EX: No.5 DATE: 20/03/2	**Develop a linear regression model for forecasting time series data.**

AIM:

To analyze and visualize the Air Quality Index trend over time using synthetic data and apply linear regression to identify the overall trend.

ALGORITHM:

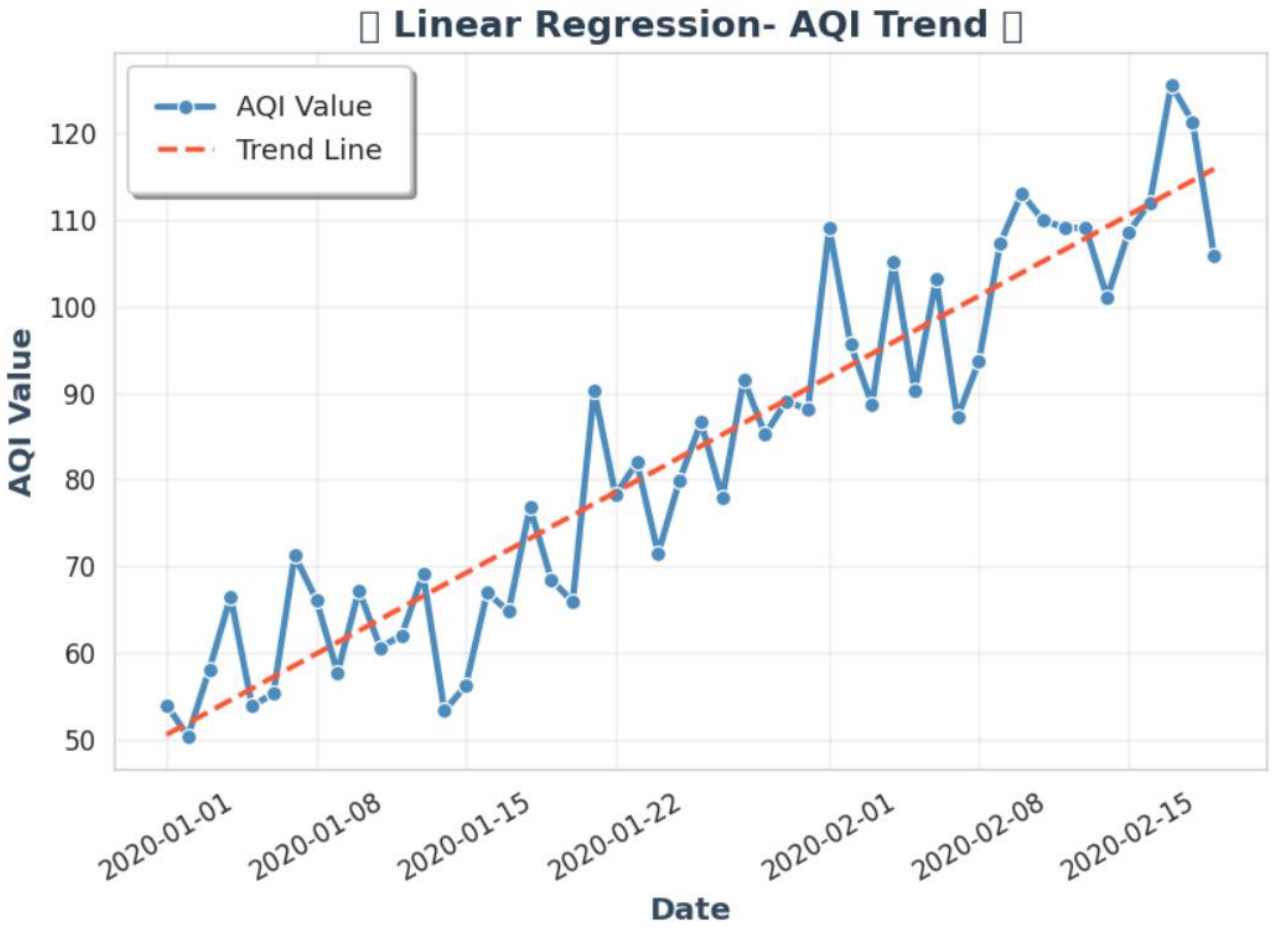
1. Load the Dataset
2. Generate synthetic AQI data
3. Create Data Frame
4. Perform Linear Regression
5. Visualize and display Graph

CODE:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from scipy.stats import linregress
dates = pd.date_range(start="2020-01-01", periods=50, freq='D')
np.random.seed(42)
aqi_values = np.linspace(50, 120, 50) + np.random.normal(0, 8, 50)
df = pd.DataFrame({'Date': dates, 'AQI Value': aqi_values})
slope, intercept, r_value, p_value, std_err = linregress(range(len(df)), df['AQI Value'])
df['Trend'] = slope * np.arange(len(df)) + intercept

plt.figure(figsize=(8, 5), dpi=120)

sns.set_style("whitegrid")

sns.lineplot(x=df['Date'], y=df['AQI Value'], label="AQI Value", color='#4B8BBE', linewidth=2.5,
marker='o', markersize=6)

plt.plot(df['Date'], df['Trend'], label="Trend Line", color='#FF5733', linestyle='dashed', linewidth=2)

plt.title("Linear Regression- AQI Trend ", fontsize=14, fontweight='bold', color='#2C3E50')

plt.xlabel("Date", fontsize=12, fontweight='bold', color='#34495E')
```

```
plt.ylabel("AQI Value", fontsize=12, fontweight='bold', color='#34495E')
plt.xticks(rotation=30, fontsize=10)
plt.yticks(fontsize=10)
plt.legend(fontsize=11, loc='upper left', frameon=True, fancybox=True, shadow=True, borderpad=1)
plt.grid(alpha=0.3)
plt.show()
```

OUTPUT



RESULT:

Thus the program has been completed and verified successfully.