

3. Implement program for Linear Regression Model of a time series data.

EX.N0 : 3	Implement program for Linear Regression Model of a time series data.
<u>DATE : 20/02/2025</u>	

AIM:

Implement program for Linear Regression Model of a time series data.

PROGRAM:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error

# Load the dataset
file_path = "C:/Users/Lenovo/Downloads/climate_change_data.csv"
df = pd.read_csv(file_path)

# Convert 'Date' to datetime and sort
df['Date'] = pd.to_datetime(df['Date'])
df = df.sort_values(by='Date')

# Convert 'Date' to numerical format (ordinal values)
df['Date_Ordinal'] = df['Date'].map(lambda x: x.toordinal())

# Selecting features and target variable
X = df[['Date_Ordinal', 'CO2 Emissions', 'Sea Level Rise', 'Precipitation', 'Humidity', 'Wind Speed']]
y = df['Temperature']

# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42, shuffle=False)

# Train the Linear Regression model
model = LinearRegression()
model.fit(X_train, y_train)

# Predictions and evaluation
y_pred = model.predict(X_test)
mse = mean_squared_error(y_test, y_pred)
rmse = np.sqrt(mse)
```

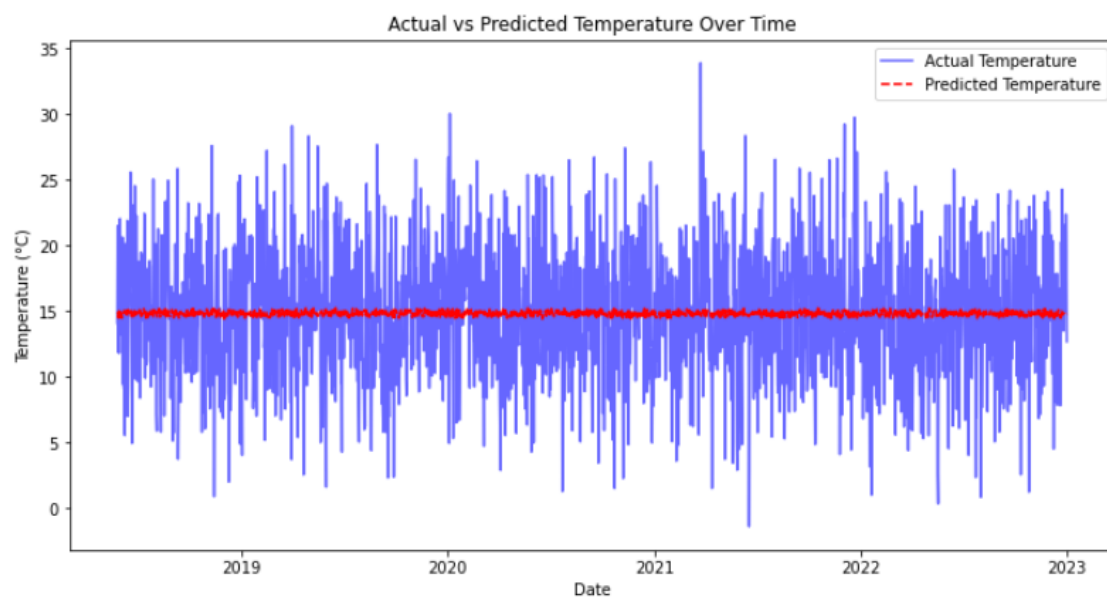
```

# Visualization
plt.figure(figsize=(12, 6))
plt.plot(df['Date'].iloc[len(y_train):], y_test, label="Actual Temperature", color="blue", alpha=0.6)
plt.plot(df['Date'].iloc[len(y_train):], y_pred, label="Predicted Temperature", color="red",
linestyle="dashed")
plt.xlabel("Date")
plt.ylabel("Temperature (°C)")
plt.title("Actual vs Predicted Temperature Over Time")
plt.legend()
plt.show()

# Output model performance
print("Model Coefficients:", model.coef_)
print("Intercept:", model.intercept_)
print("Root Mean Squared Error (RMSE):", rmse)

```

OUTPUT:



```

Model Coefficients: [-3.11137658e-05 -1.88313127e-04  1.08858092e-02  1.29774233e-03
-3.78484066e-03  9.20788264e-03]
Intercept: 37.72511031810996
Root Mean Squared Error (RMSE): 4.980088917047077

```

RESULT:

Thus, the program for Implement programs for Implement programs for linear regression model of a time series data is executed successfully.