Residual error: The diff b/w one actual data point with its predicted data point

Date ______ Day ______

"LINEAR REGRESSION"

→ Eqn of Linear Regression

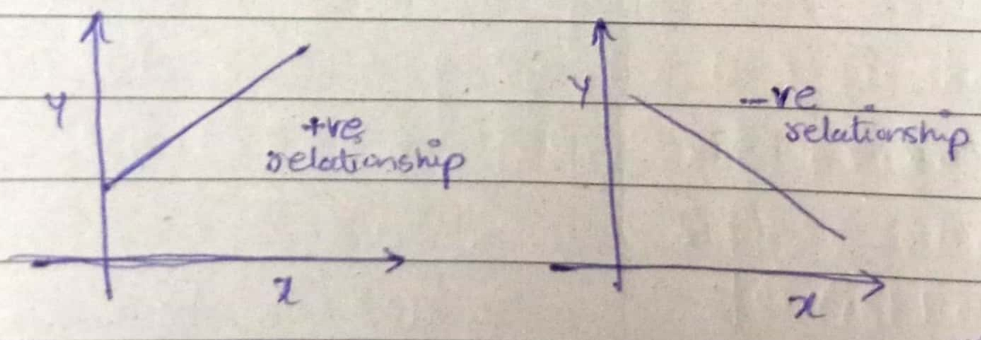
$$Y = mx + b$$

- b → intercept (value of Y when x=0)
- Y → dependent variable (response variable)
- x → independent var (explanatory or predictor variable)
- m → slope (how much Y changes for a unit change in x)

→ Used for predicting continuous values.

↳ Predicting house price

↳ Stock Price, ~~House Price pre~~ estimated delivery time prediction



▷ Least Square Regression: → works only on 2 features. Doesnot give optimal weights

$$m = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}$$

$$b = \frac{\Sigma y - m(\Sigma x)}{n}$$

Day

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x	y	x^2	y^2	xy
1	1	1	1	1
2	1	4	1	2
3	2	9	4	6
4	2	16	4	8
5	4	25	16	20
Σ 15	10	55	26	37

$$m = \frac{5(37) - (15)(10)}{5(55) - (15)^2} = 0.70$$

$$b = \frac{10 - 0.70(15)}{5} = -0.10$$

$$y = 0.70x - 0.10$$

$r = \underline{1} \rightarrow$ perfect positive relationship

$r = 0 \rightarrow$ no relationship

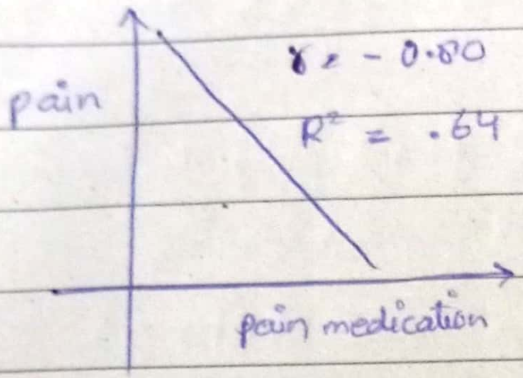
$r = -1 \rightarrow$ perfect negative relation

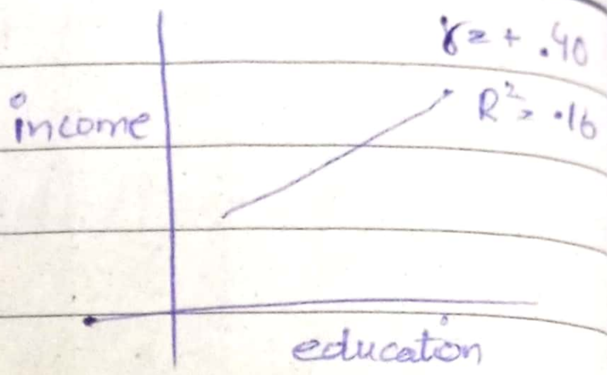
$R^2 \rightarrow$ shows intensity or how strong relation is

$$r = \left(\frac{S_x}{S_y}\right) \times m$$

$$S_x = \sqrt{\frac{\Sigma x^2 - \frac{1}{n}(\Sigma x)^2}{n-1}}, \quad S_y = \sqrt{\frac{\Sigma y^2 - \frac{1}{n}(\Sigma y)^2}{n-1}}$$

two point jaha cost function 0 ho is called global minimum point which is only one.





Relationship among SST, SSR, SSE

- SST = SSR + SSE

actual ... predicted

$$\Sigma(y_i-\bar{y})^2 = \Sigma(\hat{y}_i-\bar{y})^2 + \Sigma(y_i-\hat{y}_i)^2$$

SST → Total Sum of Squares

SST → Sum of Sq. due to regression

SSE → " " " " error

$r^2 = \frac{SSR}{SST}$ J or Cost func $= \frac{1}{n}\sum_{i=1}^{n}(\hat{y}-y_i)^2$

↳ gives info about goodness of fit of a model

$r_{xy} = (\text{sign of } b)\sqrt{r^2}$

Date   Day

LOGISTIC REGRESSION

→ Continuous values par categorical values predict karni hai.

↳ Study hrs & Fail.Pass

sigmoid

$$y = \frac{1}{1 + e^{-(a_0 + a_1 x_i)}}$$

slope (m)

independent

intercept (b)

values lies b/w 0 & 1