**Linear Regression for Time Series Analysis**

**AIM:**

**To develop a linear regression model for forecasting time series data**

**PROGRAM**

**import pandas as pd**

**import numpy as np**

**import matplotlib.pyplot as plt**

**import seaborn as sns**

**from sklearn.linear\_model import LinearRegression**

**from sklearn.model\_selection import train\_test\_split**

**file\_path**

**= "C:/Users/Lenovo/Downloads/PRICE\_AND\_DEMAND\_201801\_NSW1.csv"**

**df = pd.read\_csv(file\_path)**

**df["SETTLEMENTDATE"] = pd.to\_datetime(df["SETTLEMENTDATE"],**

**format="%Y/%m/%d %H:%M:%S")**

**df = df.sort\_values(by="SETTLEMENTDATE")**

**df.set\_index("SETTLEMENTDATE", inplace=True)**

**df["timestamp"] = (df.index - d3. Methodology**

**df["timestamp"] = (df.index - df.index[0]).total\_seconds()**

**X = df["timestamp"].values.reshape(-1, 1)**

**y = df["TOTALDEMAND"].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)**

**df["SETTLEMENTDATE"] = pd.to\_datetime(df["SETTLEMENTDATE"],**

**format="%Y/%m/%d %H:%M:%S")**

**df = df.sort\_values(by="SETTLEMENTDATE")**

**df.set\_index("SETTLEMENTDATE", inplace=True**

**y\_pred = model.predict(X\_test)**

**index\_values = df.index.to\_numpy()**

**plt.figure(figsize=(10, 5))**

**plt.plot(index\_values[len(X\_train):], y\_test, label="Actual Demand", color="blue")**

**plt.plot(index\_values[len(X\_train):], y\_pred, label="Predicted Demand",**

**color="red", linestyle="dashed")**

**plt.xlabel("Time")**

**plt.ylabel("Total Demand")**

**plt.title("Linear Regression Forecasting of Total Demand")**

**plt.legend()**

**plt.show()**

**index\_values = np.array(df.index[len(X\_train):])**

**plt.figure(figsize=(10, 5))**

**plt.scatter(index\_values, y\_test, label="Actual Demand", color="blue",**

**alpha=0.5)**

**plt.scatter(index\_values, y\_pred, label="Predicted Demand", color="red",**

**alpha=0.5)**

**plt.xlabel("Time")**

**plt.ylabel("Total Demand")**

**plt.title("Linear Regression Forecasting of Total Demand")**

**plt.legend()**

**plt.xticks(rotation=45)**

* **plt.show()**
* 
* RESULT:
* The program develop a linear regression model for forecasting time series data
* was executed successfully.