

EX -7

03/04/2025

Implement program for decomposing time series data into trend and seasonality

AIM :

Implement program for decomposing time series data into trend and seasonality.

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

```
plt.figure(figsize=(12, 6))
plt.plot(ts)
plt.title('Original Time Series (Unique Visits)')
plt.xlabel('Date')
plt.ylabel('Number of Visits')
plt.grid(True)
plt.show()
```

Step 4 - Time series decomposition

```
plt.figure(figsize=(12, 8))

plt.subplot(4, 1, 1)
plt.plot(ts, label='Original')
plt.legend(loc='upper left')
plt.title('Time Series Decomposition')

plt.subplot(4, 1, 2)
plt.plot(result.trend, label='Trend')
plt.legend(loc='upper left')

plt.subplot(4, 1, 3)
plt.plot(result.seasonal, label='Seasonality')
plt.legend(loc='upper left')

plt.subplot(4, 1, 4)
plt.plot(result.resid, label='Residuals')
plt.legend(loc='upper left')

plt.tight_layout()
plt.show()
```

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Step 5 - summary statistics of the components

```
print("\nTrend Summary Statistics:")  
print(result.trend.describe())
```

```
print("\nSeasonal Summary Statistics:")  
print(result.seasonal.describe())
```

```
print("\nResiduals Summary Statistics:")  
print(result.resid.describe())
```

Trend Summary Statistics:

```
count    2161.000000  
mean      2945.721095  
std       696.971357  
min       1057.714286  
25%       2435.000000  
50%       2951.285714  
75%       3465.857143  
max       4611.571429
```

Name: trend, dtype: float64

Seasonal Summary Statistics:

```
count    2167.000000  
mean       1.000166  
std        0.219536  
min        0.604495  
25%        0.787914  
50%        1.132255  
75%        1.192669  
max        1.204932
```

Name: seasonal, dtype: float64

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Residuals Summary Statistics:

count 2161.000000

mean 0.999031

std 0.076579

min 0.538122

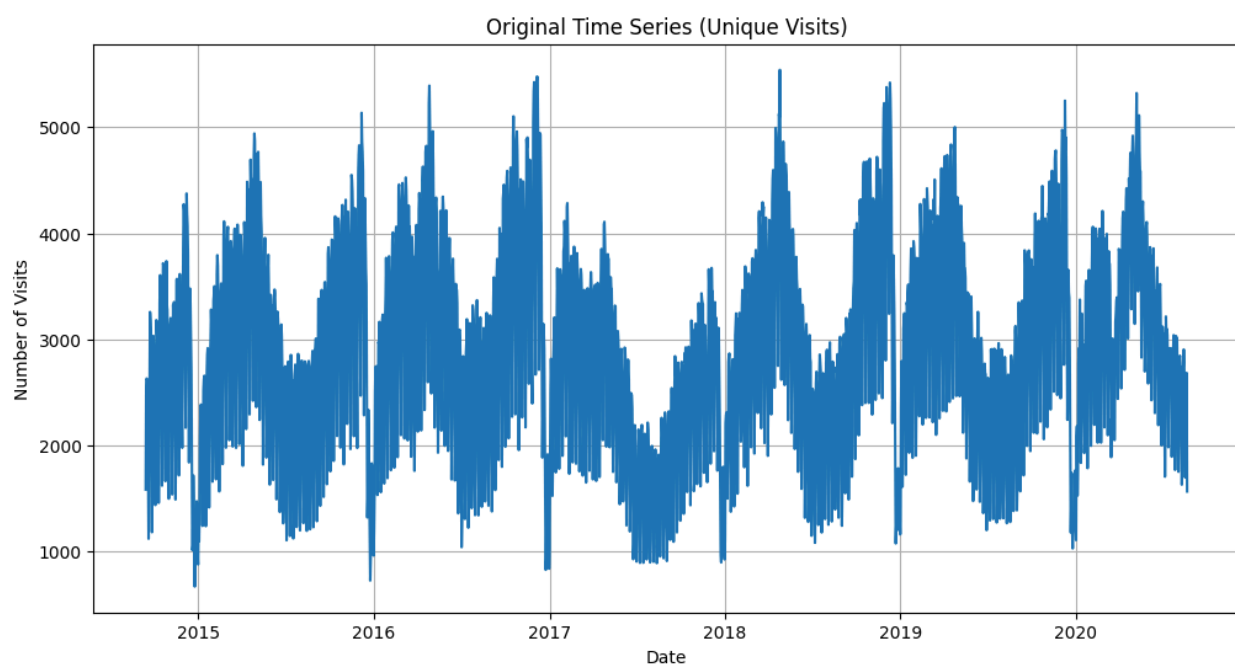
25% 0.966198

50% 1.003011

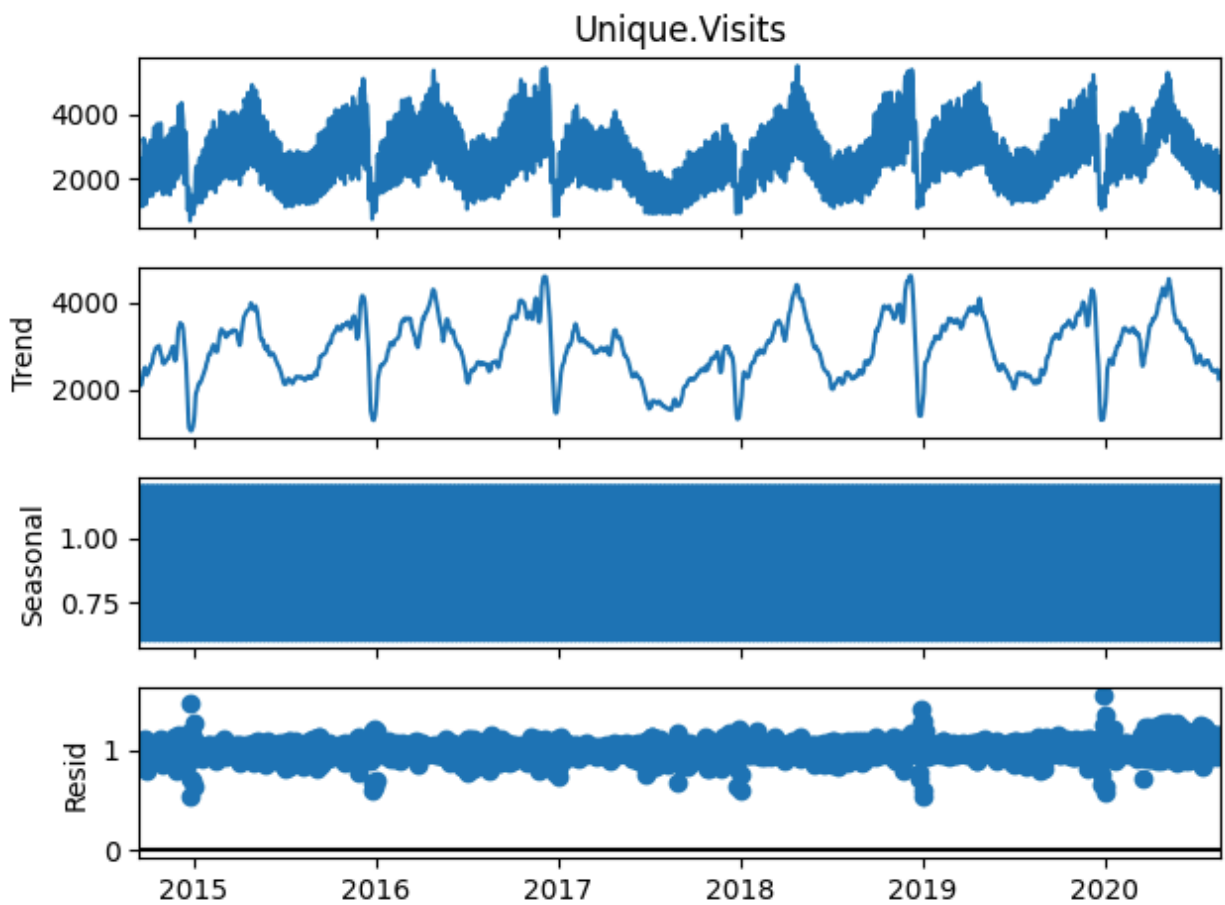
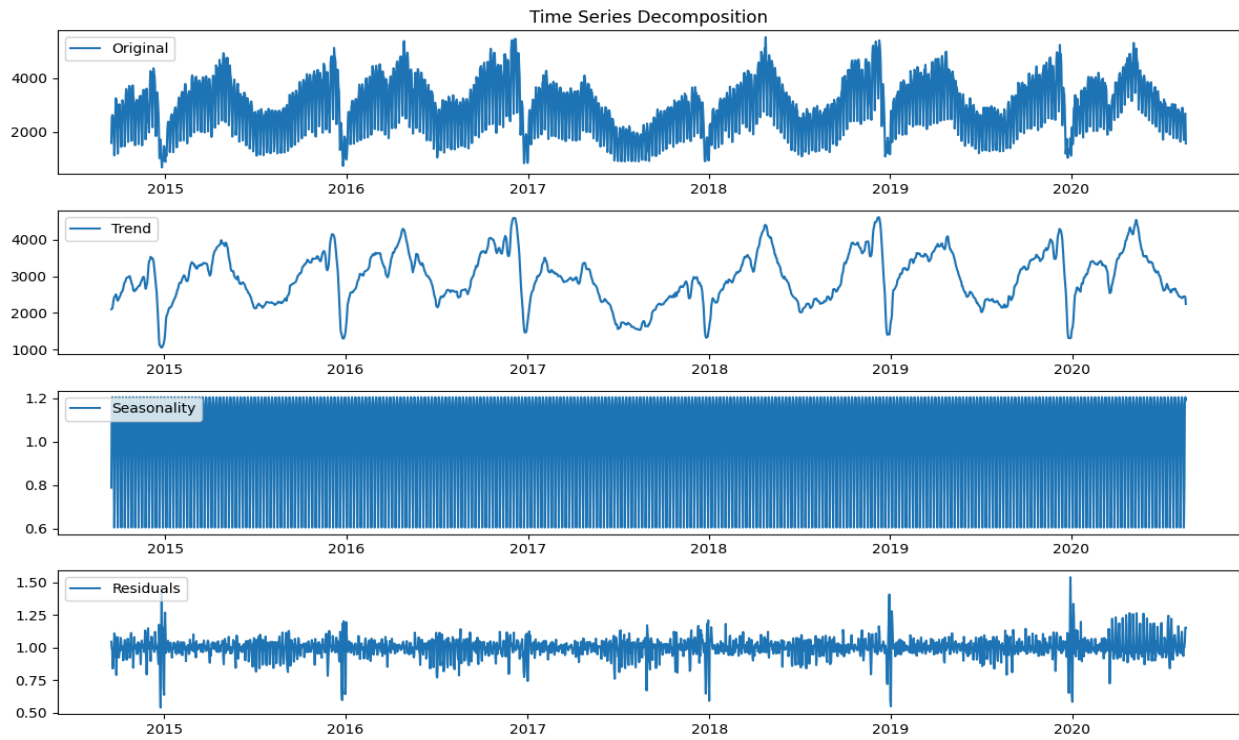
75% 1.036575

max 1.538856

Name: resid, dtype: float64



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Result:

Thus the Program has been Executed Successfully.