**Implement program to apply moving average smoothing for data preparation and time series forecasting.**

**EX:No.6**

**DATE: 01/03/25**

# 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.

## SCOPE OF THE PROGRAM:

* 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

# Import the cleaned sales dataset

df = pd.read\_csv("cleaned\_sales\_data.csv")

# Convert 'Order Date' to datetime format

df['Order Date'] = pd.to\_datetime(df['Order Date'], errors='coerce')

# Set 'Order Date' as the index

df.set\_index('Order Date', inplace=True)

# Create a daily aggregated sales series

df\_daily = df['Sales'].resample('D').sum()

# Apply Moving Average Smoothing

window\_size = 30 # 30-day moving average

df\_smooth = df\_daily.to\_frame(name='Sales')

df\_smooth['Moving\_Avg'] = df\_smooth['Sales'].rolling(window=window\_size).mean()

# Plot the original and smoothed time series

plt.figure(figsize=(14, 6))

plt.plot(df\_smooth['Sales'], label='Original Sales', alpha=0.4)

plt.plot(df\_smooth['Moving\_Avg'], label=f'{window\_size}-Day Moving Average', color='red')

plt.xlabel("Date")

plt.ylabel("Sales")

plt.title("Office Supplies Sales Trend Estimation using Moving Average Smoothing")

plt.legend()

plt.tight\_layout()

plt.show()

# OUTPUT:

# exp6

**RESULT:**

Thus, the program to apply moving average smoothing for data preparation and time series forecasting has been done successfully.