Student Performance Prediction

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Introduction

Predicting student performance helps in understanding the factors affecting their final exam scores. By using machine learning, we can analyze study hours and previous scores to estimate a student's final exam result. This project applies a Linear Regression model to predict student performance based on given data.

3. Methodology

Step 1: Data Collection

We use a dataset containing the following information for 20 students:

- Study Hours
- Previous Exam Scores
- Final Exam Scores

Step 2: Data Preprocessing

- Load the data into a DataFrame.
- Check for missing values.
- Split data into training and testing sets.

Step 3: Model Training

- Use Linear Regression to train the model.
- Train the model on 80% of the data and test it on 20%.

Step 4: Performance Evaluation

- Use Mean Absolute Error (MAE) and Mean Squared Error (MSE) to check accuracy.
- Predict new scores based on user input.

Code Typed:

```
  # Step 1: Import necessary libraries

import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

from sklearn.model_selection import train_test_split

from sklearn.linear_model import LinearRegression

from sklearn.metrics import mean_absolute_error, mean_squared_error


# Step 2: Create the dataset manually (without uploading a file)

data = {

   "StudyHours": [8.777482, 9.161915, 3.278010, 4.500247, 2.264931, 5.178765, 5.195977, 7.551904, 1.940879, 3.315756,

                  4.599099, 2.471536, 6.708061, 6.692461, 9.654504, 6.392792, 4.655716, 6.339880, 6.195849, 7.819022],

   "PreviousScores": [75, 55, 77, 60, 72, 87, 45, 68, 73, 78, 99, 68, 63, 44, 85, 86, 57, 69, 52, 90],

   "FinalExamScore": [64, 82, 70, 60, 60, 81, 85, 57, 65, 68, 81, 96, 85, 93, 52, 43, 99, 42, 76, 79]

}


# Convert dictionary to DataFrame

df = pd.DataFrame(data)


# Step 3: Display first few rows

print("\nDataset Preview:")

print(df.head())


# Step 4: Check for missing values

print("\nMissing values in dataset:\n", df.isnull().sum())


# Step 5: Define features (X) and target variable (y)

X = df[['StudyHours', 'PreviousScores']]  # Independent Variables

y = df['FinalExamScore']  # Dependent Variable
```

```
# Step 6: Split data (80% Train, 20% Test)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Step 7: Train a Linear Regression model
model = LinearRegression()
model.fit(X_train, y_train)

# Step 8: Make predictions
y_pred = model.predict(X_test)

# Step 9: Model evaluation
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
print(f"\nModel Performance:\nMean Absolute Error (MAE) = {mae:.2f}\nMean Squared Error (MSE) = {mse:.2f}")

# Step 10: Live User Input for Prediction
study_hours = float(input("\nEnter study hours: "))
previous_score = float(input("Enter previous score: "))

# Predict final exam score
predicted_score = model.predict([[study_hours, previous_score]])
print(f"\nPredicted Final Exam Score: {predicted_score[0]:.2f}")

# Step 11: Visualization
plt.scatter(df['StudyHours'], df['FinalExamScore'], color='blue', label='Actual Scores')
plt.xlabel('Study Hours')
plt.ylabel('Final Exam Score')
plt.title('Study Hours vs Final Exam Score')
plt.grid(True)

# Plot Regression Line
```

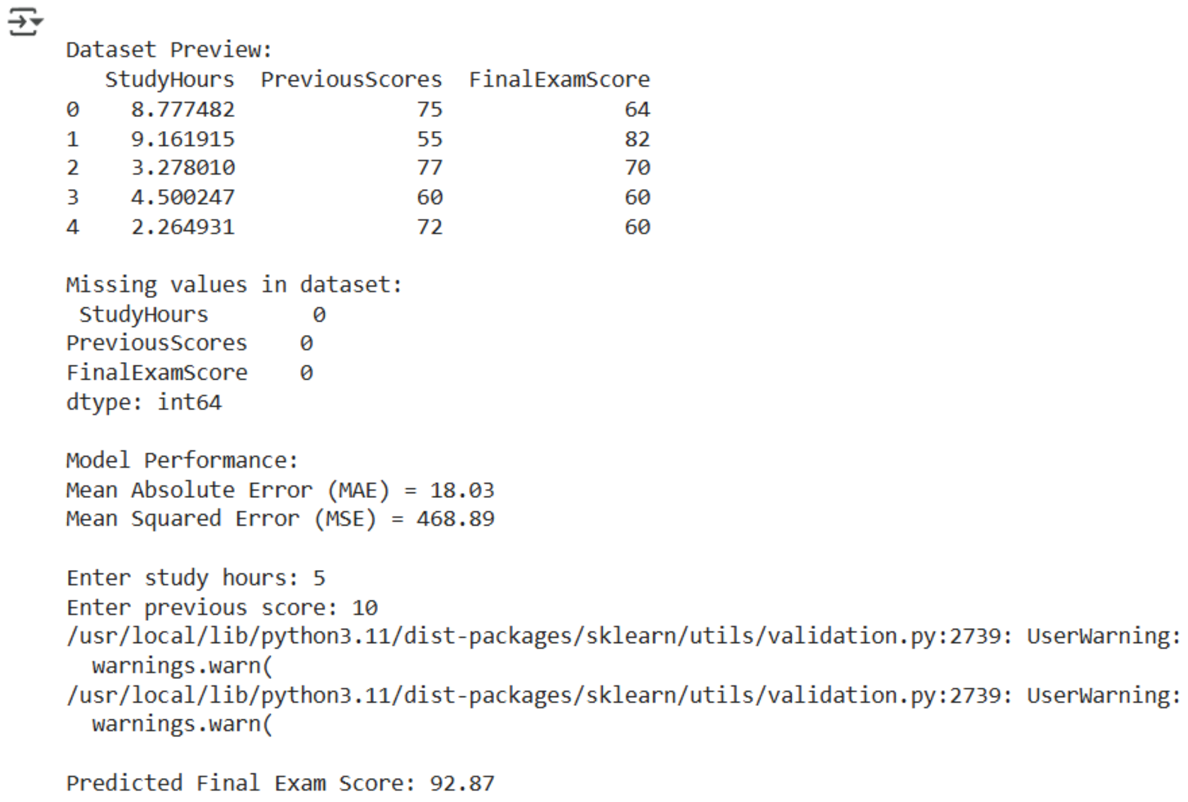
```
x_range = np.linspace(min(df['StudyHours']), max(df['StudyHours']), 100).reshape(-1, 1)

y_range = model.predict(np.hstack((x_range, np.full_like(x_range,
np.mean(df['PreviousScores'])))))

plt.plot(x_range, y_range, color='red', label='Regression Line')


plt.legend()

plt.show()
```



```
Dataset Preview:
   StudyHours  PreviousScores  FinalExamScore
0    8.777482              75              64
1    9.161915              55              82
2    3.278010              77              70
3    4.500247              60              60
4    2.264931              72              60

Missing values in dataset:
 StudyHours       0
PreviousScores    0
FinalExamScore    0
dtype: int64

Model Performance:
Mean Absolute Error (MAE) = 18.03
Mean Squared Error (MSE) = 468.89

Enter study hours: 5
Enter previous score: 10
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning:
  warnings.warn(
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning:
  warnings.warn(

Predicted Final Exam Score: 92.87
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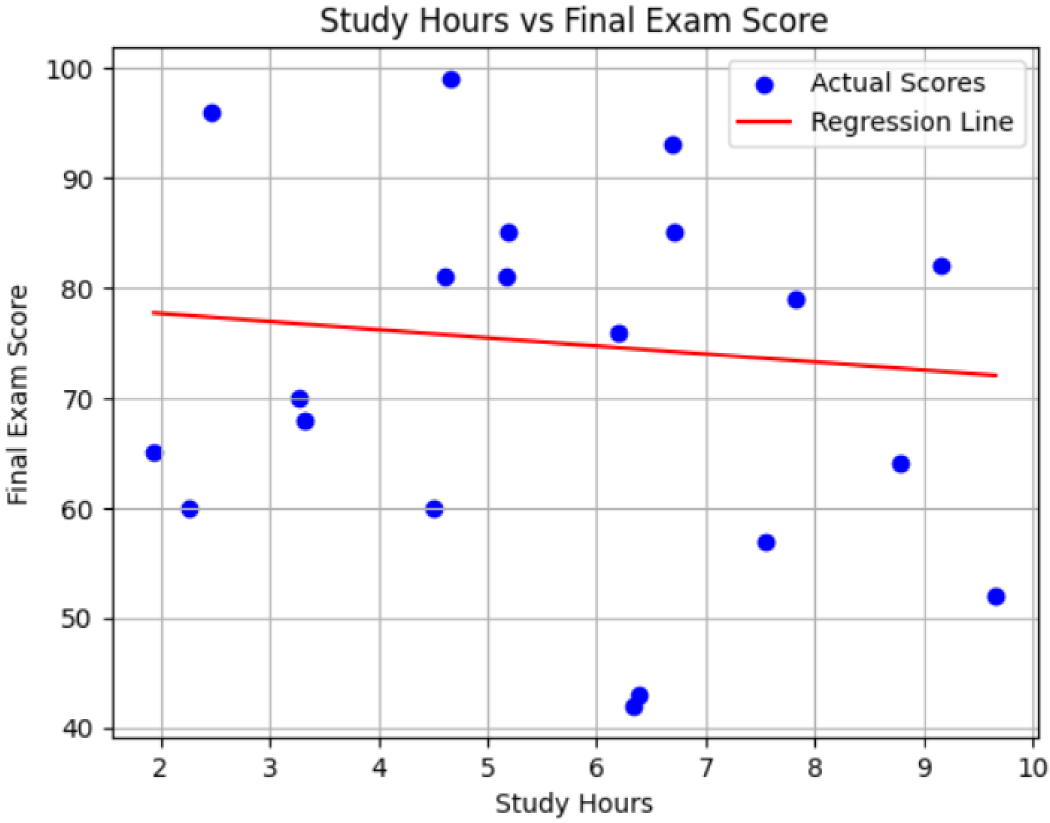
Study Hours vs Final Exam Score
Final Exam Score
Study Hours
Actual Scores
Regression Line