

What is the procedure for conducting an Augmented Dickey-Fuller Test in R, and can you provide an example of its application?

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The Augmented Dickey-Fuller Test is a statistical method used for testing the presence of a unit root in a time series data, which indicates non-stationarity. This test is commonly used in econometric analysis to determine the presence of a trend or seasonality in a dataset.

To conduct an Augmented Dickey-Fuller Test in R, the following steps can be followed:

1. Load the dataset into R and make sure it is in a time series format.
2. Install and load the "tseries" package, which contains the `adf.test` function for performing the test.
3. Use the `adf.test` function with the time series data as the input.
4. The output of the test will include the test statistic, the p-value, and the critical values at different significance levels.
5. Based on the p-value, the null hypothesis of a unit root can be accepted or rejected. A p-value less than the chosen significance level (usually 0.05) indicates the presence of a unit root and non-stationarity in the data.

An example of the application of the Augmented Dickey-Fuller Test would be to determine the stationarity of a stock price time series data. The test can be used to check if the stock prices follow a random walk or if there is a trend present. This information can be useful for making investment decisions.

Augmented Dickey-Fuller Test in R (With Example)

A time series is said to be "stationary" if it has no trend, exhibits constant variance over time, and has a constant autocorrelation structure over time.

One way to test whether a time series is stationary is to perform an augmented Dickey-Fuller test, which uses the following null and alternative hypotheses:

H0: The time series is non-stationary. In other words, it has some time-dependent structure and does not have constant variance over time.

HA: The time series is stationary.

If the from the test is less than some significance level (e.g. $\alpha = .05$), then we can reject the null hypothesis and conclude that the time series is stationary.

The following step-by-step example shows how to perform an augmented Dickey-Fuller test in R for a given time series.

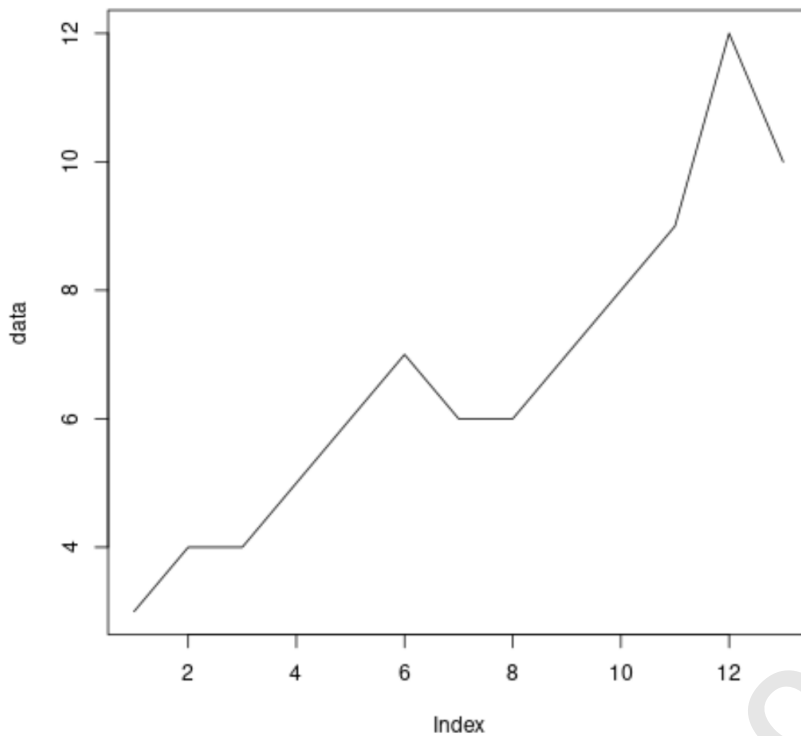
Example: Augmented Dickey-Fuller Test in R

Suppose we have the following time series data in R:

```
data <- c(3, 4, 4, 5, 6, 7, 6, 6, 7, 8, 9, 12, 10)
```

Before we perform an augmented Dickey-Fuller test on the data, we can create a quick plot to visualize the data:

```
plot(data, type='l')
```



To perform an augmented Dickey-Fuller test, we can use the function from the tseries library.

The following code shows how to use this function:

```
library(tseries)
```

```
#perform augmented Dickey-Fuller test
```

```
adf.test(data)
```

Augmented Dickey-Fuller Test

```
data: data
```

```
Dickey-Fuller = -2.2048, Lag order = 2, p-value = 0.4943
```

alternative hypothesis: stationary

Here's how to interpret the most important values in the output:

Test statistic: -2.2048

P-value: 0.4943

This means the time series is non-stationary. In other words, it has some time-dependent structure and does not have constant variance over time.

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