EX:No.6 DATE: 01/03/25	**Implement program to apply moving average smoothing for data preparation and time series forecasting.**

AIM:

To implement program to apply moving average smoothing for data preparation and time series forecasting.

OBJECTIVE:

To smooth and prepare office supply sales time series data using moving average smoothing techniques to reduce noise, highlight trends, and support basic forecasting.

BACKGROUND:

- Time series data often contains short-term fluctuations that make trends difficult to observe.
- Moving average smoothing reduces this noise by averaging data points over a fixed window, making trends more visible.
- This smoothed version is easier to analyze and can serve as a foundation for forecasting models.
- Proper data preparation improves the accuracy and interpretability of time series forecasts.

SCOPEOFTHEPROGRAM:

- Load and clean the office supply sales dataset
- Set the datetime column as the index
- Aggregate sales data by daily frequency
- Apply 30-day moving average smoothing to reduce short-term fluctuations
- Visualize the original vs. smoothed time series to interpret sales trends

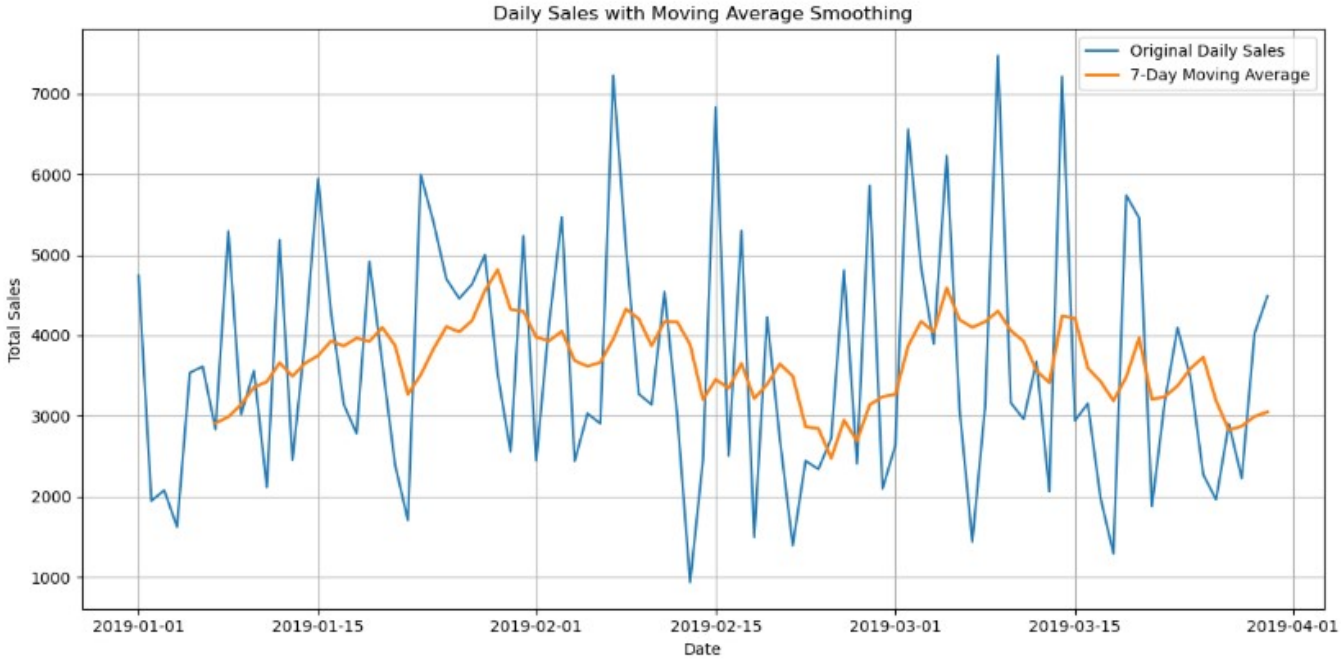
ALGORITHM:

- Import required libraries (pandas, matplotlib)
- Load the dataset and convert the date column to datetime format
- Set the date column as the index of the DataFrame
- Resample the data to obtain daily total sales
- Apply moving average smoothing using a 30-day window
- Plot the original and smoothed series for visual comparison

CODE:

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

# Load your CSV
df = pd.read_csv(r"C:\Users\exam\Downloads\supermarket_sales - Sheet1.csv")

# Convert 'Date' to datetime format
df['Date'] = pd.to_datetime(df['Date'])

# Group by Date and calculate total sales per day
daily_sales = df.groupby('Date')['Total'].sum().sort_index()

# Apply 7-day moving average
window_size = 7
moving_avg = daily_sales.rolling(window=window_size).mean()

# Plot the results
plt.figure(figsize=(12, 6))
plt.plot(daily_sales, label='Original Daily Sales')
plt.plot(moving_avg, label=f'{window_size}-Day Moving Average', linewidth=2)
plt.title('Daily Sales with Moving Average Smoothing')
plt.xlabel('Date')
plt.ylabel('Total Sales')
plt.legend()
plt.grid(True)
plt.tight_layout()
plt.show()
```

OUTPUT:



RESULT:

Thus,theprogramto apply moving average smoothing for data preparation and time series forecastinghasbeendone successfully.