Exp:3

Develop a linear regression model for forecasting time series data.

Aim:

Develop a linear regression model for forecasting time series data.

1. Importing Required Libraries

```
import pandas as pd

import numpy as np

import matplotlib.pyplot as plt

import seaborn as sns

from sklearn.model_selection import train_test_split

from sklearn.linear_model import LinearRegression

from sklearn.metrics import mean_absolute_error, mean_squared_error
```

Explanation:

We import numpy (np) is used for numerical operations, pandas (pd) for data manipulation, matplotlib.pyplot (plt) for plotting.

2. Loading the Dataset

```
df = pd.read_csv("/content/GOOGL.csv")

df["Date"] = pd.to_datetime(df["Date"])

df.set_index("Date", inplace=True)

df = df[["Close"]]

df["Days"] = (df.index - df.index.min()).days
```

Explanation:
We use pd.read_csv() to load a CSV file containing google stock prices data.

3. Describing the dataset

dataset.describe()

4.Formating the Date Column

```
X = df["Days"].values.reshape(-1, 1)

y = df["Close"].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, shuffle=False)

model = LinearRegression()

model.fit(X_train, y_train)
```

5.Splitting the Dataset

```
x_train, x_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
y_train = y_train.fillna(y_train.mean())
y_test=y_test.fillna(y_test.mean())
```

6.Initialise the model and train the model

```
# Train the model
model = LinearRegression()
model.fit(x_train, y_train)
```

7.Fit the test set to the model

```
y_pred=model.predict(x_test)
```

8.Calculating accuracy

```
y_pred = model.predict(X_test)

mae = mean_absolute_error(y_test, y_pred)

mse = mean_squared_error(y_test, y_pred)

rmse = np.sqrt(mse)

print(f"Mean Absolute Error (MAE): {mae:.2f}")

print(f"Mean Squared Error (MSE): {mse:.2f}")

print(f"Root Mean Squared Error (RMSE): {rmse:.2f}")
```

Mean Absolute Error (MAE): 733.67

Mean Squared Error (MSE): 871895.11

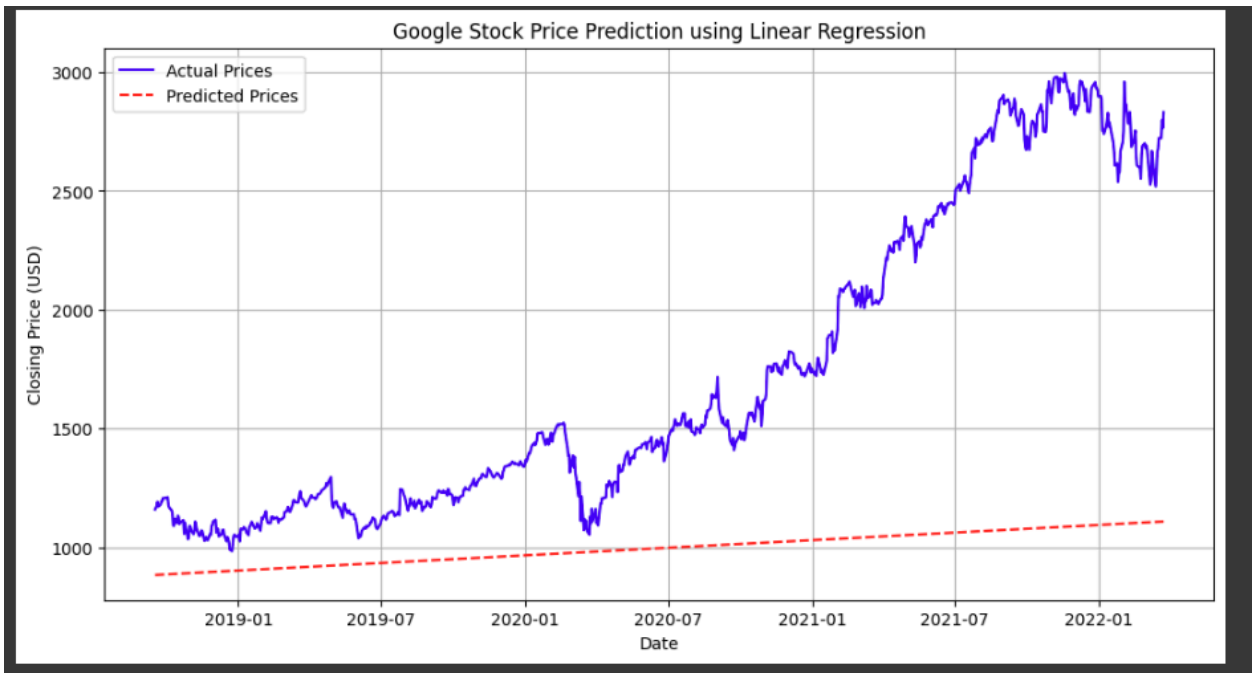
Root Mean Squared Error (RMSE): 933.75

9.Plotting the data

```
plt.figure(figsize=(12, 6))

plt.plot(df.index[len(X_train):], y_test, label="Actual Prices", color="blue")

plt.plot(df.index[len(X_train):], y_pred, label="Predicted Prices", color="red",
linestyle="dashed")

plt.xlabel("Date")

plt.ylabel("Closing Price (USD)")

plt.title("Google Stock Price Prediction using Linear Regression")

plt.legend()
```

plt.grid()

plt.show()



9.Forecast Future Stock Prices:

future_days = np.array(range(df["Days"].max() + 1, df["Days"].max() + 31)).reshape(-1, 1)

future_pred = model.predict(future_days)

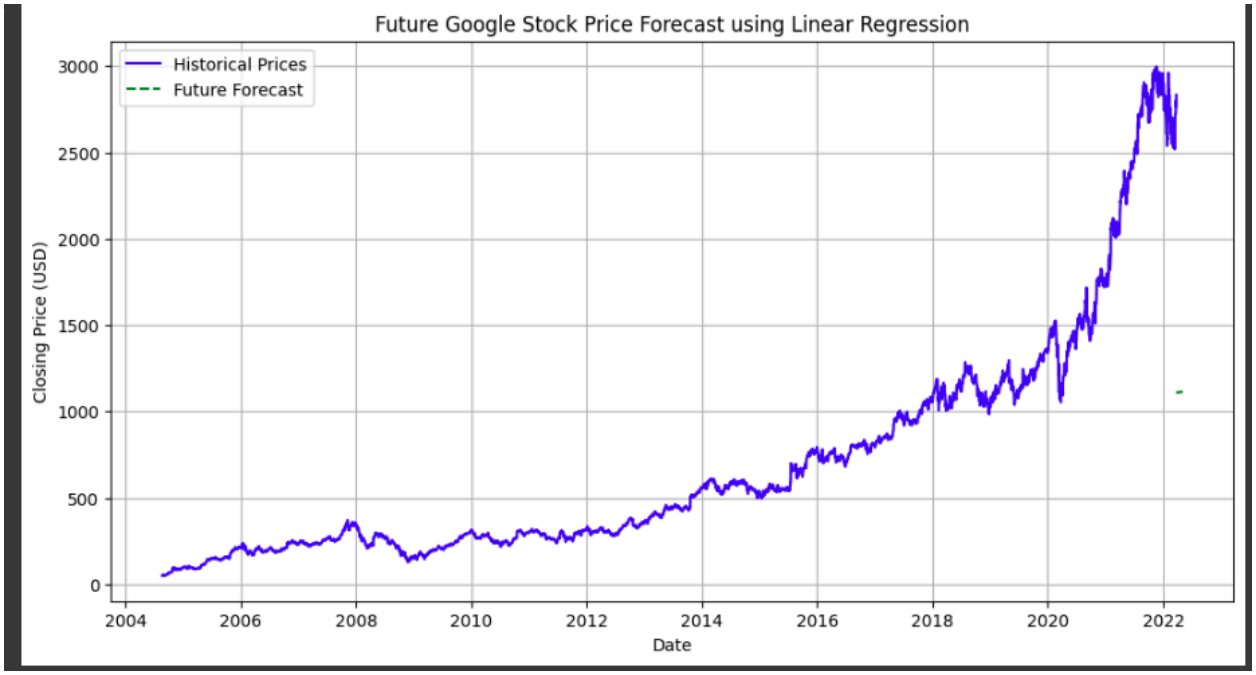
future_dates = pd.date_range(start=df.index.max(), periods=30, freq="B") # Business days

forecast_df = pd.DataFrame({"Date": future_dates, "Predicted Close": future_pred})

plt.figure(figsize=(12, 6))

plt.plot(df.index, df["Close"], label="Historical Prices", color="blue")

```
plt.plot(forecast_df["Date"], forecast_df["Predicted Close"], label="Future Forecast", color="green", linestyle="dashed")

plt.xlabel("Date")

plt.ylabel("Closing Price (USD)")

plt.title("Future Google Stock Price Forecast using Linear Regression")

plt.legend()

plt.grid()

plt.show()
```



Result:

Thus the Linear Regression model for ForeCasting Time Series Data has been Executed Successfully.