Introduction to Regression

Regression is a core statistical technique used to model and analyze the relationship between variables. It helps us understand how the dependent variable (the one we aim to predict) is influenced by one or more independent variables (predictors). In this presentation, we will focus on two main types of regression: linear regression and non-linear regression.

We will begin by exploring linear regression from three different perspectives:

- **Calculations**: We will discuss the methods used to compute the regression coefficients, such as optimization techniques like gradient descent and the least squares method.
- **Statistics**: The statistical foundations of linear regression, including the assumptions and estimation of coefficients using the least squares approach, will be covered.
- **Linear Algebra**: From a linear algebra perspective, we will frame linear regression as a matrix equation, using the normal equation to find the best-fit line.

We will also explore the geometric interpretation of non-linear regression, showing how the model adjusts to fit data that cannot be captured by a simple linear relationship. Finally, we will apply both linear and non-linear regression to a real-world dataset to examine their performance and understand when to use each method.