221501111 - TSA EXP4

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns+
from statsmodels.tsa.stattools import adfuller
from google.colab import files
import io
```

```
print("Please upload your dataset (CSV file).")
uploaded = files.upload()
```

```
Please upload your dataset (CSV file).
Choose Files No file chosen     Upload widget is only available when the cell has been executed in the current browser session. Please rerun this cell to
```

```
filename = list(uploaded.keys())[0]
print(f"Uploaded file: {filename}")
```

```
Uploaded file: cleaned_weather.csv
```

```
df = pd.read_csv(io.BytesIO(uploaded[filename]))
```

```
print("\nColumn names in the dataset:", df.columns.tolist())
```

```

Column names in the dataset: ['date', 'p', 'T', 'Tpot', 'Tdew', 'rh', 'VPmax', 'VPact', 'VPdef', 'sh', 'H2OC', 'rho', 'wv', 'max. wv', '
```

```
date_column = input("\nEnter the column name for the date (or press Enter if no date column): ").strip()
```

```

Enter the column name for the date (or press Enter if no date column): date
```

```
if date_column and date_column in df.columns:
    df[date_column] = pd.to_datetime(df[date_column])  # Convert to datetime format
    df.set_index(date_column, inplace=True)  # Set as index
    print(f"\n'{date_column}' column set as index.")
else:
    print("\nNo date column provided or found. Using default index.")
```

```

'date' column set as index.
```

```
print("\nFirst few rows of the dataset:")
print(df.head())
```

```

First few rows of the dataset:
                           p     T    Tpot  Tdew    rh  VPmax  VPact  VPdef  \
date
2020-01-01 00:10:00  1008.89  0.71  273.18 -1.33  86.1   6.43   5.54   0.89
2020-01-01 00:20:00  1008.76  0.75  273.22 -1.44  85.2   6.45   5.49   0.95
2020-01-01 00:30:00  1008.66  0.73  273.21 -1.48  85.1   6.44   5.48   0.96
2020-01-01 00:40:00  1008.64  0.37  272.86 -1.64  86.3   6.27   5.41   0.86
2020-01-01 00:50:00  1008.61  0.33  272.82 -1.50  87.4   6.26   5.47   0.79

                       sh  H2OC      rho    wv  max. wv     wd  rain  raining  \
date
2020-01-01 00:10:00  3.42  5.49  1280.62  1.02     1.60  224.3   0.0      0.0
2020-01-01 00:20:00  3.39  5.45  1280.33  0.43     0.84  206.8   0.0      0.0
2020-01-01 00:30:00  3.39  5.43  1280.29  0.61     1.48  197.1   0.0      0.0
2020-01-01 00:40:00  3.35  5.37  1281.97  1.11     1.48  206.4   0.0      0.0
2020-01-01 00:50:00  3.38  5.42  1282.08  0.49     1.40  209.6   0.0      0.0

                     SWDR  PAR  max. PAR   Tlog
date
2020-01-01 00:10:00   0.0  0.0       0.0  11.45
2020-01-01 00:20:00   0.0  0.0       0.0  11.51
2020-01-01 00:30:00   0.0  0.0       0.0  11.60
2020-01-01 00:40:00   0.0  0.0       0.0  11.70
```

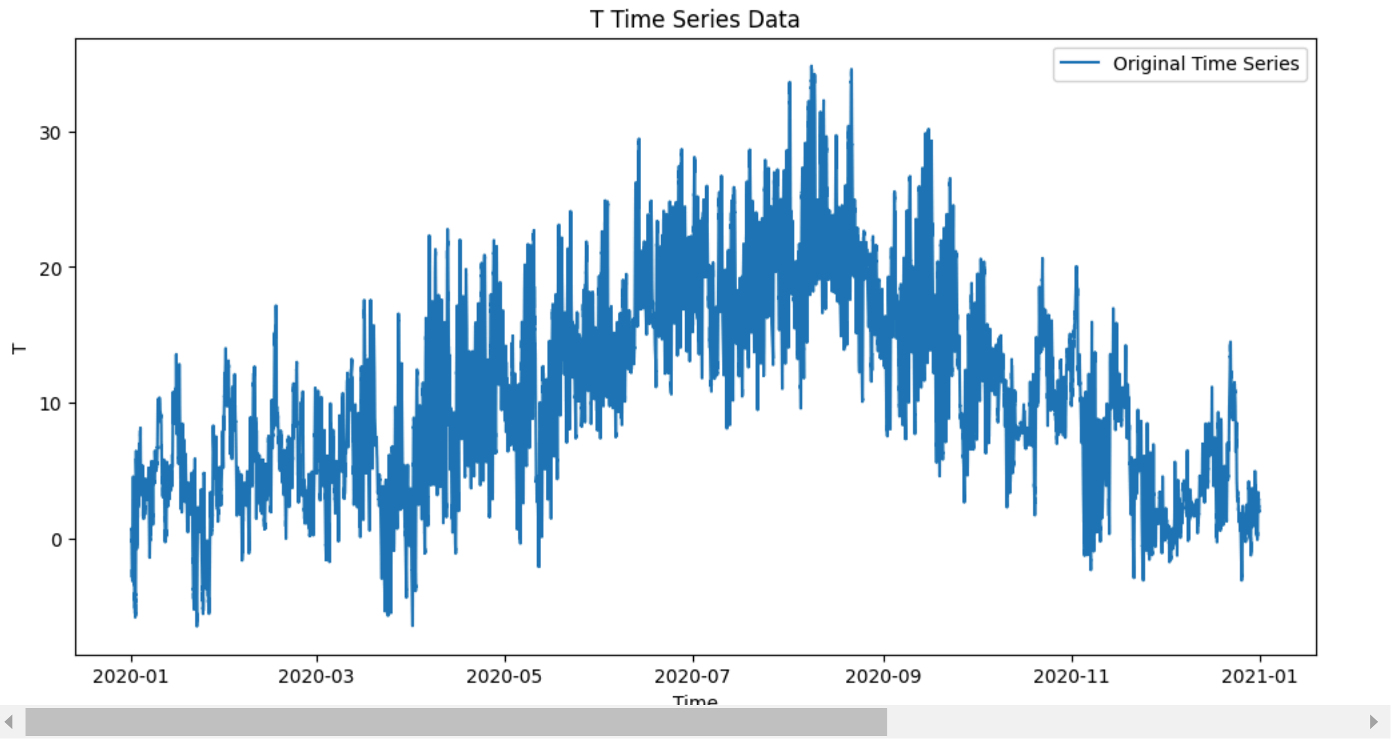
```
     2020-01-01 00:50:00   0.0  0.0       0.0  11.81
```

```
column_name = input("\nEnter the column name for time-series analysis (e.g., Temperature): ").strip()
```

```
     Enter the column name for time-series analysis (e.g., Temperature): T
```

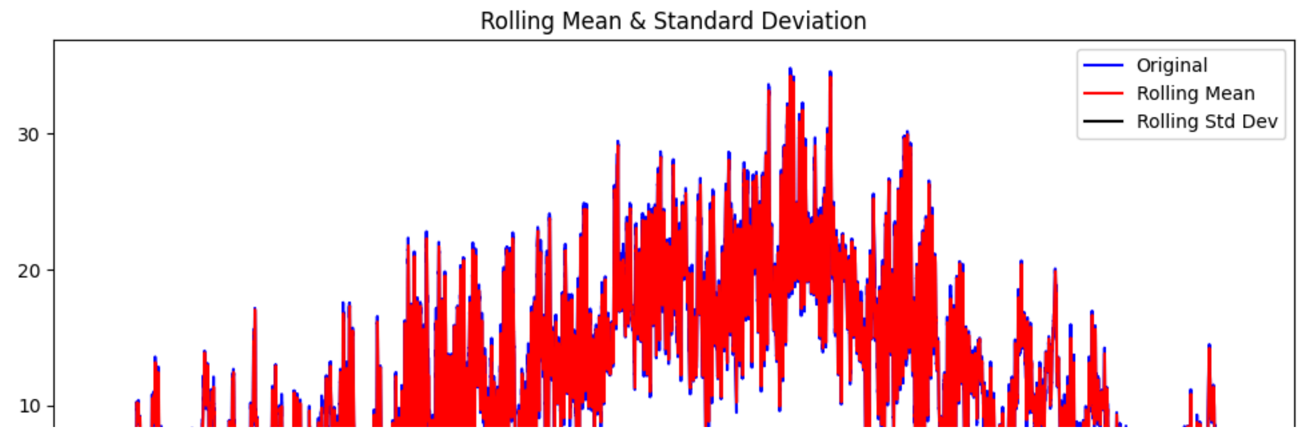
```
if column_name not in df.columns:
    print(f"\nError: Column '{column_name}' not found in dataset.")
else:
    ts = df[column_name]
```

```
 plt.figure(figsize=(12,6))
 plt.plot(ts, label="Original Time Series")
 plt.title(f"{column_name} Time Series Data")
 plt.xlabel("Time")
 plt.ylabel(column_name)
 plt.legend()
 plt.show()
```



```
rolling_window = 12  # Choose a window size
rolmean = ts.rolling(window=rolling_window).mean()
rolstd = ts.rolling(window=rolling_window).std()
```

```
    plt.figure(figsize=(12,6))
    plt.plot(ts, color="blue", label="Original")
    plt.plot(rolmean, color="red", label="Rolling Mean")
    plt.plot(rolstd, color="black", label="Rolling Std Dev")
    plt.title("Rolling Mean & Standard Deviation")
    plt.legend()
    plt.show()
```



```
def adf_test(timeseries):
    print("\nResults of Augmented Dickey-Fuller Test:")
    adf_result = adfuller(timeseries.dropna())  # Drop NaN values
    labels = ["Test Statistic", "p-value", "#Lags Used", "Number of Observations Used"]
    for value, label in zip(adf_result[:4], labels):
        print(f"{label}: {value}")

    print("\nCritical Values:")
    for key, value in adf_result[4].items():
        print(f"\t{key}: {value}")
    if adf_result[1] <= 0.05:
        print("\nConclusion: The time series is STATIONARY (p-value <= 0.05)")
    else:
        print("\nConclusion: The time series is NON-STATIONARY (p-value > 0.05)")
adf_test(ts)
```

```
Results of Augmented Dickey-Fuller Test:
Test Statistic: -8.407443757648588
p-value: 2.1485277355859027e-13
#Lags Used: 58
Number of Observations Used: 52637

Critical Values:
        1%: -3.43047423996295
        5%: -2.8615949115726993
        10%: -2.5667992276035014

Conclusion: The time series is STATIONARY (p-value <= 0.05)
```