

Regression

- Regression is a supervised machine learning technique used to predict continuous numerical values based on input data.
- It is a statistical method that helps us understand and predict the relationship b/w variables.
- independent variables (features)
 - dependent variables (target/output)

Key Components of Regression

1. Independent Variables (X): - also called predictors. these are the input variables used to make predictions.
Example :- years of experience, temperature etc.
2. Dependent Variable (Y): - also called target or output, this is the value we want to predict.
Example :- Salary, house price, future temp.
3. Regression Model :- A mathematical function that maps input variables (X) to the Output (Y).

For Example

- Predicting salary based on years of experience
DV IV
- Predicting exam score based on study hours
DV IV
- Predicting resale price based on vehicle age
DV IV

Types of Regression

Linear Regression

- Uses a straight line to predict values.

Example Predicting house prices based on size.

Equation

$$Y = mX + b$$

Predicted output $\leftarrow$ Y
Slope $\leftarrow$ m (how much Y changes when X changes)
Input feature $\leftarrow$ X
Intercept (starting point of the line) $\leftarrow$ b

Multiple Linear Regression

- Uses more than one feature to predict the target.

Example Predicting car price on age, mileage, brand.

Equation:

$$Y = b_0 + b_1X_1 + b_2X_2 + \dots + b_nX_n$$

Polynomial Regression

- Uses a curved line to fit the data.

Example Predicting population growth over time.

Equation

$$Y = b_0 + b_1X + b_2X^2 + b_3X^3 + \dots + b_nX^n$$

Logistic Regression

- Predicts Yes/No or 0/1 outcomes.

Example Predicting if an email is spam (1) or not (0).

• Sigmoid function is used.