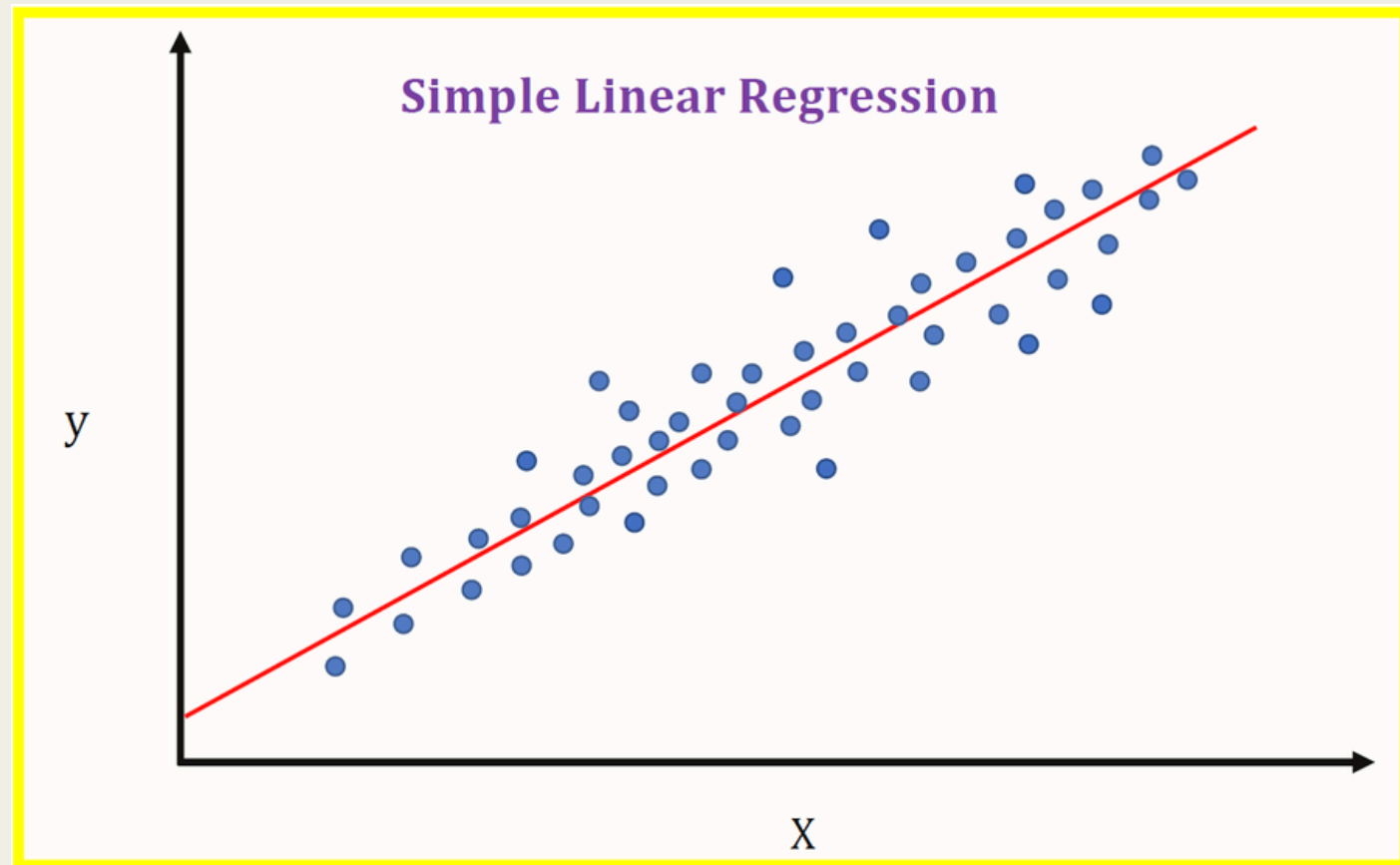




LINEAR REGRESSION



WHAT IS LR?



Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. One variable is considered to be an explanatory variable or an independent variable, and the other is considered to be a dependent variable. Linear regression creates an equation in which you input your given numbers (X) and it outputs the target variable that you want to find out (Y).



HOW IT WORKS?

Equation - $Y=mX+b$

Where:

Y = Dependent variable (output), X = Independent variable (input)

m = Slope (coefficient), b = Intercept

The model:

Finds the best line

Minimizes error using Cost Function (MSE - Mean Squared Error)

Uses Gradient Descent to optimize



HYPERPARAMETERS

- These are set before training:
- Learning rate (for gradient descent)
- Number of iterations
- Regularization parameter (λ)
- Type of regularization (L1, L2)



TYPES OF LR



Simple Linear Regression – A regression technique that models the relationship between one independent variable (X) and one dependent variable (Y) using a straight line.

Multiple Linear Regression – An extension of simple linear regression that models the relationship between two or more independent variables (X_1, X_2, \dots) and one dependent variable (Y).



PROS & CONS

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1. Pros

- Simple & interpretable
- Works well for small datasets
- Fast computation

2. Cons

- Assumes linear relationship
- Sensitive to outliers
- Not suitable for complex patterns



REAL WORLD USE CASES

1. STOCK PREDICTION
2. PREDICT FUTURE PRICES/COSTS
3. PREDICT FUTURE REVENUE
4. COMPARING PERFORMANCE OF NEW PRODUCTS