Exp

February 20, 2025

```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import PolynomialFeatures
from sklearn.model_selection import train_test_split

# Dataset
data = {
    "YearsExperience": [2, 5, 7, 10, 12],
    "EducationLevel": [16, 18, 16, 20, 18],
    "Age": [24, 28, 32, 35, 40],
    "Salary": [40000, 60000, 75000, 90000, 110000]
}
df = pd.DataFrame(data)
```

```python
# Simple Linear Regression (SLR)
X_slr = df[["YearsExperience"]]
y = df["Salary"]
slr_model = LinearRegression()
slr_model.fit(X_slr, y)
slr_pred = slr_model.predict(X_slr)

print("SLR Coefficients:", slr_model.coef_)
print("SLR Intercept:", slr_model.intercept_)

# Multiple Linear Regression (MLR)
X_mlr = df[["YearsExperience", "EducationLevel", "Age"]]
mlr_model = LinearRegression()
mlr_model.fit(X_mlr, y)
mlr_pred = mlr_model.predict(X_mlr)

print("MLR Coefficients:", mlr_model.coef_)
print("MLR Intercept:", mlr_model.intercept_)

# Polynomial Regression (PLR)
poly = PolynomialFeatures(degree=2)
X_poly = poly.fit_transform(X_slr)
```

```python
plr_model = LinearRegression()
plr_model.fit(X_poly, y)
plr_pred = plr_model.predict(X_poly)

print("PLR Coefficients:", plr_model.coef_)
print("PLR Intercept:", plr_model.intercept_)

# Plot Results
plt.scatter(df["YearsExperience"], y, color='blue', label='Actual')
plt.plot(df["YearsExperience"], slr_pred, color='red', label='SLR Prediction')
plt.plot(df["YearsExperience"], mlr_pred, color='orange', label='MLR␣
 ↪Prediction')
plt.plot(df["YearsExperience"], plr_pred, color='green', linestyle='dashed',␣
 ↪label='PLR Prediction')
plt.xlabel("Years of Experience")
plt.ylabel("Salary")
plt.legend()
plt.title("Regression Models for Salary Prediction")
plt.show()
```

```
SLR Coefficients: [6767.51592357]
SLR Intercept: 26273.885350318487
MLR Coefficients: [ 192.30769231  673.07692308 4134.61538462]
MLR Intercept: -69711.5384615385
PLR Coefficients: [   0.        5958.78962536   57.34870317]
PLR Intercept: 28403.458213256665
```

Regression Models for Salary Prediction