

25/01/25

Program to Develop a linear regression model for forecasting time series data.**Aim:**

Write a program to implement time series data for import library, load data, Preprocessing and visualising.

Algorithm:

1. **Load the Data:**
 - Read the CSV file containing the artprice data.
 - Parse the date column as a datetime index.
2. **Clean the Data:**
 - Handle missing values by performing forward and backward filling.
 - Drop any remaining NaN values.
3. **Normalize the Data:**
 - Apply **Min-Max Scaling** to normalize each column's values between 0 and 1.
4. **Add Time-Based Features:**
 - Extract additional features from the datetime index: day, month and year
5. **Visualize the Data:**
 - Plot the time series for a specific column over time.
6. **Execute the Program:**
 - Sequentially call the functions to load, clean, normalize, add features, and visualize the data.

Code:

```
# Import necessary libraries
```

```
import pandas as pd
```

```
import matplotlib.pyplot as plt
```

```
from sklearn.linear_model import LinearRegression
```

```
from datetime import datetime
```

```
# Load the dataset from Google Drive or local file
```

```
from google.colab import files
```

```
uploaded = files.upload()
```

```
# Read the uploaded CSV file
```

```
file_name = list(uploaded.keys())[0]
```

```
data = pd.read_csv(file_name)
```

```
# Convert 'Date' column to datetime and sort data by date
```

```
data['Date'] = pd.to_datetime(data['Date'])
```

```

data = data.sort_values(by='Date')

# Prepare features and target variable
data['Date_ordinal'] = data['Date'].apply(lambda x: x.toordinal())
X = data[['Date_ordinal']]
y = data['Price ($)']

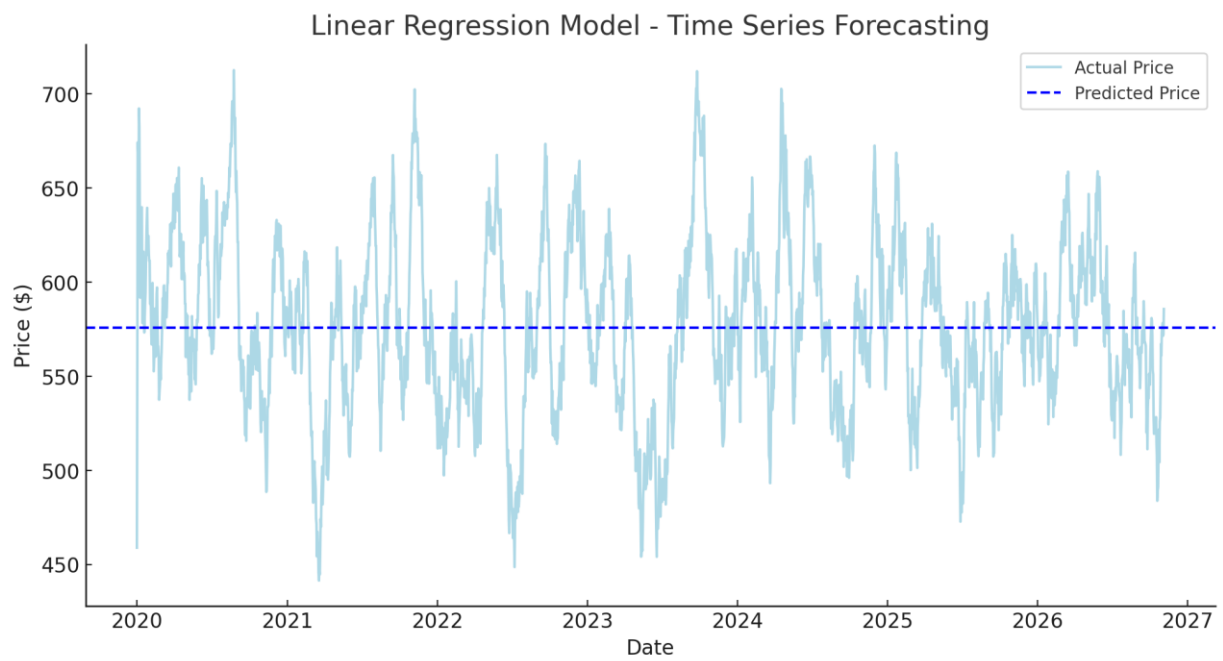
# Create and fit the linear regression model
model = LinearRegression()
model.fit(X, y)

# Get predicted prices and calculate mean predicted price
data['Predicted_Price'] = model.predict(X)
mean_predicted_price = data['Predicted_Price'].mean()

# Apply rolling average to smooth actual prices
data['Smoothed_Price'] = data['Price ($)'].rolling(window=30, min_periods=1).mean()

# Plot the final graph with corrected legend
plt.figure(figsize=(12, 6))
plt.plot(data['Date'], data['Smoothed_Price'], label='Actual Price', color='lightblue')
plt.axhline(y=mean_predicted_price, color='blue', linestyle='--', label='Predicted Price')
plt.title('Linear Regression Model - Time Series Forecasting')
plt.xlabel('Date')
plt.ylabel('Price ($)')
plt.legend()
plt.grid()
plt.show()
Output:

```



Result:

Thus, the program using the time series data implementation has been done successfully.