Lecture : 05

"Data Preprocessing"

→ Load the dataset
→ Import libraries
→ Handling missing values
→ Remove duplicates
→ Normalize and scale the data.
  normalize (0 to 1 or -1)
  Scaling (mean of 0 and standard deviation of 1)
→ Encoding categorical variables
→ visualization

Lecture : 06

Linear Regression

→ Linear Regression is a method to find a relationship between a dependent variable and one or more independent variable using a straight line.

→ Types of Linear Regression

① simple Linear Regression
② Multiple Linear Regression
③ Polynomial Regression
④ Ridge Regression
⑤ Lasso Regression

→ simple Linear Regression

Linear relationship between a dependent variable Y and a single independent variable X

Mathematics of Linear Regression

$$Y = mx + c$$

Least square Method

$$SSE = \sum (y_i - (\beta_0 + \beta_1 x_i))^2$$

SSE ↙ sum of squared errors

Normal equation:

$$\beta_1 = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2}$$

$$\beta_0 = \bar{y} - \beta_1 \bar{x}$$

→ Multiple Linear Regression:

Multiple linear Regression (MLR) is a statistical method used to predict an outcome (dependent variable) based on two or more input features (independent variables)

$$Y = b_0 + b_1 x_1 + b_2 x_2 + \cdots + b_n x_n + \epsilon$$

⇒ Evaluating Linear Regression Models

① Mean squared Error (MSE)

$$MSE = \frac{1}{n} \sum_{i=1}^{n} (y_i - \hat{y}_i)^2$$

→ Overview of Linear Regression

① Define the problem
② collect and prepare data
③ split data
④ Fit the model
⑤ Train the model
⑥ Evaluate performance
⑦ Make predictions
⑧ Interpret Results