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

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| **EX.N0 : 4** | **Implement program for Linear Regression Model of a time series data.** |
| **DATE : 20/02/2025** |

**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()

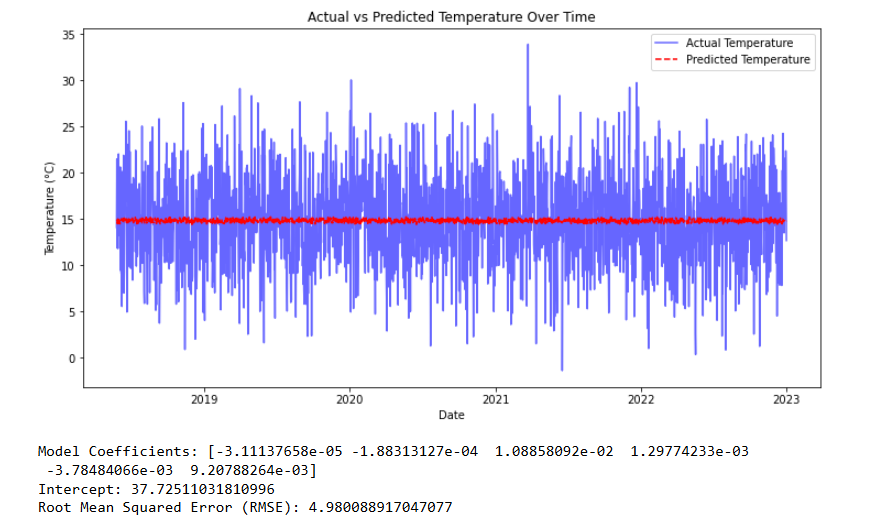
# Output model performance

print("Model Coefficients:", model.coef\_)

print("Intercept:", model.intercept\_)

print("Root Mean Squared Error (RMSE):", rmse)

**OUTPUT:**

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# RESULT:

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