EXERCISE NO 06

MOVING AVERAGE SMOOTHING FOR DATA PREPARATION AND TIME SERIES FORECASTING

AIM:

To prepare data by moving average smoothing and time series forecasting.

ALGORITHM:

1. Load & Preprocess Data: Read dataset, convert dates, and aggregate monthly.
2. Apply moving average: weighted moving average.
3. Visualize Results: Plot original, moving average series.

PROCEDURE:

1. Import the necessary libraries:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.linear_model import LinearRegression
```

2. Load the time series data:

```
# Load dataset
file_path = "/content/amazon.csv"
df = pd.read_csv(file_path, encoding='latin1')
```

3. Pre process the data:

```
# Map Portuguese month names to English
month_map = {
    'Janeiro': 'January', 'Fevereiro': 'February', 'Março': 'March',
    'Abril': 'April', 'Maio': 'May', 'Junho': 'June',
    'Julho': 'July', 'Agosto': 'August', 'Setembro': 'September',
    'Outubro': 'October', 'Novembro': 'November', 'Dezembro': 'December'
}

df['month'] = df['month'].map(month_map)
df['date'] = pd.to_datetime(df['month'] + ' ' + df['year'].astype(str), format='%B %Y', errors='coerce')
df.set_index('date', inplace=True)

df_monthly = df.resample('ME')['number'].sum()
```

4. Moving average implementation:

```
# Moving Average Smoothing
window = 3
df_ma = df_monthly.rolling(window=window, center=True).mean()
```

5. Visualization:

```
# Plot results
plt.figure(figsize=(12, 6))
plt.plot(df_monthly, label='Original Series', alpha=0.7)
plt.plot(df_ma, label='Moving Average Smoothing', linestyle='dashed', color='red')
plt.legend()
plt.title('Time Series Smoothing using Moving Average')
plt.show()
```

OUTPUT: