Ex.no: 04 **221501008**

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Checking stationarity of time series data using augmented dickey fuller test

AIM:

To check stationarity of time series data using augmented dickey fuller test.

PROCEDURE:

1. **Import Required Libraries**
   - `pandas`: For data manipulation and loading the dataset.
   - `statsmodels.tsa.stattools.adfuller`: For performing the Augmented Dickey-Fuller test.
   - `matplotlib.pyplot`: For visualizing the time series data.
2. **Load the Dataset**
   - Read the CSV file containing time series data (`Gold_Price_DataSet.csv`).
   - Set the 'Date' column as the index.
   - Handle errors such as:
     - Missing file.
     - Incorrect column name.
3. **Extract the Time Series Data**
   - Select the 'Price' column (assumed to contain time series values).
4. **Perform the Augmented Dickey-Fuller (ADF) Test**
   - Apply the `adfuller()` function to check stationarity.
   - Print the results:
     - ADF Statistic
     - p-value
     - Critical values at 1%, 5%, and 10% confidence levels.
5. **Interpret the Results**
   - If `p-value <= 0.05`: The time series is **stationary**.
   - Else: The time series is **non-stationary**.
6. **Plot the Time Series Data**
   - Visualize the 'Price' column against 'Date' to observe trends and patterns.

Code:

```
import pandas as pd
from statsmodels.tsa.stattools import adfuller
import matplotlib.pyplot as plt
```

```
try:
  data = pd.read_csv('/content/Gold_Price_DataSet.csv', index_col='Date')
# Assuming 'Date' is your date/time index column
except FileNotFoundError:
  print("Error: '/content/Gold_Price_DataSet.csv' not found. Please upload
your data file.")
  data = None
except KeyError:
    print("Error: 'Date' column not found in the CSV. Please specify
correct index column name.")
    data = None

if data is not None:
    # Extract the time series data
    # The column name was changed from 'value' to 'Price'
    timeseries = data['Price'] # Assuming 'Price' is your time series data
column

    # Perform the Augmented Dickey-Fuller test
    result = adfuller(timeseries)

    # Print the test results
    print('ADF Statistic: %f' % result[0])
    print('p-value: %f' % result[1])
    print('Critical Values:')
    for key, value in result[4].items():
        print('\t%s: %.3f' % (key, value))
```

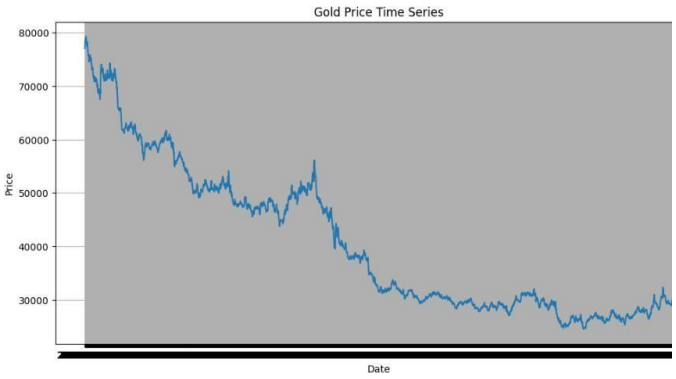
```
    print(result[1])

    # Interpret the results
    if result[1] <= 0.05:
        print("The time series is likely stationary.")
    else:
        print("The time series is likely non-stationary.")
```

OUTPUT:

```
ADF Statistic: -3.140151
p-value: 0.023721
Critical Values:
      1%: -3.433
      5%: -2.863
      10%: -2.567
0.023721012233801 04
The time series is likely stationary.
```

```
plt.figure(figsize=(12, 6))
plt.plot(data.index, timeseries)
plt.title('Gold Price Time Series')
plt.xlabel('Date')
plt.ylabel('Price')
plt.grid(True)
plt.show()
```

OUTPUT:



RESULT:

The program for checking a time series data stationary or not has been successfully implemented .