1 point X, then in y  
1.5 point changes.

$$\begin{aligned} \text{Calculate } (b) &= \text{mean of } y - (m * \text{mean of } x) \\ &= 13 - (1.5 \times 10) \\ &= 13 - 15 \end{aligned}$$

$$b = -2$$



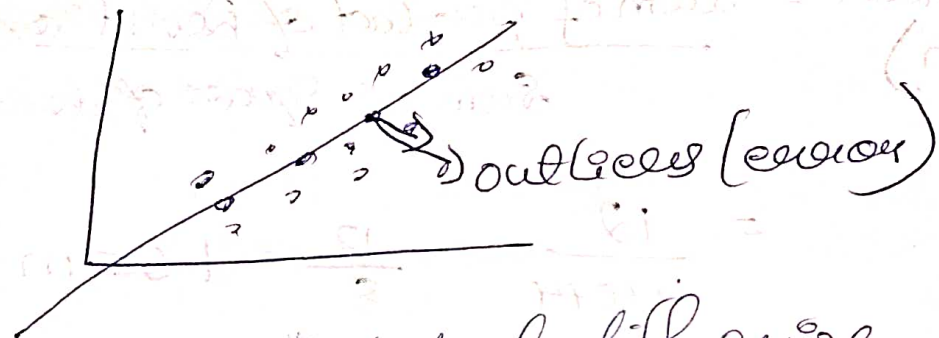


Suppose

$$\begin{aligned} & 20 \text{ inches} \\ & m \times \text{inches} - b \\ & = 1.5 \times 20 - 2 \end{aligned}$$

$$= 30 - 2$$

$$= 28 \$ \quad (\text{best case}) \text{ getting line}$$



becoz some will keep diff prize  
for 20.

→ we try to reduce the errors.

Linear Regression is a fundamental statistical technique used to model the relationship between dependent variable (Target) and one or more independent variable (features).

Single → No of hours → monthly salary

multi → No of hours & age → monthly salary