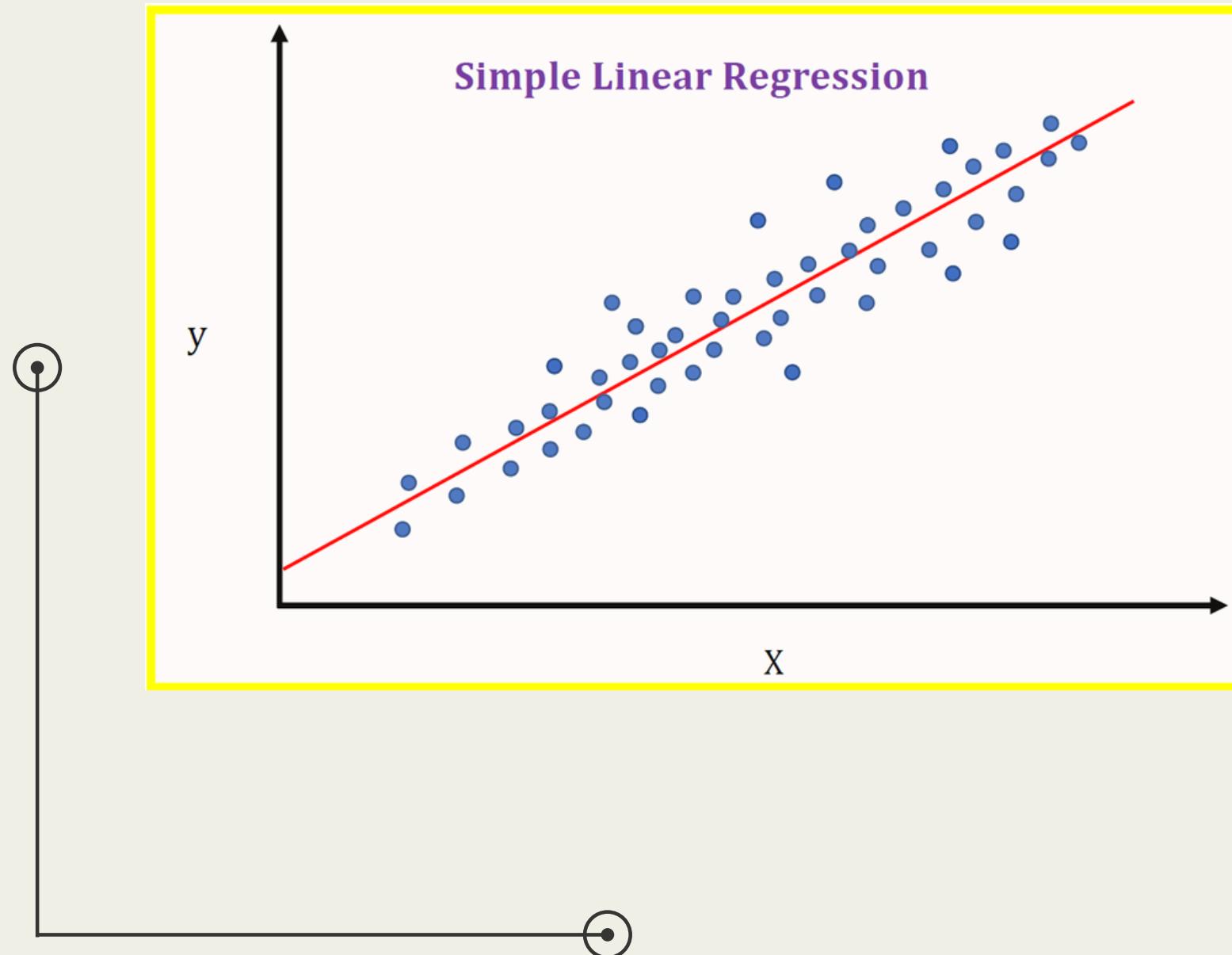


LINEAR REGRESSION



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).



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HOW IT WORKS?

Equation - $Y = mX + b$

Where:

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

m = Slope (coefficient), b = Intercept

The model:

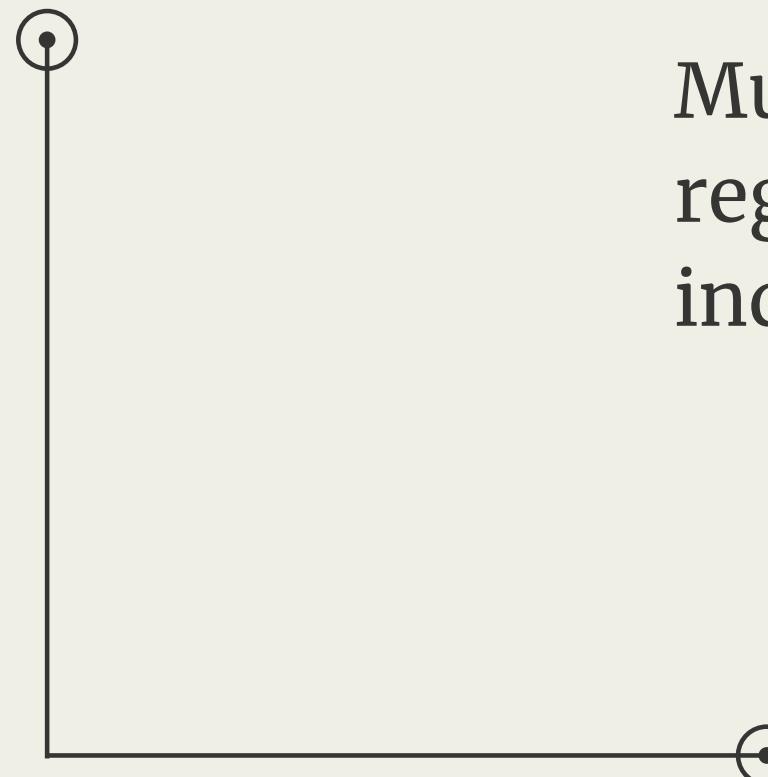
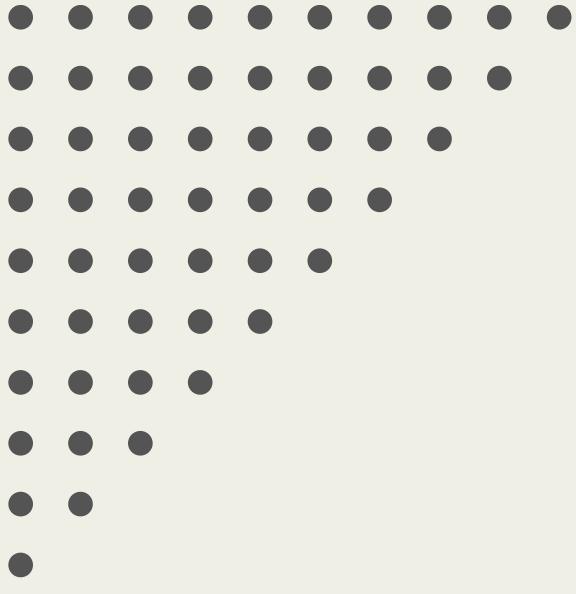
Finds the best line

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

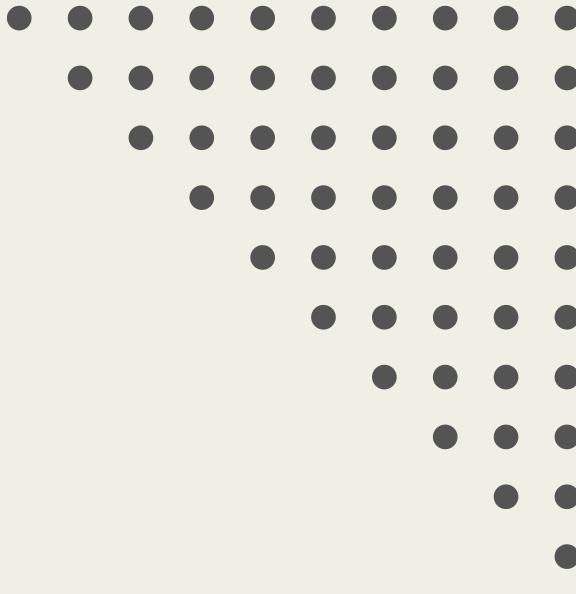
Uses Gradient Descent to optimize

HYPERPARAMETERS

- These are set before training:
- Learning rate (for gradient descent)
- Number of iterations
- Regularization parameter (Lambda)
- 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

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



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