```
import os


import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from xgboost import XGBRegressor
from sklearn.ensemble import RandomForestRegressor
from sklearn.linear_model import LinearRegression
from sklearn.preprocessing import MinMaxScaler
from sklearn.metrics import mean_absolute_error,mean_squared_error,r2_score
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense,LSTM
from tensorflow.keras.callbacks import EarlyStopping,ModelCheckpoint



inventory_forecast= pd.read_csv('/content/cocacola.07.csv.csv')
inventory_forecast.head(10)
```

	Date	Open	High	Low	Close	Adj Close	Volume
0	18-06-2001	22.129999	22.225000	21.735001	21.885000	12.246120	6354400
1	19-06-2001	21.885000	22.045000	21.770000	21.875000	12.240531	5441000
2	20-06-2001	21.875000	22.120001	21.725000	21.965000	12.290888	8301800
3	21-06-2001	21.965000	22.240000	21.775000	21.795000	12.195761	10298800
4	22-06-2001	21.795000	21.855000	21.295000	21.424999	11.988725	9211200
5	25-06-2001	21.629999	22.100000	21.629999	21.795000	12.195761	14690600
6	26-06-2001	21.795000	22.150000	21.514999	21.975000	12.296491	20446600
7	27-06-2001	21.975000	22.174999	21.875000	22.090000	12.360837	12653800
8	28-06-2001	22.110001	22.705000	22.110001	22.674999	12.688185	15615000
9	29-06-2001	22.750000	22.830000	22.430000	22.500000	12.590258	13146800

Next steps: Generate code with `inventory_forecast` View recommended plots

Checking the Null values in the Dataset

```
inventory_forecast.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5160 entries, 0 to 5159
Data columns (total 7 columns):
```

```
 #   Column     Non-Null Count  Dtype
---  ------     --------------  -----
 0   Date       5160 non-null   object
 1   Open       5160 non-null   float64
 2   High       5160 non-null   float64
 3   Low        5160 non-null   float64
 4   Close      5160 non-null   float64
 5   Adj Close  5160 non-null   float64
 6   Volume     5160 non-null   int64
dtypes: float64(5), int64(1), object(1)
memory usage: 282.3+ KB
```

```
inventory_forecast=inventory_forecast.drop(['Adj Close','Open','Close'],axis=1)
```

```
inventory_forecast.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 5160 entries, 0 to 5159
Data columns (total 4 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   Date    5160 non-null   object
 1   High    5160 non-null   float64
 2   Low     5160 non-null   float64
 3   Volume  5160 non-null   int64
dtypes: float64(2), int64(1), object(1)
memory usage: 161.4+ KB
```

```
inventory_forecast.head(10)
```

	Date	High	Low	Volume
0	18-06-2001	22.225000	21.735001	6354400
1	19-06-2001	22.045000	21.770000	5441000
2	20-06-2001	22.120001	21.725000	8301800
3	21-06-2001	22.240000	21.775000	10298800
4	22-06-2001	21.855000	21.295000	9211200
5	25-06-2001	22.100000	21.629999	14690600
6	26-06-2001	22.150000	21.514999	20446600
7	27-06-2001	22.174999	21.875000	12653800
8	28-06-2001	22.705000	22.110001	15615000
9	29-06-2001	22.830000	22.430000	13146800

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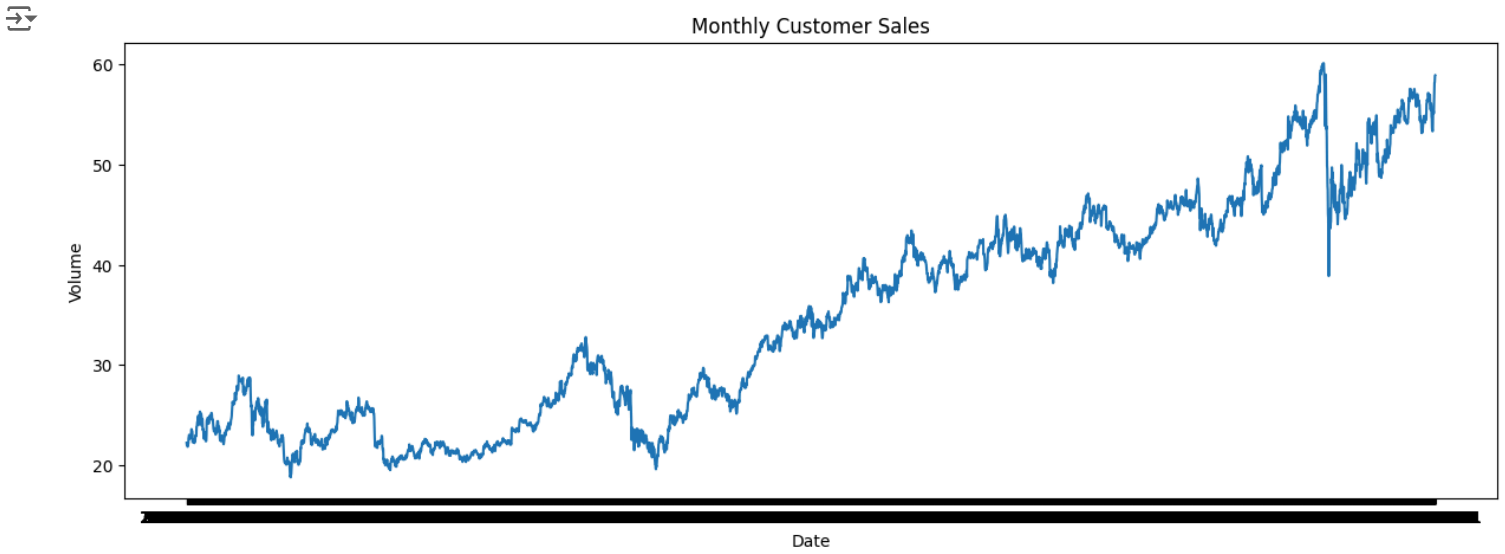
Visualization

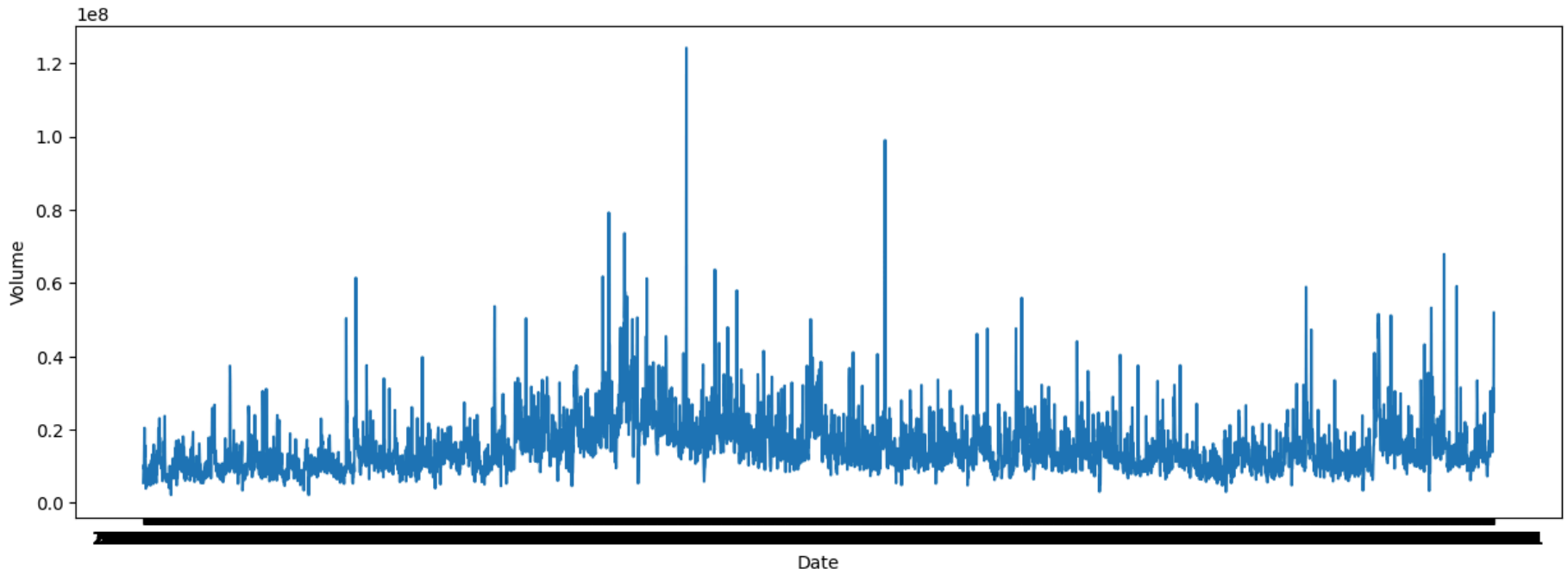
```
import matplotlib.pyplot as plt
plt.figure(figsize=(15,5))
plt.plot(inventory_forecast['Date'],inventory_forecast['High'])
plt.xlabel('Date')
plt.ylabel('Volume')
plt.title('Monthly Customer Sales')
plt.show()
```




```
inventory_forecast['Volume_diff']=inventory_forecast['Volume'].diff()
inventory_forecast = inventory_forecast.dropna()
inventory_forecast.head(10)
```

	Date	High	Low	Volume	Volume_diff
1	19-06-2001	22.045000	21.770000	5441000	-913400.0
2	20-06-2001	22.120001	21.725000	8301800	2860800.0
3	21-06-2001	22.240000	21.775000	10298800	1997000.0
4	22-06-2001	21.855000	21.295000	9211200	-1087600.0
5	25-06-2001	22.100000	21.629999	14690600	5479400.0
6	26-06-2001	22.150000	21.514999	20446600	5756000.0
7	27-06-2001	22.174999	21.875000	12653800	-7792800.0
8	28-06-2001	22.705000	22.110001	15615000	2961200.0
9	29-06-2001	22.830000	22.430000	13146800	-2468200.0
10	02-07-2001	23.025000	22.334999	7314800	-5832000.0

```
plt.figure(figsize=(15,5))
plt.plot(inventory_forecast['Date'], inventory_forecast['Volume'])
plt.xlabel("Date")
plt.ylabel("Volume")
plt.show()
```



```
supervised_data = inventory_forecast.drop(['Date','Volume'], axis=1)


for i in range(1,13):
  col_name = 'month_' + str(i)
  supervised_data[col_name] = supervised_data['Volume_diff'].shift(i)
supervised_data = supervised_data.dropna().reset_index(drop=True)
supervised_data.head(10)
```

	High	Low	Volume_diff	month_1	month_2	month_3	month_4	month_5	month_6	month_7	month_8	
0	22.745001	22.285000	-494800.0	1618800.0	-3418600.0	-5832000.0	-2468200.0	2961200.0	-7792800.0	5756000.0	5479400.0	-1
1	22.840000	22.280001	-468200.0	-494800.0	1618800.0	-3418600.0	-5832000.0	-2468200.0	2961200.0	-7792800.0	5756000.0	5
2	22.645000	22.225000	4887200.0	-468200.0	-494800.0	1618800.0	-3418600.0	-5832000.0	-2468200.0	2961200.0	-7792800.0	5
3	22.875000	22.145000	-2205000.0	4887200.0	-468200.0	-494800.0	1618800.0	-3418600.0	-5832000.0	-2468200.0	2961200.0	-7
4	22.750000	22.450001	-283400.0	-2205000.0	4887200.0	-468200.0	-494800.0	1618800.0	-3418600.0	-5832000.0	-2468200.0	2
5	23.070000	22.555000	-478000.0	-283400.0	-2205000.0	4887200.0	-468200.0	-494800.0	1618800.0	-3418600.0	-5832000.0	-2
6	23.490000	23.025000	1929600.0	-478000.0	-283400.0	-2205000.0	4887200.0	-468200.0	-494800.0	1618800.0	-3418600.0	-5
7	23.600000	22.955000	-870400.0	1929600.0	-478000.0	-283400.0	-2205000.0	4887200.0	-468200.0	-494800.0	1618800.0	-3
8	23.475000	22.805000	656800.0	-870400.0	1929600.0	-478000.0	-283400.0	-2205000.0	4887200.0	-468200.0	-494800.0	1
9	23.445000	22.900000	-3150400.0	656800.0	-870400.0	1929600.0	-478000.0	-283400.0	-2205000.0	4887200.0	-468200.0	-

Next steps: Generate code with supervised_data View recommended plots

```
train_data = supervised_data[:-12]
test_data = supervised_data[-12:]
print("Train Data Shape: ", train_data.shape)
print("Test Data Shape: ", test_data.shape)
```

```
Train Data Shape:  (5135, 15)
Test Data Shape:  (12, 15)
```

```
scaler = MinMaxScaler(feature_range=(-1,1))
scaler.fit(train_data)
train_data = scaler.transform(train_data)
test_data = scaler.transform(test_data)
```

```
x_train, y_train = train_data[:,1:], train_data[:,0:1]
x_test, y_test = test_data[:,1:], test_data[:,0:1]
y_train = y_train.ravel()
y_test = y_test.ravel()
print("X_train Shape: ", x_train.shape)
print("y_train Shape: ", x_train.shape)
print("X_test Shape: ", x_test.shape)
print("y_test Shape: ", x_test.shape)
```

```
X_train Shape:  (5135, 14)
y_train Shape:  (5135, 14)
X_test Shape:  (12, 14)
y_test Shape:  (12, 14)
```

```
sales_dates = inventory_forecast['Date'][-12:].reset_index(drop=True)
predict_df=pd.DataFrame(sales_dates)
```

```
act_sales=inventory_forecast['Volume'][-13:].to_list()
print(act_sales)
```

```
[18719600, 17074200, 21062400, 26624100, 23832700, 18026300, 13846400, 23151000, 31362800, 24806600, 24923800, 24696900, 51874400]
```

Create the Linear Regression model, and predicted Output

```
lr_model=LinearRegression()
lr_model.fit(x_train, y_train)
lr_pre=lr_model.predict(x_test)
```

```
lr_pre = lr_pre.reshape(-1,1)
lr_pre_test_set =np.concatenate([lr_pre,x_test],axis=1)
lr_pre_test_set =scaler.inverse_transform(lr_pre_test_set)
```

```
result_list = []
for index in range(0, len(lr_pre_test_set)):
    result_list.append(lr_pre_test_set[index][0] + act_sales[index])
lr_pre_series = pd.Series(result_list, name="Linear Predication")
predict_df = predict_df.merge(lr_pre_series, left_index=True, right_index=True)
```

```
# print(predict_df)
lr_mse=np.sqrt(mean_squared_error(predict_df['Linear Predication'],inventory_forecast['Volume'] [-12:]))
lr_mae=mean_absolute_error(predict_df['Linear Predication'],inventory_forecast['Volume'][-12:])
lr_r2=r2_score=(predict_df['Linear Predication'],inventory_forecast['Volume'][-12:])
print("Linear Regression MSE", lr_mse)
print("Linear Regression MAE", lr_mae)
print("Linear Regression R2", lr_r2)
```

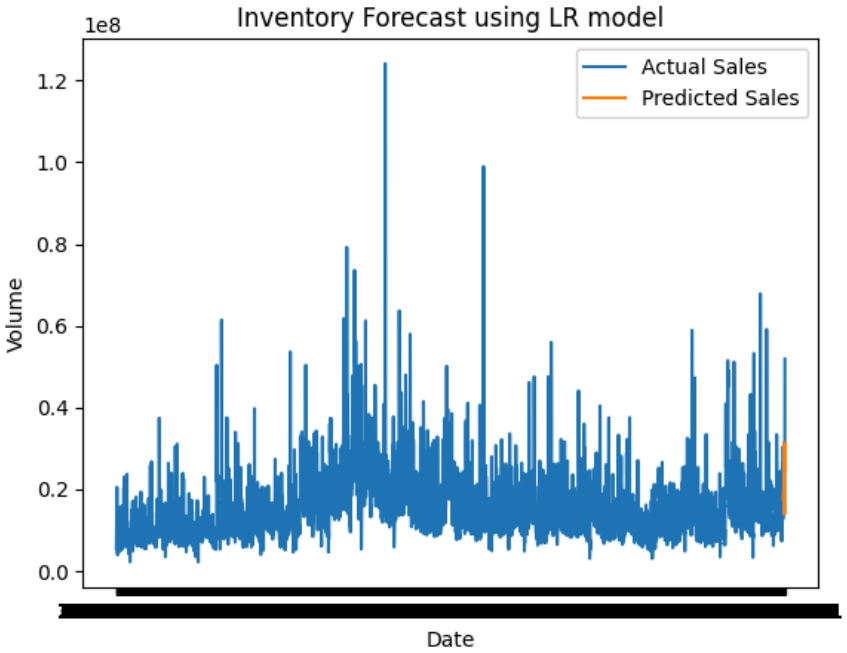
```
Linear Regression MSE 9328246.535392681
Linear Regression MAE 6297266.342521627
Linear Regression R2 (0     1.871965e+07
1     1.707425e+07
2     2.106245e+07
3     2.662416e+07
4     2.383276e+07
5     1.802636e+07
6     1.384646e+07
7     2.315106e+07
8     3.136286e+07
9     2.480666e+07
10    2.492386e+07
11    2.469696e+07
Name: Linear Predication, dtype: float64, 5148    17074200
5149    21062400
5150    26624100
5151    23832700
5152    18026300
5153    13846400
5154    23151000
5155    31362800
5156    24806600
5157    24923800
5158    24696900
5159    51874400
Name: Volume, dtype: int64)
```

```
# Assuming the correct column name for predicted values is 'Linear Predication'

# Plot Actual Sales
plt.plot(inventory_forecast['Date'], inventory_forecast['Volume'])

# Plot Predicted Sales
plt.plot(predict_df['Date'], predict_df['Linear Predication'])

plt.title("Inventory Forecast using LR model")
plt.xlabel('Date')
plt.ylabel('Volume')
plt.legend(['Actual Sales', 'Predicted Sales'])
plt.show()
```


Inventory Forecast using LR model
1e8
Actual Sales
Predicted Sales
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Volume
Date