Experiment No.: 6

Aim

Program to implement linear and multiple regression techniques using any standard dataset available in the public domain and evaluate its performance.

CO2

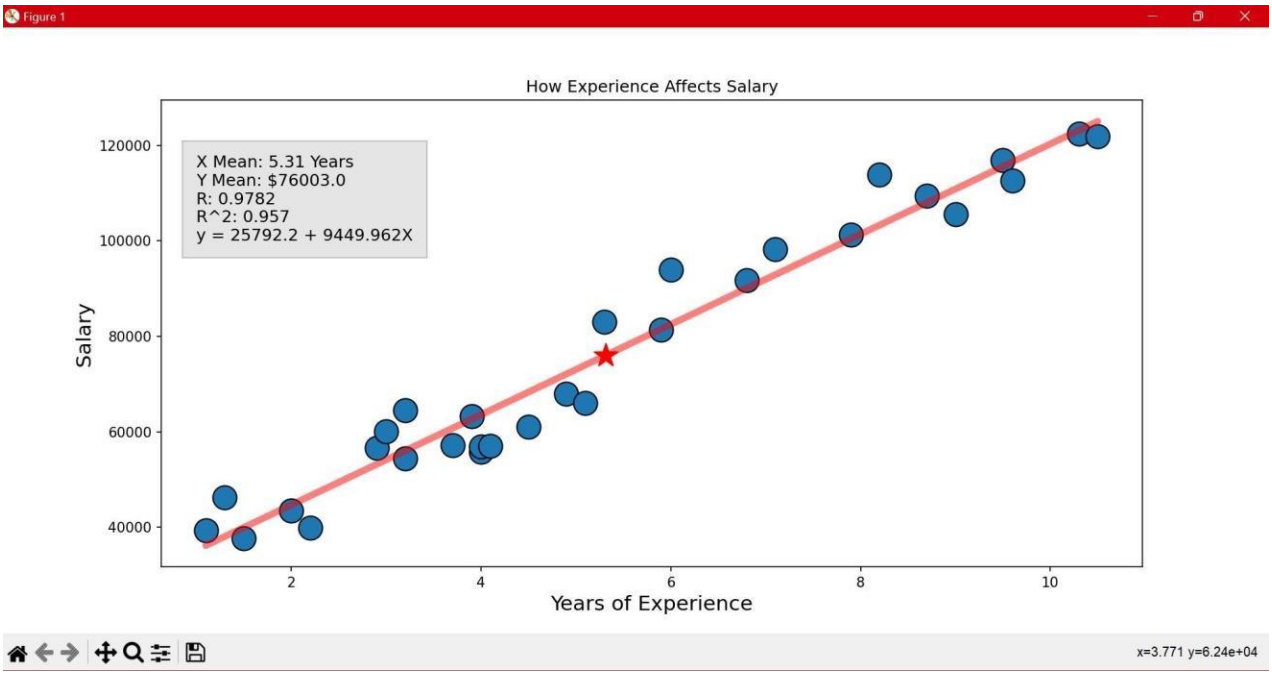
Use different packages and frameworks to implement regression and classification algorithms

Procedure

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
data = pd.read_csv('Salary_Data.csv')
x = data['YearsExperience']
y = data['Salary']
def linear_regression(x, y):
    N = len(x)
    x_mean = x.mean()
    y_mean = y.mean()
    B1_num = ((x - x_mean) * (y - y_mean)).sum()
    B1_den = ((x - x_mean) ** 2).sum()
    B1 = B1_num / B1_den
    B0 = y_mean - (B1 * x_mean)
    reg_line = 'y = {} + {}β'.format(B0, round(B1, 3))
    return (B0, B1, reg_line)
def corr_coef(x, y):
    N = len(x)
    num = (N * (x * y).sum()) - (x.sum() * y.sum())
    den = np.sqrt((N * (x ** 2).sum() - x.sum() ** 2) * (N * (y ** 2).sum() - y.sum() ** 2))
    R = num / den
    return R
```

```
B0, B1, reg_line = linear_regression(x, y)
print('Regression Line: ', reg_line)
R = corr_coef(x, y)
print('Correlation Coef.: ', R)
print('"Goodness of Fit": ', R ** 2)
plt.figure(figsize=(12,5))
plt.scatter(x, y, s=300, linewidths=1, edgecolor='black')
text = '"X Mean: {} Years
Y Mean: ${}
R: {}
R^2: {}
y = {} + {}X"'.format(round(x.mean(), 2),
                      round(y.mean(), 2),
                      round(R, 4),
                      round(R**2, 4),
                      round(B0, 3),
                      round(B1, 3))
plt.text(x=1, y=100000, s=text, fontsize=12, bbox={'facecolor': 'grey', 'alpha': 0.2, 'pad': 10})
plt.title('How Experience Affects Salary')
plt.xlabel('Years of Experience', fontsize=15)
plt.ylabel('Salary', fontsize=15)
plt.plot(x, B0 + B1*x, c = 'r', linewidth=5, alpha=.5, solid_capstyle='round')
plt.scatter(x=x.mean(), y=y.mean(), marker='*', s=10**2.5, c='r')
def predict(B0, B1, new_x):
    y = B0 + B1 * new_x
    return y
plt.show()
```

Output Screenshot



Result

The program was executed and the result was successfully obtained. Thus CO2 was obtained.