

EXP : No.6

DATE: 10/4/25

Implement Program TO Apply Moving Average Smoothing For Data Preparation and Time Series Forecasting

AIM:

To generate and visualize synthetic air quality data by applying moving average smoothing, in order to observe trends and reduce the effect of short-term fluctuations.

ALGORITHM:

1. Load the Dataset
2. Generate Date Range
3. Generate Synthetic AQI Data
4. Create a DataFrame
5. Apply Moving Average Smoothing
6. Visualize the Smoothed Data
7. Display the Plot

CODE:

```
import numpy as np
import matplotlib.pyplot as plt

dates = pd.date_range(start="2020-01-01", periods=100, freq='D')
np.random.seed(42)

aqi_values = np.linspace(50, 150, 100) + np.random.normal(0, 10, 100)
df = pd.DataFrame({'Date': dates, 'AQI Value': aqi_values})
df.set_index('Date', inplace=True)

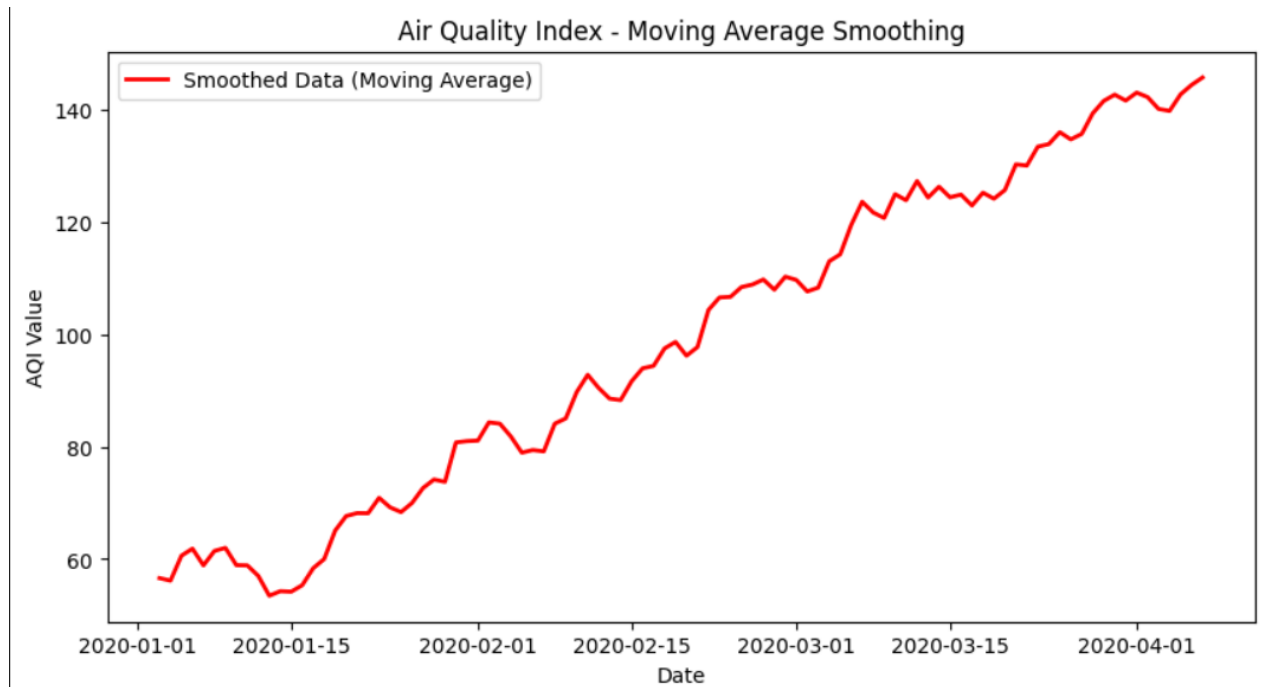
df['Smoothed'] = df['AQI Value'].rolling(window=5, center=True).mean()

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

plt.plot(df.index, df['Smoothed'], label='Smoothed Data (Moving Average)', color='r', linewidth=2)
plt.title("Air Quality Index - Moving Average Smoothing")
plt.xlabel("Date")
```

```
plt.ylabel("AQI Value")  
plt.legend()  
plt.show()
```

OUTPUT:



RESULT:

Thus the program has been completed and verified successfully.