Package ‘testcorr’

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ac.test

Testing zero autocorrelation

Description

The function ac.test computes the test statistics for examining the null hypothesis of zero autocorrelation for univariate time series given in Dalla, Giraitis and Phillips (2019).

Usage

ac.test(x, max.lag, alpha = 0.05, lambda = 2.576, plot = TRUE, table = TRUE, var.name = NULL, scale.font = 1)

Arguments

- **x**: A numeric vector or a univariate numeric time series object or a data frame.
- **max.lag**: Maximum lag at which to calculate the test statistics.
- **alpha**: Significance level for hypothesis testing used in the plots. Default is 0.05.
- **lambda**: Threshold in *Q* test statistics. Default is 2.576.
- **plot**: Logical. If TRUE the sample autocorrelations with their confidence bands and the cumulative statistics with their critical values are plotted. Default is TRUE.
- **table**: Logical. If TRUE the sample autocorrelations, the confidence bands, the test statistics and their p-values are printed out. Default is TRUE.
- **var.name**: NULL or a character string specifying the variable name. If NULL and x has name, the name of x is used. If NULL and x has no name, the string "x" is used. Default is NULL.
- **scale.font**: A positive number indicating the scaling of the font size in the plots. Default is 1.

Details

The standard *t* and robust *t* statistics are for testing the null hypothesis \( H_0 : \rho_k = 0 \) at lags \( k = 1, ..., \text{max.lag} \), and the standard LB and robust *Q* statistics are for testing the null hypothesis \( H_0 : \rho_1 = \ldots = \rho_m = 0 \) at lags \( m = 1, ..., \text{max.lag} \), where \( \rho_k \) denotes the autocorrelation of \( x_t \) at lag \( k \).

Value

An object of class "ac.test", which is a list with the following components:

- **lag**: The lags used.
- **ac**: The sample autocorrelations.
- **scb**: The lower and upper limit of the confidence bands based on the standard test statistics.
rcb The lower and upper limit of the confidence bands based on the robust test statistics.
t The t test statistics.
pvt The p-values for the t test statistics.
tilde The \( \tilde{t} \) test statistics.
pvttilde The p-values for the \( \tilde{t} \) test statistics.
lb The LB test statistics.
pvlb The p-values for the LB test statistics.
qtilde The \( \tilde{Q} \) test statistics.
pvqtilde The p-values for the \( \tilde{Q} \) test statistics.

Note

Missing values are not allowed.

Author(s)

Violetta Dalla, Liudas Giraitis and Peter C. B. Phillips

References


Examples

```r
x <- rnorm(100)
ac.test(x, max.lag = 10)
```

---

**cc.test**  
*Testing zero cross-correlation*

Description

The function cc.test computes the test statistics for examining the null hypothesis of zero cross-correlation for bivariate time series given in Dalla, Giraitis and Phillips (2019).

Usage

```r
cc.test(x, y, max.lag, alpha = 0.05, lambda = 2.576, plot = TRUE, table = TRUE, var.names = NULL, scale.font = 1)
```
Arguments

- **x**: A numeric vector or a univariate numeric time series object or a data frame.
- **y**: A numeric vector or a univariate numeric time series object or a data frame.
- **max.lag**: Maximum lag at which to calculate the test statistics.
- **alpha**: Significance level for hypothesis testing used in the plots. Default is 0.05.
- **lambda**: Threshold in $\tilde{Q}$ test statistics. Default is 2.576.
- **plot**: Logical. If TRUE the sample cross-correlations with their confidence bands and the cumulative statistics with their critical values are plotted. Default is TRUE.
- **table**: Logical. If TRUE the sample cross-correlations, the confidence bands, the test statistics and their p-values are printed out. Default is TRUE.
- **var.names**: NULL or a character string specifying the variable names. If NULL and x,y have names, the names of x,y are used. If NULL and x,y have no names, the string c("x","y") is used. Default is NULL.
- **scale.font**: A positive number indicating the scaling of the font size in the plots. Default is 1.

Details

The standard $t$ and robust $\tilde{t}$ statistics are for testing the null hypothesis $H_0: \rho_k = 0$ at lags $k = -\text{max.lag}, ..., -1, 0, 1, \text{max.lag}$, and the standard $HB$ and robust $\tilde{Q}$ statistics are for testing the null hypothesis $H_0: \rho_0 = ... = \rho_m = 0$ at lags $m = -\text{max.lag}, ..., -1, 0, 1, \text{max.lag}$, where $\rho_k$ denotes the cross-correlation of $x_t$ and $y_{t-k}$ at lag $k$.

Value

An object of class "cc.test", which is a list with the following components:

- **lag**: The lags used.
- **cc**: The sample cross-correlations.
- **scb**: The lower and upper limit of the confidence bands based on the standard test statistics.
- **rcb**: The lower and upper limit of the confidence bands based on the robust test statistics.
- **t**: The $t$ test statistics.
- **pvt**: The p-values for the $t$ test statistics.
- **ttildetilde**: The $\tilde{t}$ test statistics.
- **pvttilde**: The p-values for the $\tilde{t}$ test statistics.
- **hb**: The $HB$ test statistics.
- **pvhb**: The p-values for the $HB$ test statistics.
- **qtilde**: The $\tilde{Q}$ test statistics.
- **pvqtilde**: The p-values for the $\tilde{Q}$ test statistics.
Note
Missing values are not allowed.

Author(s)
Violetta Dalla, Liudas Giraitis and Peter C. B. Phillips

References

Examples
```r
x <- rnorm(100)
y <- rnorm(100)
cc.test(x, y, max.lag = 10)
```

Description
The function iid.test computes the test statistics for examining the null hypothesis of i.i.d. property for univariate series given in Dalla, Giraitis and Phillips (2019).

Usage
```r
iid.test(x, max.lag, alpha = 0.05, plot = TRUE, table = TRUE,
var.name = NULL, scale.font = 1)
```

Arguments
- **x**: A numeric vector or a univariate numeric time series object or a data frame.
- **max.lag**: Maximum lag at which to calculate the test statistics.
- **alpha**: Significance level for hypothesis testing used in the plots. Default is 0.05.
- **plot**: Logical. If TRUE the test statistics and their critical values are plotted. Default is TRUE.
- **table**: Logical. If TRUE the test statistics and their p-values are printed out. Default is TRUE.
- **var.name**: NULL or a character string specifying the variable name. If NULL and x has name, the name of x is used. If NULL and x has no name, the string "x" is used. Default is NULL.
- **scale.font**: A positive number indicating the scaling of the font size in the plots. Default is 1.
Details

The $J_{x|x}$ and $J_{x,x^2}$ statistics are for testing the null hypothesis of i.i.d. at lag $k$, $k = 1, \ldots, \text{max.lag}$, and the $C_{x|x}$ and $C_{x,x^2}$ statistics are for testing the null hypothesis of i.i.d. at lags $1, \ldots, m$, $m = 1, \ldots, \text{max.lag}$.

Value

An object of class "iid.test", which is a list with the following components:

- lag: The lags used.
- jab: The $J_{x|x}$ test statistics.
- pvjab: The p-values for the $J_{x|x}$ test statistics.
- jsq: The $J_{x,x^2}$ test statistics.
- pvjsq: The p-values for the $J_{x,x^2}$ test statistics.
- cab: The $C_{x|x}$ test statistics.
- pvcab: The p-values for the $C_{x|x}$ test statistics.
- csq: The $C_{x,x^2}$ test statistics.
- pvcsq: The p-values for the $C_{x,x^2}$ test statistics.

Note

Missing values are not allowed.

Author(s)

Violetta Dalla, Liudas Giraitis and Peter C. B. Phillips

References


Examples

```r
x <- rnorm(100)
 iid.test(x, max.lag = 10)
```
Description

The function rcorr.test computes the test statistics for examining the null hypothesis of zero Pearson correlation for multivariate series in Dalla, Giraitis and Phillips (2019).

Usage

rcorr.test(x, plot = TRUE, table = TRUE, var.names = NULL, scale.font = 1)

Arguments

x  A numeric matrix or a multivariate numeric time series object or a data frame.
plot Logical. If TRUE the sample Pearson correlations and the p-values for significance are plotted. Default is TRUE.
table Logical. If TRUE the sample Pearson correlations and the p-values for significance are printed out. Default is TRUE.
var.names NULL or a character string specifying the variable names. If NULL and x has names, the names of x are used. If NULL and x has no names, the string c("x[1]","x[2]",...) is used. Default is NULL.
scale.font A positive number indicating the scaling of the font size in the plots. Default is 1.

Details

The p-value of the robust \( \tilde{t} \) statistic is for testing the null hypothesis \( H_0 : \rho_{i,j} = 0 \), where \( \rho_{i,j} \) denotes the correlation of \( x_i \) and \( x_j \).

Value

An object of class "rcorr.test", which is a list with the following components:

pc The sample Pearson correlations.
pv The p-values for the \( \tilde{t} \) test statistics.

Note

Missing values are not allowed.

Author(s)

Violetta Dalla, Liudas Giraitis and Peter C. B. Phillips
References


Examples

```r
x <- matrix(rnorm(400),100)
rcorr.test(x)
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