# ASSIGNMENT NO: 6

## Problem Statement-

This data consists of temperatures of INDIA averaging the temperatures of all places month-wise. Temperature values are recorded in CELSIUS.
a) Apply Linear Regression using a suitable library function and predict the Month-wise
temperature.
b) Assess the performance of regression models.

## S/W Packages and Libraries used-

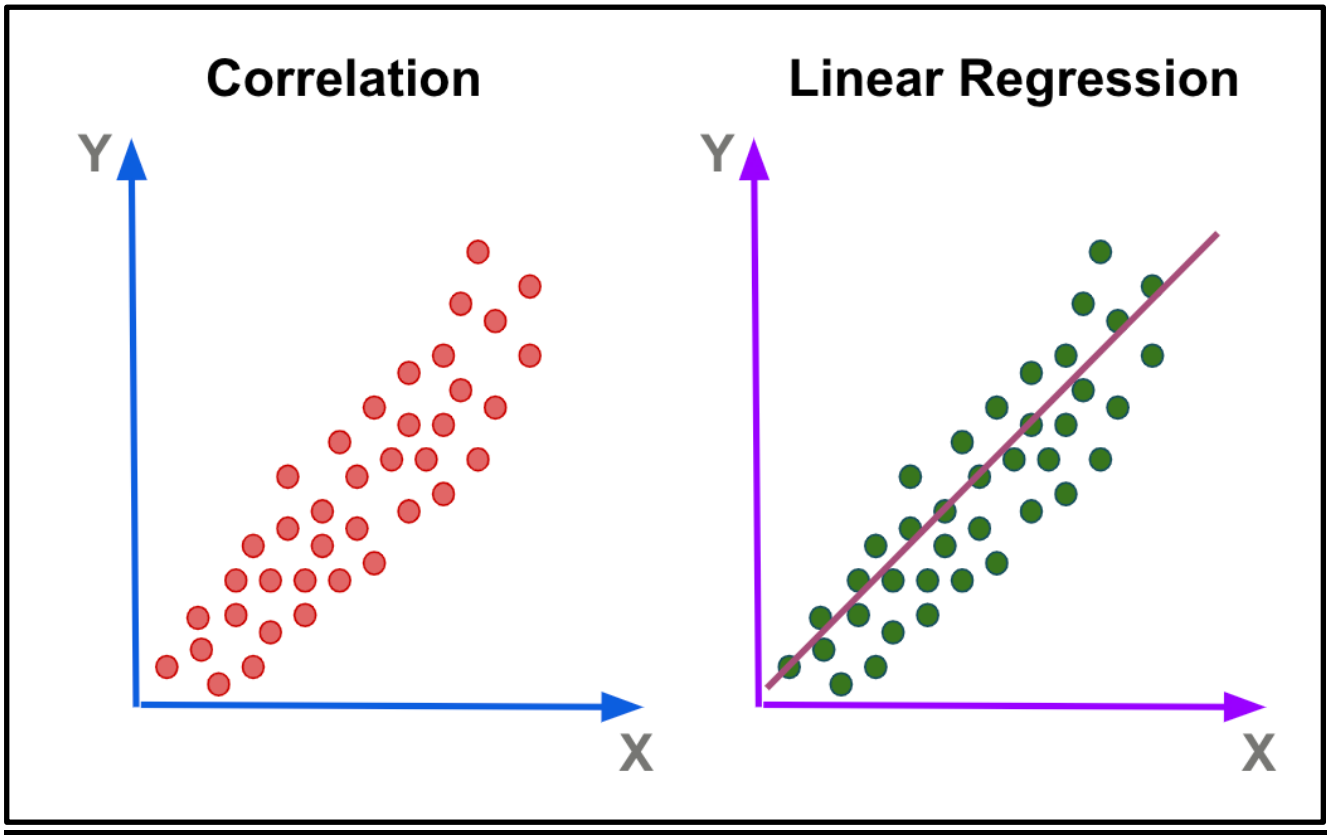
Software Package: Python
Libraries Used:
pandas: For data manipulation and analysis.
scikit-learn: For implementing machine learning algorithms, including Linear Regression.
matplotlib: For data visualization.

## Theory-

- Linear Regression:
    - It is a statistical method that is used for predictive analysis.
    - Linear regression makes predictions for continuous/real or numeric variables such as sales, salary, age, product price, etc.

- Linear regression algorithm shows a linear relationship between a dependent (y) and one or more independent (y) variables, hence called linear regression.

- Since linear regression shows the linear relationship, which means it finds how the value of the dependent variable is changing according to the value of the independent variable.




## Methodology-

- Data Preprocessing:
    - Load the temperature data.
    - Prepare the data by separating features (months) and target variable (monthly temperatures).
    - Split the data into training and testing sets.
- Model Training:
    - Initialize a Linear Regression model.
    - Fit the model on the training data.
- Model Evaluation:
    - Predict the month-wise temperatures using the trained model.
    - Evaluate the model's performance using Mean Squared Error (MSE), Mean Absolute Error (MAE), and R-Square metrics.

## Applications:

- Predicting the Salary of a person based on years of experience- Therefore, Experience becomes the independent variable while Salary turns into the dependent variable.
- Predicting crop yields based on the amount of rainfall- Yield is a dependent variable while the measure of precipitation is an independent variable.

## Limitations:

- Linear Regression assumes a linear relationship between the independent and dependent variables, which may not always hold true in real-world scenarios.

- The accuracy of predictions can be affected by outliers and noise in the data.

- The model's performance heavily depends on the quality and representativeness of the training data.

## Conclusion:

- Linear Regression can be effectively used to predict month-wise temperatures in India.
- The model's performance can be assessed using metrics like MSE, MAE, and R-Square.
- Despite its limitations, Linear Regression provides a simple and interpretable approach for temperature prediction, which can be valuable for various applications in climate science and related fields.