

Linear Regression

Linear Regression is a supervised learning algorithm used for predicting a continuous output (like price, temperature etc.) based on input features.

It tries to draw a straight line (best-fit line) through the data points that best represents the relationship between the independent variable (X) and the dependent variable (Y).

Types of linear Regression

Simple linear Regression:-

→ Only one input feature (X)

→ Example:- Predicting marks based on hours studied.

Multiple linear Regression

→ More than one input feature

($x_1, x_2, \dots, x_n$)

→ Example:- Predicting house price based on size, location and number of rooms.

Equation of linear Regression

Notes by: @jwebdevelopers.

X	Y	X ²	XY
1	1	1	1
2	2	4	4
3	1.3	9	3.9
4	3.75	16	15
5	2.25	25	11.25

Step 3:- Calculate sums

$$\Sigma X = 1 + 2 + 3 + 4 + 5 = 15$$

$$\Sigma Y = 1 + 2 + 1.3 + 3.75 + 2.25 = 10.3$$

$$\Sigma X^2 = 1 + 4 + 9 + 16 + 25 = 55$$

$$\Sigma XY = 1 + 4 + 3.9 + 15 + 11.25 = 35.15$$

Step 4:- Calculate slope (m)

$$m = \frac{n \cdot \Sigma XY - \Sigma X \cdot \Sigma Y}{n \cdot \Sigma X^2 - (\Sigma X)^2}$$

$$= \frac{5 \cdot 35.15 - 15 \cdot 10.3}{5 \cdot 55 - 15^2}$$

$$= \frac{175.75 - 154.5}{275 - 225} = \frac{21.25}{50} = 0.425$$

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Step 5 :- calculate intercept (b)

$$b = \frac{\sum Y - m \sum X}{n}$$

$$b = \frac{10.3 - 0.425 \cdot 15}{5}$$

$$= \frac{10.3 - 6.375}{5}$$

$$= \frac{3.925}{5} = \frac{0.785}{b}$$

Step 6 :- final Regression Line

$$Y = \frac{0.425}{m} X + \frac{0.785}{b}$$

lets Make Prediction (optional)

To predict for $X=6$.

$$Y = 0.425 \cdot 6 + 0.785 = 3.41$$

Applications of Linear Regression

- Predicting housing prices
- Stock market trends
- Estimating sales revenue.
- Health data predictions

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Instagram :-

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