INTRODUCTION TO AI MSE 1 REPORT

1. Title Page
   - Title: Students Performance Prediction
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   - Course Name: Introduction to AI
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2. Introduction

In this project, we aim to predict the **Final Exam Score** of students based on two factors:
Study Hours and **Previous Scores**.
The objective is to build a predictive model using **Linear Regression** and visualize how study hours and previous performance impact the final exam score.
We have created a small dataset manually, which includes information about the students' study hours, previous scores, and their final exam scores.

The Linear Regression model will be trained on this dataset, and the model will be evaluated using various performance metrics.

3. Methodology

Data Collection:

- A dataset containing the following columns was created manually:
  - **Study Hours**: The number of hours a student has studied.
  - **Previous Scores**: The student's previous exam scores.
  - **Final Exam Score**: The score obtained by the student in the final exam.

Data Preprocessing:

- Missing values were checked and handled.
- Features **StudyHours** and **PreviousScores** were selected as independent variables, while the **FinalExamScore** was the dependent variable.

Model Training:

- A **Linear Regression** model was used to predict the final exam score.
- The data was split into training and testing sets using an 80/20 split.

Evaluation:

- The model was evaluated using common regression metrics such as **Mean Absolute Error (MAE)** and **Mean Squared Error (MSE)**.

Prediction:

- The model allows for live predictions. The user can input study hours and previous score, and the system will predict the final exam score.

Visualization:

- Visualizations were created to show the relationship between **Study Hours** and **Final Exam Score**, and to plot the regression line showing how study hours impact the score.

4. Code

Python Code:

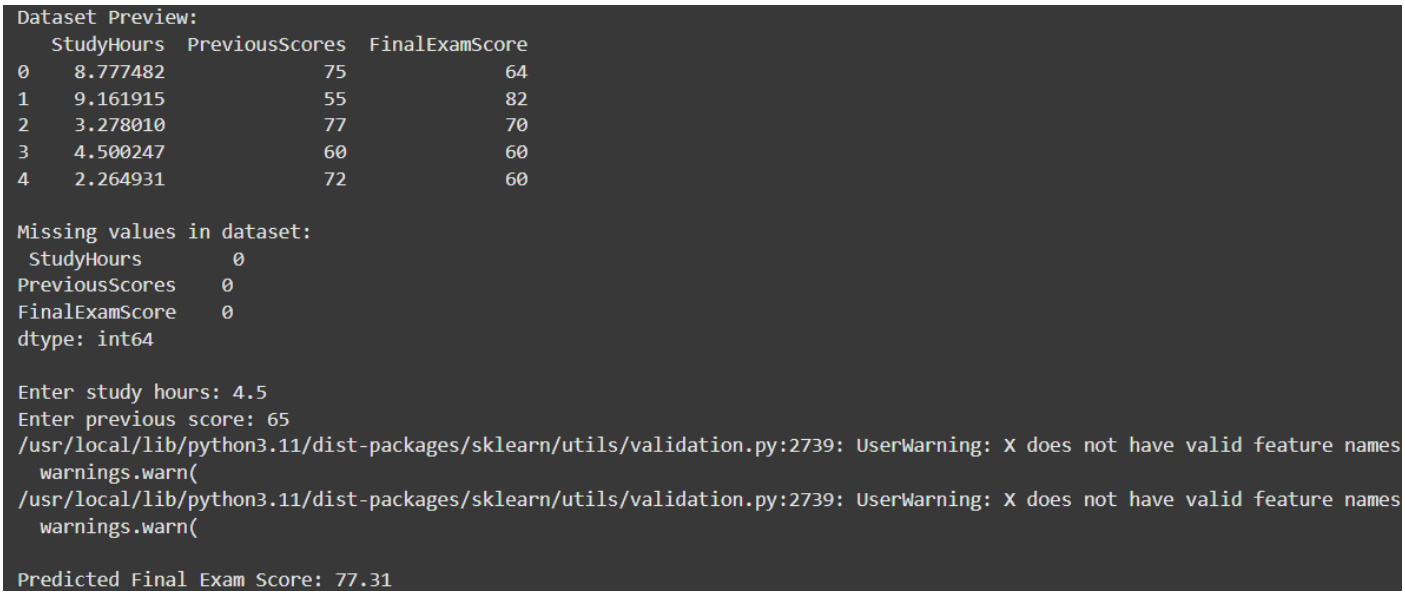
```
# Step 1: Import necessary libraries

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 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')
```

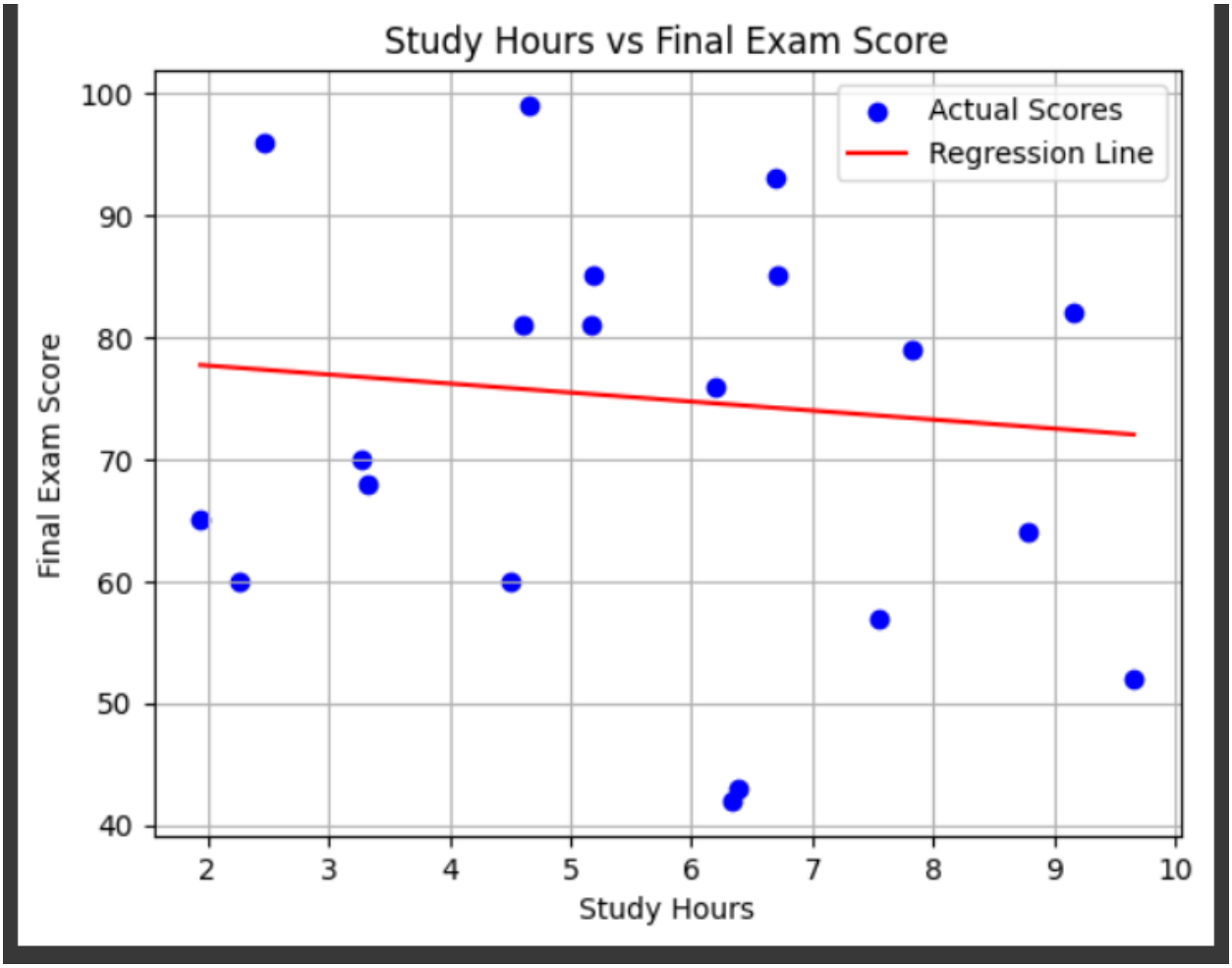
```
plt.grid(True)

# 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()
```

5. Screenshots & Output



```
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

Enter study hours: 4.5
Enter previous score: 65
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning: X does not have valid feature names
  warnings.warn(
/usr/local/lib/python3.11/dist-packages/sklearn/utils/validation.py:2739: UserWarning: X does not have valid feature names
  warnings.warn(

Predicted Final Exam Score: 77.31
```

Graphical Visualisation:



Final Notes:

- The **Linear Regression model** predicts final exam scores based on study hours and previous scores.
- The **scatter plot** and **regression line** visually represent the relationship between the independent variables and the target variable.

- The **live prediction** feature allows users to input study hours and previous scores and get the predicted final exam score.

This project demonstrates a basic application of linear regression to predict student performance.