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27/03/2025

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

AIM :

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

Procedure and Code :

Step 1 - Import the Files and Libraries .

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

Step 2 - Describe and Read the Data

```
df=pd.read_csv('/content/drive/MyDrive/TimeSereisDatasets/
daily-website-vvisitors.csv)
```

```
df.head(10)
```

```
df.shape
```

```
(2167, 8)
```

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Step 3 -original time series

```
ts = df['Unique.Visits']

# Plot original time series
plt.figure(figsize=(12,6))
plt.plot(ts, label='Original')
plt.title('Daily Unique Visitors')
plt.xlabel('Date')
plt.ylabel('Visitors')
plt.legend()
plt.show()
```

Step 4 -Moving Average Smoothing

```
window_size = 7  # weekly moving average
moving_avg = ts.rolling(window=window_size).mean()

# Plot original vs smoothed
plt.figure(figsize=(12,6))
plt.plot(ts, label='Original')
plt.plot(moving_avg, label=f'{window_size}-day Moving Average', color='red')
plt.title('Moving Average Smoothing')
plt.xlabel('Date')
plt.ylabel('Visitors')
plt.legend()
plt.show()
```

Step 5 -Time Series Forecasting with Exponential Smoothing

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```
# Split data into train and test (last 30 days for testing)
split_date = ts.index[-30]
train = ts[ts.index <= split_date]
test = ts[ts.index > split_date]

# Simple Exponential Smoothing
fit1 = SimpleExpSmoothing(train).fit()
fcast1 = fit1.forecast(len(test))

# Holt's Linear Trend Model
fit2 = Holt(train).fit()
fcast2 = fit2.forecast(len(test))

# Plot forecasts
plt.figure(figsize=(12,6))
plt.plot(train, label='Train')
plt.plot(test, label='Test')
plt.plot(fcast1, label='Simple Exponential Smoothing')
plt.plot(fcast2, label='Holt\'s Linear Trend')
plt.title('Time Series Forecasting')
plt.xlabel('Date')
plt.ylabel('Visitors')
plt.legend()
plt.show()
```

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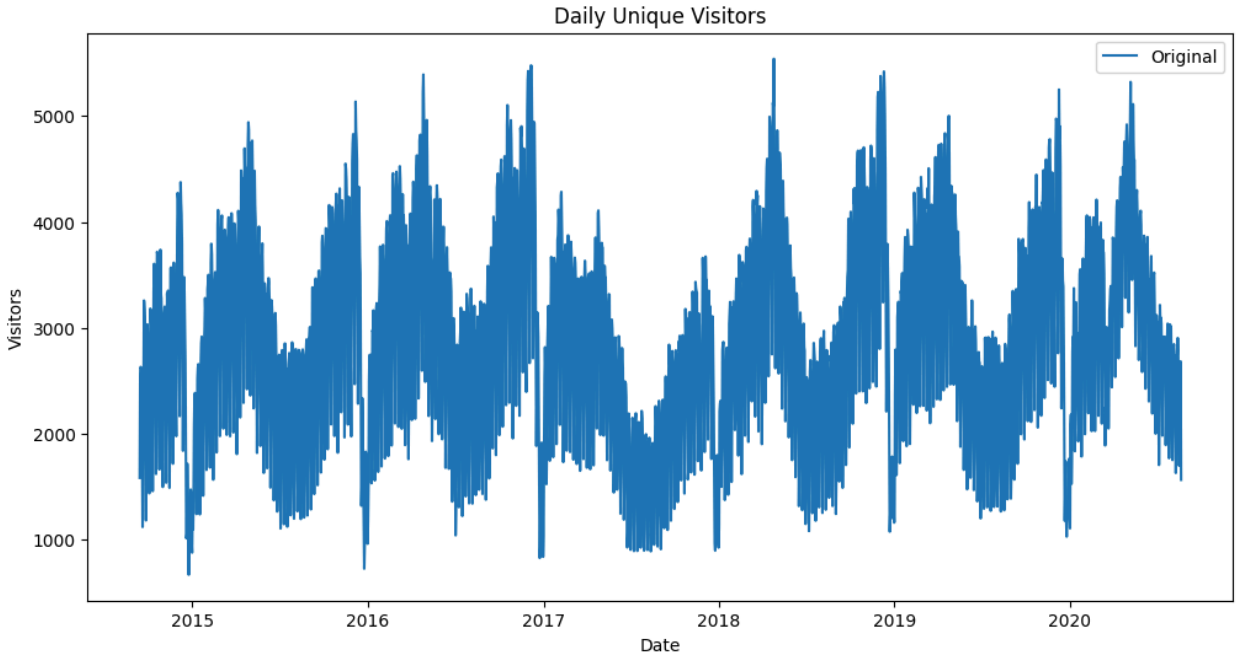

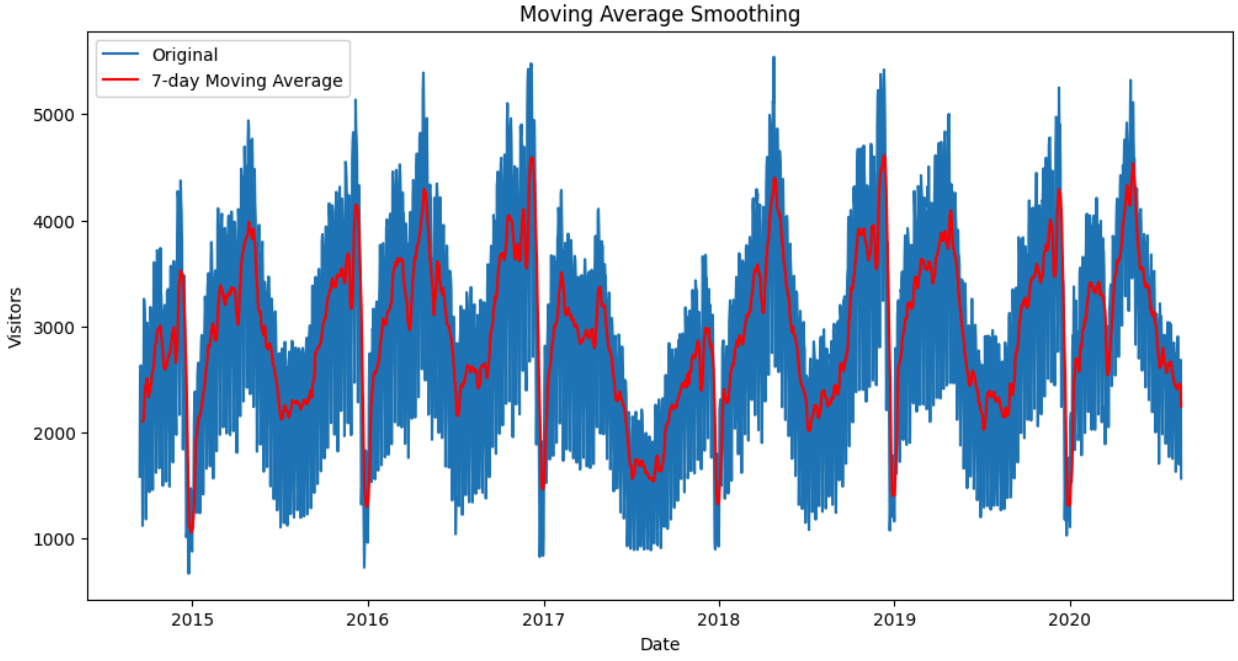

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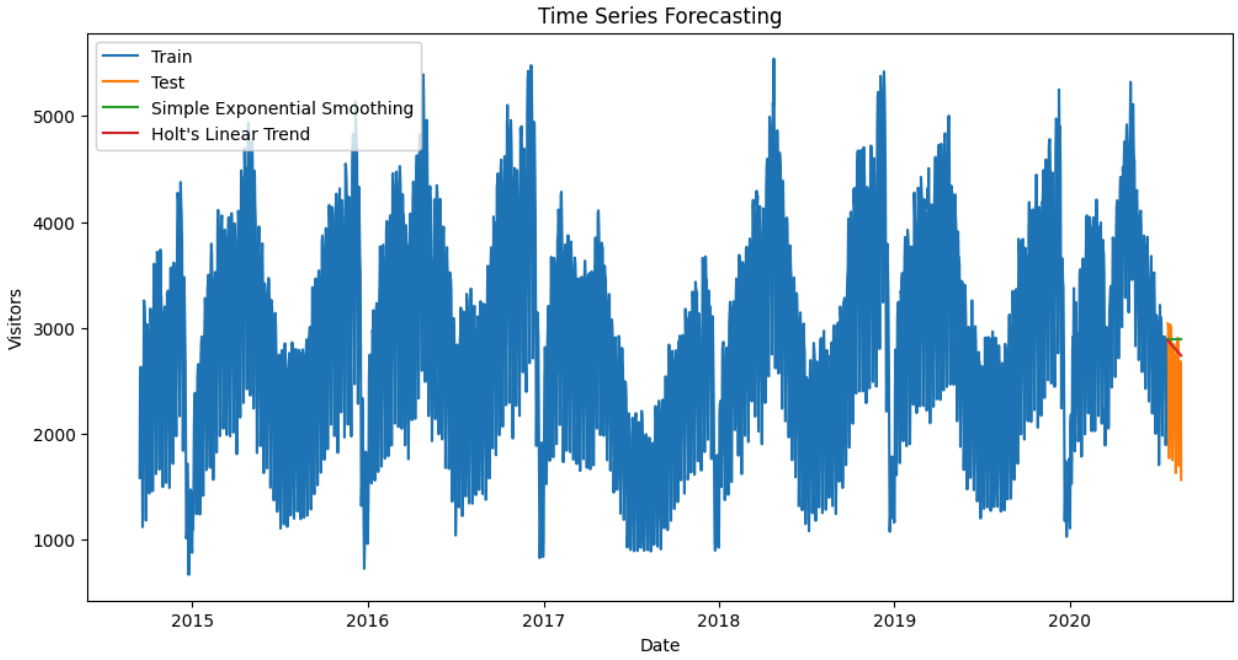

Result:

Thus the Program has been Executed Successfully.