EX:No.6 DATE: 5/04/25	**Implement program to apply moving average smoothing for data preparation and time series forecasting.**

AIM:

To implement Moving Average Smoothing for time series forecasting by reducing short-term fluctuations and highlighting trends for better predictive analysis.

ALGORITHM:

Step 1: Read the dataset and preprocess the time series.

Step 2: Apply Moving Average Smoothing using a rolling window to smooth out noise and fluctuations.

Step 3 Compute trend analysis using smoothed values for better forecasting.

Step 4: Compare original and smoothed data visually using plots.

Step 5: Use the smoothed data to enhance forecasting models by eliminating short-term irregularities.

Step 6: Analyze the effectiveness of smoothing in making time series data more stationary and predictable.

CODE AND DESCRIPTION:

```
import pandas as pd
import matplotlib.pyplot as plt

# Load the dataset
file_path = "/content/ma_lga_12345.csv"
df = pd.read_csv(file_path)

# Convert 'saledate' to datetime format and set as index
df['saledate'] = pd.to_datetime(df['saledate'], format="%d/%m/%Y")
df.set_index('saledate', inplace=True)

# Moving Average Smoothing Function
def moving_average_smoothing(data, window=12):
    return data.rolling(window=window).mean()

df['Smoothed_MA'] = moving_average_smoothing(df['MA'])

# Display calculations
```

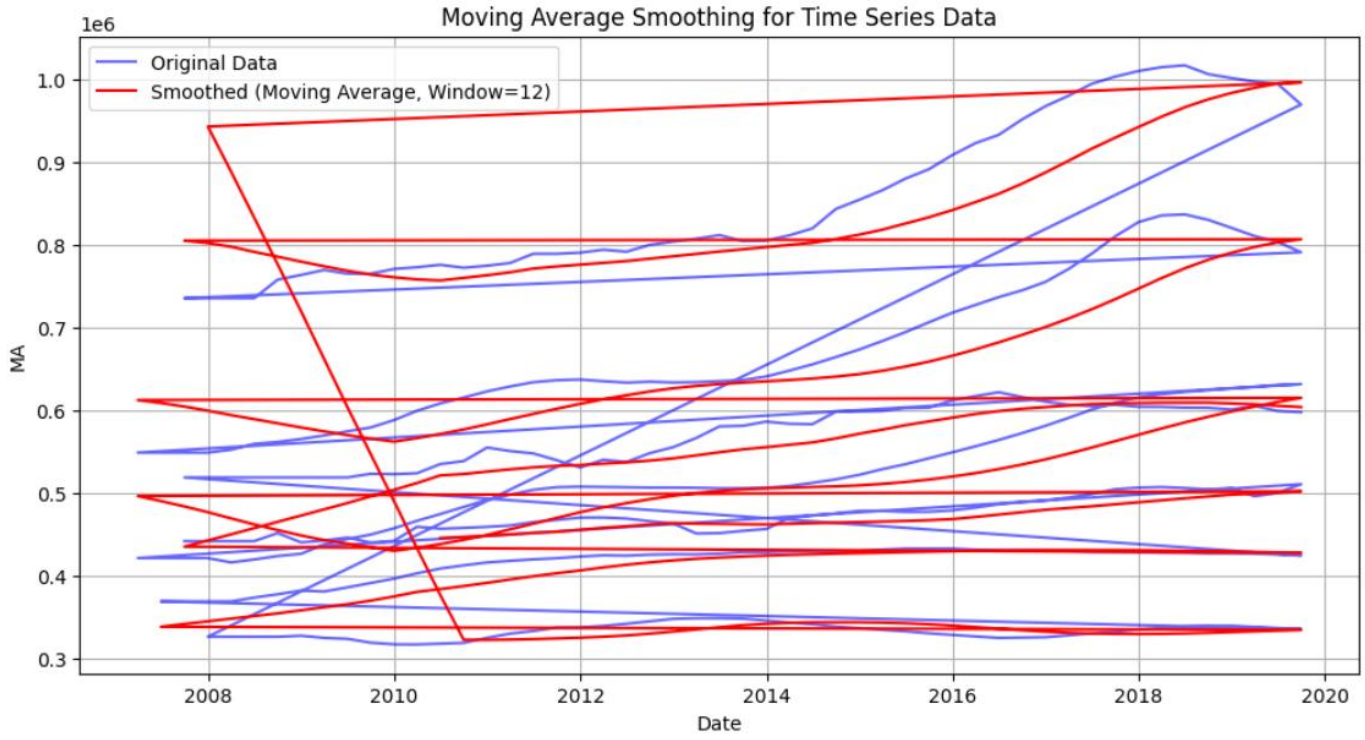
```
print("Moving Average Smoothing Calculation (Window=12):")
print(df['Smoothed_MA'].head(15))  # Display first 15 values

# Plot Original Data vs Smoothed Data
def plot_moving_average():
    plt.figure(figsize=(12, 6))
    plt.plot(df.index, df['MA'], label='Original Data', color='blue', alpha=0.6)
    plt.plot(df.index, df['Smoothed_MA'], label='Smoothed (Moving Average, Window=12)', color='red')
    plt.xlabel('Date')
    plt.ylabel('MA')
    plt.title('Moving Average Smoothing for Time Series Data')
    plt.legend()
    plt.grid(True)
    plt.show()

# Run the visualization function
plot_moving_average()
```

OUTPUT

```
2010-09-30    446848.666667
2010-12-31    448286.583333
2011-03-31    449861.916667
Name: Smoothed_MA, dtype: float64
```



RESULT:

Thus, the program has been completed and verified successfully.