Training Day 15 Report

Date: 11 July 2025
Topic: Linear Regression in Machine Learning

Overview

Today's session covered **Linear Regression**, one of the simplest and most widely used supervised learning algorithms. Linear Regression is used to predict a **continuous output variable** based on one or more input variables.

Key Concepts

What is Linear Regression?

- A statistical method to model the relationship between a dependent variable (Y) and independent variable(s) (X).

- Equation:
  $Y=mX+cY = mX + c$
  where m is the slope (coefficient) and c is the intercept (bias).

Types of Linear Regression

1. **Simple Linear Regression** – Uses a single independent variable.

2. **Multiple Linear Regression** – Uses multiple independent variables.

Applications

- Predicting house prices

- Forecasting sales

- Estimating salary based on experience

Python Example: Predicting Salary Based on Experience

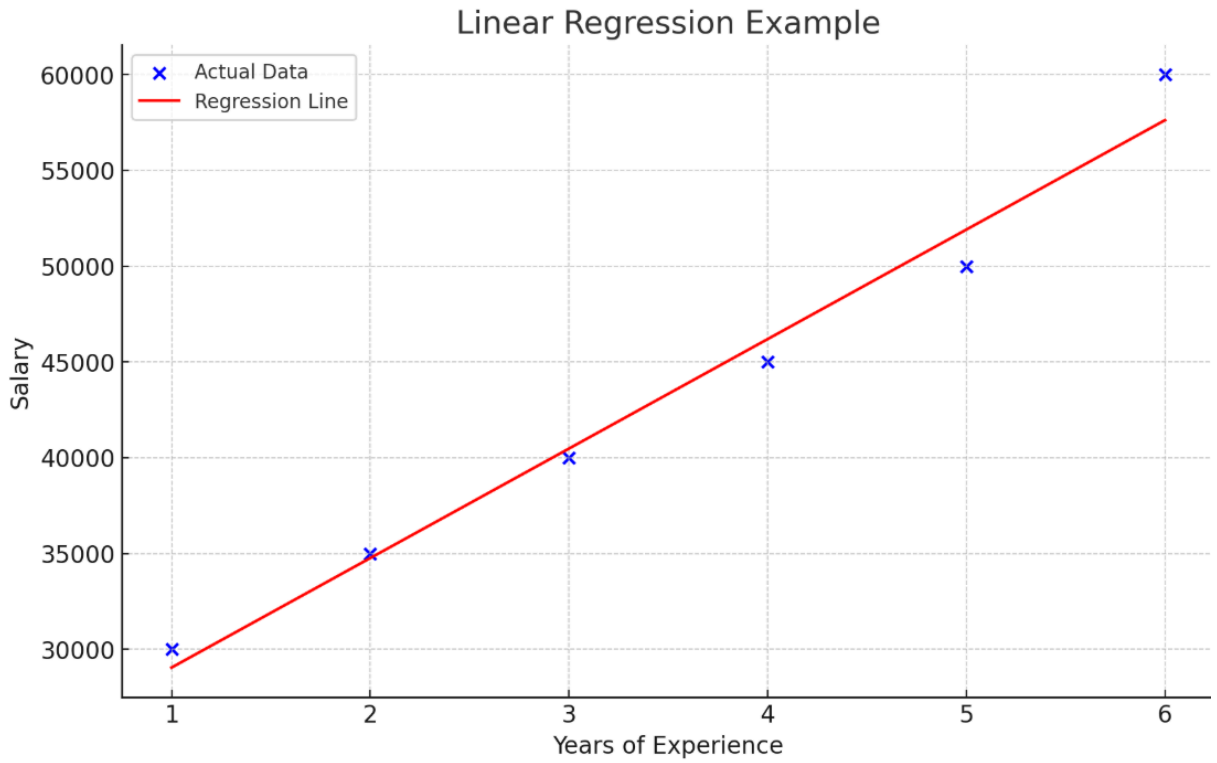
```
# Step 1: Import libraries
import numpy as np
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
```

```
# Step 2: Sample Data (Years of Experience vs Salary)
X = np.array([1, 2, 3, 4, 5, 6]).reshape(-1, 1)
y = np.array([30000, 35000, 40000, 45000, 50000, 60000])

# Step 3: Train Model
model = LinearRegression()
model.fit(X, y)

# Step 4: Make Predictions
y_pred = model.predict(X)

# Step 5: Visualization
plt.scatter(X, y, color='blue', label="Actual Data")
plt.plot(X, y_pred, color='red', label="Regression Line")
plt.xlabel("Years of Experience")
plt.ylabel("Salary")
plt.title("Linear Regression Example")
plt.legend()
plt.show()
```



Graph Representation

- **Blue Dots:** Actual salary data points.
- **Red Line:** Predicted regression line (best fit).

Learning Outcome

- Understood the concept of **Linear Regression**.
- Learned how to **train and visualize a regression model**.
- Saw how experience relates to salary using a **best-fit regression line**.