OBJECTIVE:

To apply linear regression for predicting Profit and Transactions based on Sales data.

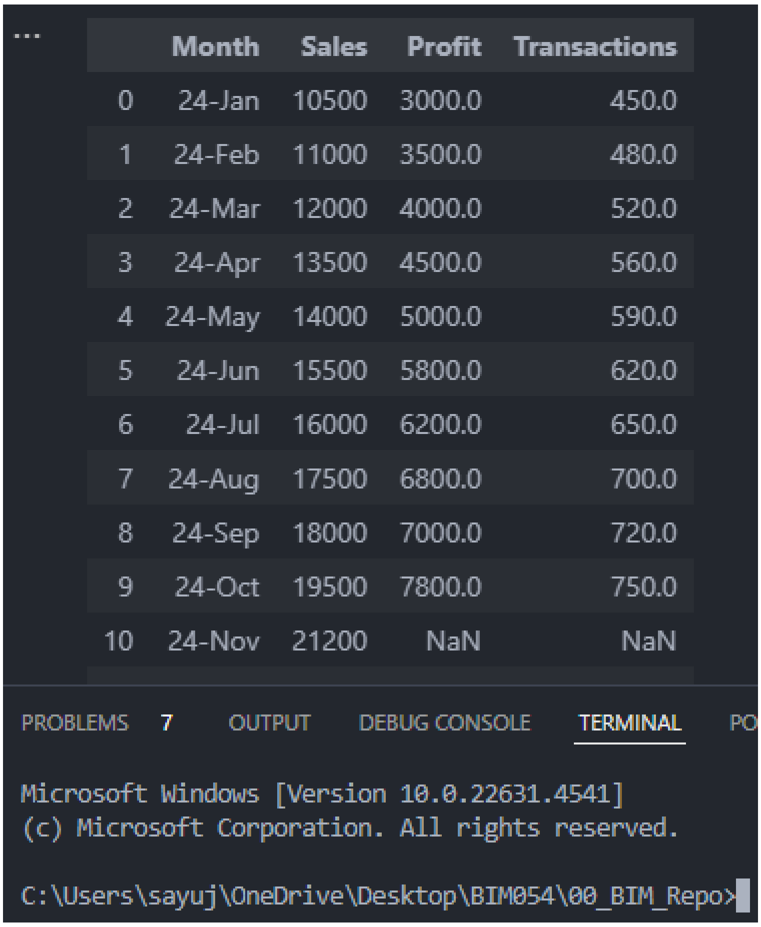
SOURCE CODE:

1. **Set Up Python Environment:**

```
# Setting up the Python Environment
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
from sklearn.model_selection import train_test_split
```

2. **Load and Prepare Data:**

```
# Loading the data
df = pd.read_csv("./Lab_2_Data.csv")
display(df)
```



	Month	Sales	Profit	Transactions
0	24-Jan	10500	3000.0	450.0
1	24-Feb	11000	3500.0	480.0
2	24-Mar	12000	4000.0	520.0
3	24-Apr	13500	4500.0	560.0
4	24-May	14000	5000.0	590.0
5	24-Jun	15500	5800.0	620.0
6	24-Jul	16000	6200.0	650.0
7	24-Aug	17500	6800.0	700.0
8	24-Sep	18000	7000.0	720.0
9	24-Oct	19500	7800.0	750.0
10	24-Nov	21200	NaN	NaN

```
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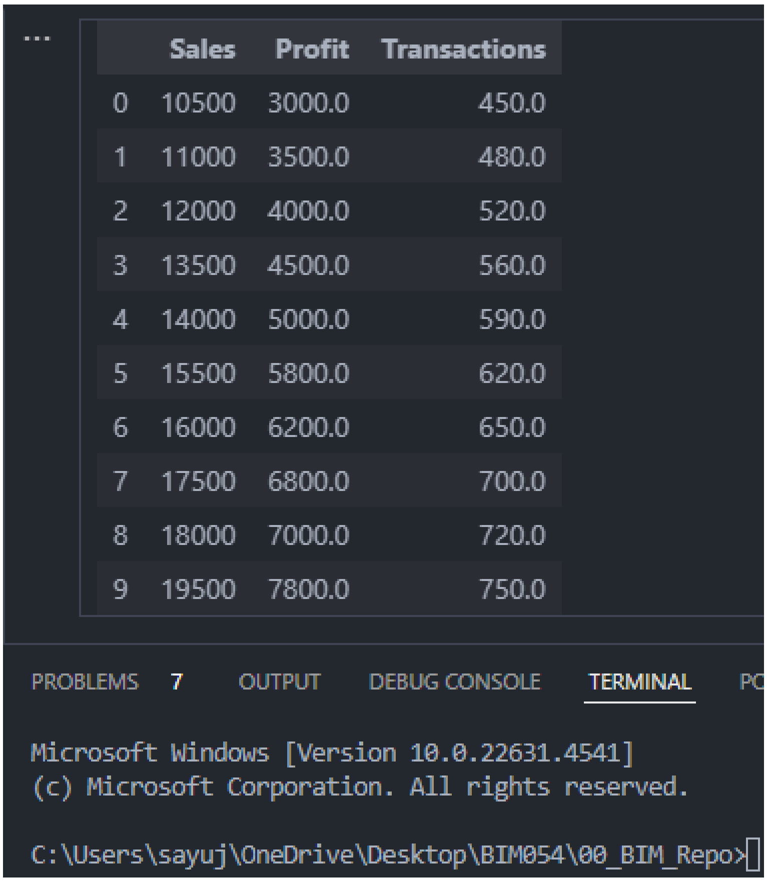
```

```
# Preparing the data
# Removing Missing Values
df = df.dropna()
```

```
# Dropping the Month Column
df = df.drop(columns="Month")
display(df)

# Checking for datatype of the given data
df.info()
```



	Sales	Profit	Transactions
0	10500	3000.0	450.0
1	11000	3500.0	480.0
2	12000	4000.0	520.0
3	13500	4500.0	560.0
4	14000	5000.0	590.0
5	15500	5800.0	620.0
6	16000	6200.0	650.0
7	17500	6800.0	700.0
8	18000	7000.0	720.0
9	19500	7800.0	750.0

```
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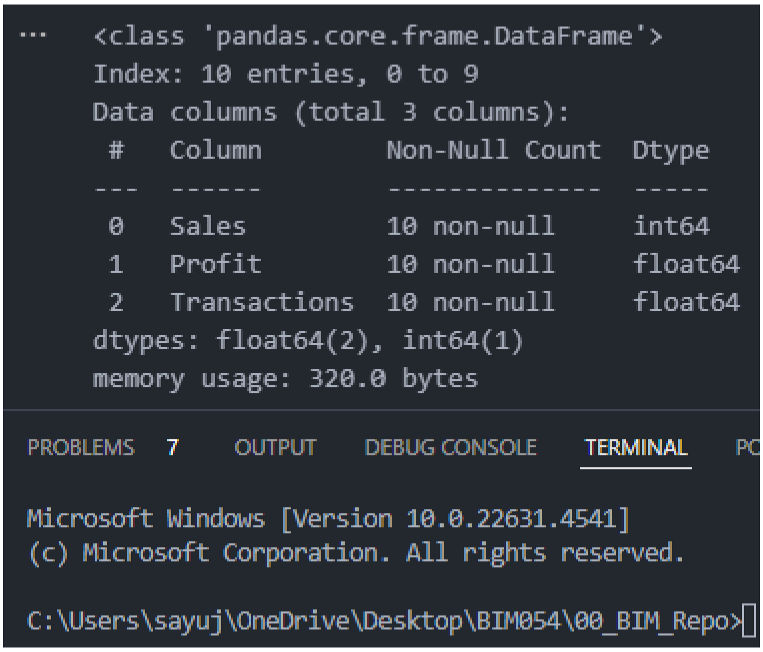

```
<class 'pandas.core.frame.DataFrame'>
Index: 10 entries, 0 to 9
Data columns (total 3 columns):
 #   Column        Non-Null Count  Dtype  
---  ------        --------------  -----  
 0   Sales         10 non-null     int64  
 1   Profit        10 non-null     float64
 2   Transactions  10 non-null     float64
dtypes: float64(2), int64(1)
memory usage: 320.0 bytes
```

```
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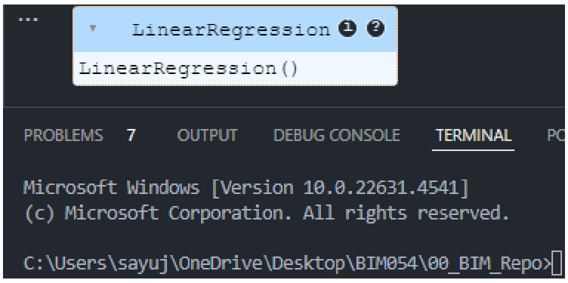
```

3. Implement Linear Regression Models:

```
# Implementing The Model
# From relation y = mx + c, predict y (profit and transactions) based on x (sales)
x = df[['Sales']]
y_profit = df[['Profit']]
y_tr = df[['Transactions']]

# Train and test data split into 80-20
x_train_profit, x_test_profit, y_train_profit, y_test_profit = train_test_split(x, y_profit,
test_size=0.2, random_state=42)
x_train_tr, x_test_tr, y_train_tr, y_test_tr = train_test_split(x, y_tr, test_size=0.2,
random_state=42)

# Train the models
model_profit = LinearRegression()
model_profit.fit(x_train_profit, y_train_profit)
model_tr = LinearRegression()
model_tr.fit(x_train_tr, y_train_tr)
```



```
LinearRegression()
```

```
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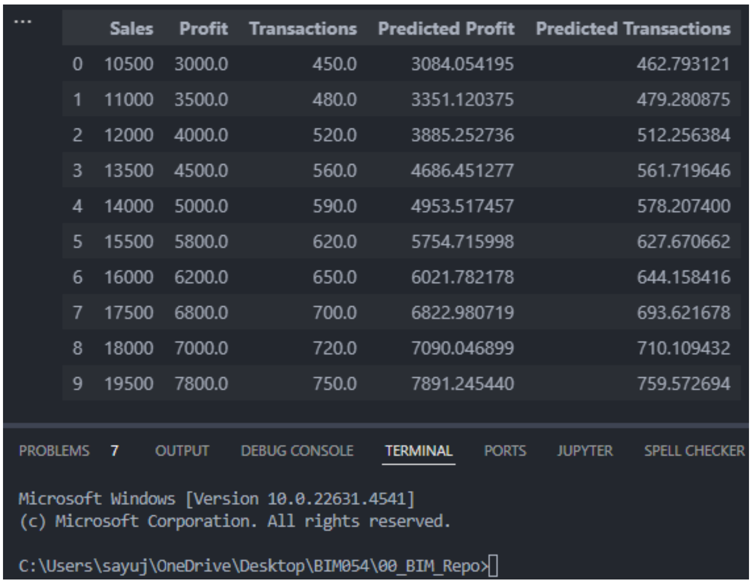
4. Make Predictions:

```
# Making Predictions
predicted_profit = model_profit.predict(x)
predicted_tr = model_tr.predict(x)

# Adding the predicted value to the dataset for visualization
df['Predicted Profit'] = predicted_profit
df['Predicted Transactions'] = predicted_tr
display(df)
```



	Sales	Profit	Transactions	Predicted Profit	Predicted Transactions
0	10500	3000.0	450.0	3084.054195	462.793121
1	11000	3500.0	480.0	3351.120375	479.280875
2	12000	4000.0	520.0	3885.252736	512.256384
3	13500	4500.0	560.0	4686.451277	561.719646
4	14000	5000.0	590.0	4953.517457	578.207400
5	15500	5800.0	620.0	5754.715998	627.670662
6	16000	6200.0	650.0	6021.782178	644.158416
7	17500	6800.0	700.0	6822.980719	693.621678
8	18000	7000.0	720.0	7090.046899	710.109432
9	19500	7800.0	750.0	7891.245440	759.572694

```
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```

5. Visualize Results:

# Plotting in graph

plt.figure(figsize=(10, 6))

plt.scatter(df['Sales'], df['Profit'], color='blue', label='Actual Profit')

plt.plot(df['Sales'], predicted_profit, color='red', label='Predicted Profit')

plt.title('Sales vs Profit')

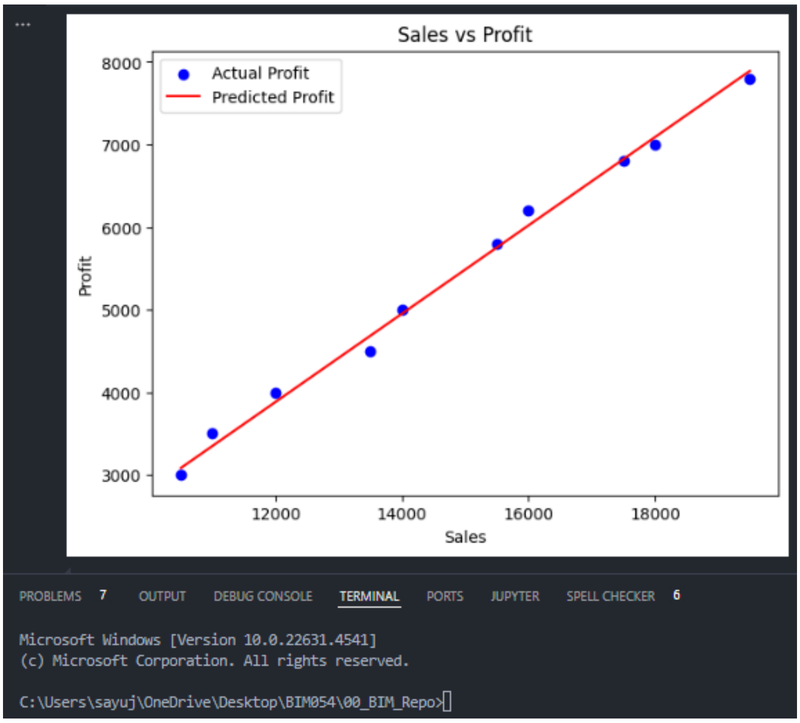
plt.xlabel('Sales')

plt.ylabel('Profit')

plt.legend()

plt.savefig("./sales_vs_profit.png")

plt.show()



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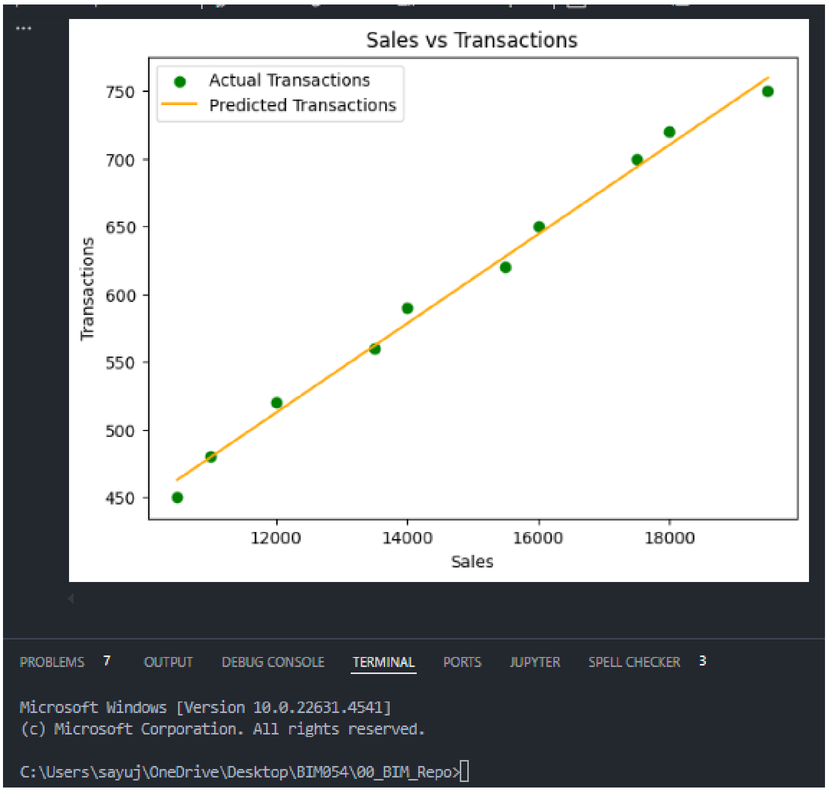
```

```
# Plot actual vs predicted Transactions

plt.figure(figsize=(10, 6))
plt.scatter(df['Sales'], df['Transactions'], color='green', label='Actual Transactions')
plt.plot(df['Sales'], predicted_tr, color='orange', label='Predicted Transactions')
plt.title('Sales vs Transactions')
plt.xlabel('Sales')
plt.ylabel('Transactions')
plt.legend()
plt.savefig("./sales_vs_Transactions.png")
plt.show()
```



```
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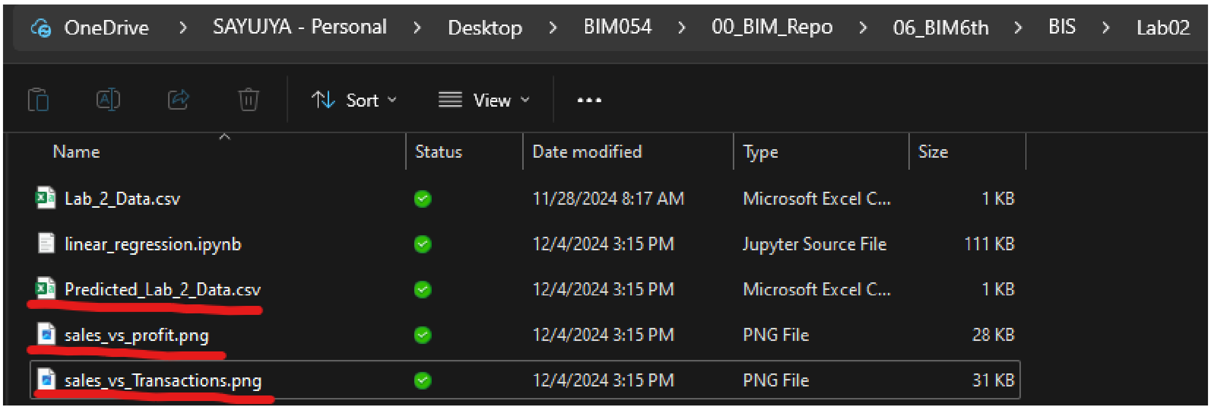
```

6. Save Results:

```
# Saving the data into new csv
df.to_csv("./Predicted_Lab_2_Data.csv", index=False)
```


OneDrive > SAYUJYA - Personal > Desktop > BIM054 > 00_BIM_Repo > 06_BIM6th > BIS > Lab02
Sort
View
...

Name	Status	Date modified	Type	Size
Lab_2_Data.csv	✓	11/28/2024 8:17 AM	Microsoft Excel C...	1 KB
linear_regression.ipynb	✓	12/4/2024 3:15 PM	Jupyter Source File	111 KB
Predicted_Lab_2_Data.csv	✓	12/4/2024 3:15 PM	Microsoft Excel C...	1 KB
sales_vs_profit.png	✓	12/4/2024 3:15 PM	PNG File	28 KB
sales_vs_Transactions.png	✓	12/4/2024 3:15 PM	PNG File	31 KB