Multiple Linear Regression

Data Science | CCDATSCL

Multiple Linear Regression determines the relationship between a **dependent variable** or **two or more independent variables**.

The independent variables can be either **continuous** or **categorical**

Example: House Price Prediction

Independent Variables

Number of Bedrooms   In a mainroad?   Airconditioned?

Dependent Variables

Price

Example: Company Profit Prediction

Independent Variables

Research and Development   Administration   Marketing

Dependent Variables

Profit

Simple Linear Regression vs Multiple Linear Regression

Simple Linear Regression

$$Y = m\,(x) + b$$

Multiple Linear Regression

$$Y = m_1(x_1) + m_2(x_2) + \ldots + m_n(x_n) + b$$

Price of Fuel (X)	Jeepney Fare (Y)
1	2
2	4
3	5
4	4
5	5

Simple Linear Regression

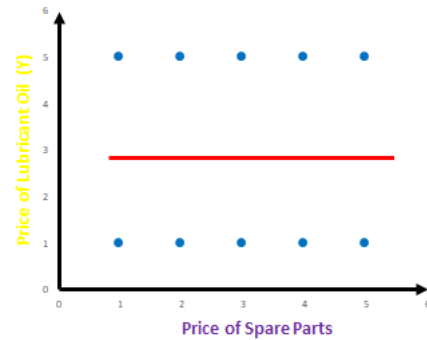| Price of Fuel (X_1)	Price of Water (X_2)	Jeepney Fare (Y)
1	5	2
2	4	4
3	3	5
4	2	4
5	1	5

Multiple Linear Regression

Correlation

- Correlation **measures the strength of the relationship between two variables**. In other words, it tells you how closely two variables are related.
- There are two types of correlation:
  - **Positive correlation**. This is when two variables move in the same direction. For example, as the price of a stock goes up, the number of shares traded also goes up.
  - **Negative correlation**. This is when two variables move in opposite directions. For example, as the price of a stock goes up, the number of shares traded goes down.
- **Correlation** is measured on a scale from **-1 to +1**.
- A **value of -1** means that the variables are perfectly **negatively correlated**.
- A **value of +1** means that the variables are perfectly **positively correlated**.
- A **value of 0** means that the variables are **not correlated at all**.
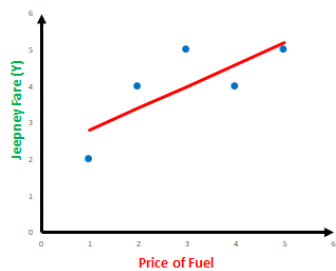
Price of Fuel	Price of Water	Jeepney Fare
1	5	2
2	4	4
3	3	5
4	2	4
5	1	5

POSITIVE CORRELATION

Price of Fuel	Jeepney Fare
1	2
2	4
3	5
4	4
5	5

NEGATIVE CORRELATION

Price of Water	Jeepney Fare
5	2
4	4
3	5
2	4
1	5

NO CORRELATION

Price of Spare Parts	Price of Lubricant Oil
5	2
4	4
3	5
2	4
1	5