Package ‘tsqn’

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Type Package

Title Applications of the Qn Estimator to Time Series (Univariate and Multivariate)

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Robust correlation matrix

Computes the robust correlation matrix of the matrix \( x \) proposed by Ma and Genton (2001) using the robust scale \( \text{Qn} \) of Rousseeuw and Croux (1993).

Usage

\[
corMatQn(x)
\]

Arguments

\( x \)  a numeric matrix

Value

a numeric matrix

References


Examples

```r
dataset <- cbind(rnorm(100), rnorm(100))
corMatQn(dataset)
```
**corQn**

Robust correlation between the variables \( x \) and \( y \)

### Description
Computes the robust correlation of \( x \) and \( y \) proposed by Ma and Genton (2001) using the robust scale Qn of Rousseeuw and Croux (1993).

### Usage
```r
corQn(x, y)
```

### Arguments
- **x**: a numeric vector
- **y**: a numeric vector

### Value
A numerical value with the robust correlation between \( x \) and \( y \)

### References


### Examples
```r
corQn(rnorm(100), rnorm(100))
```

---

**covMatQn**

Robust covariance matrix

### Description
Computes the robust covariance matrix of the matrix \( x \) proposed by Ma and Genton (2001) using the robust scale Qn of Rousseeuw and Croux (1993).

### Usage
```r
covMatQn(x)
```
Arguments

- `x`: a numeric matrix

Value

- a numeric matrix

References


Examples

```r
dataset <- cbind(rnorm(100), rnorm(100))
covMatQn(dataset)
```

---

**covQn**  
*Robust covariance between the variables x and y*

Description

Computes the robust covariance of `x` and `y` proposed by Ma and Genton (2001) using the robust scale Qn of Rousseeuw and Croux (1993).

Usage

```r
covQn(x, y)
```

Arguments

- `x`: a numeric vector
- `y`: a numeric vector

Value

- a numerical value with the robust covariance between `x` and `y`

References


Classical and Robust Geweke and Porter-Hudak (GPH) estimators for the long-memory parameter $d$ of a long-range dependent stationary processes

Description

Estimate the fractional (or “memory”) parameter $d$ of long-range dependent stationary processes by the method of Geweke and Porter-Hudak (GPH). (GPH-M) and (GPH-Qn) correspond to the estimators devised by Reisen et al. (2017) and Molinares (2009), respectively.

Usage

GPH_estimate(series, bandw.exp = 0.7, method = "GPH")

Arguments

- series : univariate time series
- bandw.exp : the bandwidth used in the regression equation
- method : character string giving the type of GPH to be computed. Allowed values are "GPH" (the default), "GPH-M" or "GPH-Qn".

Value

- $d$ : GPH estimate
- sd.as : asymptotic standard deviation
- sd.reg : standard error deviation

Author(s)

Valderio Reisen, Céline Lévy-Leduc and Higor Cotta.

References


Examples

```r
library(fracdiff)
simseries <- fracdiff.sim(1500, d = 0.3)
GPH_estimate(simseries$series, method="GPH")$d
## not run:
GPH_estimate(simseries$series, method="GPH-Qn")$d
GPH_estimate(simseries$series, method="GPH-M")$d

## End(Not run)
```

Description

This function computes the robust M-periodogram proposed by Reisen et al. (2017).

Usage

```r
PerioMrob(series)
```

Arguments

- `series`: univariate time series

Value

A numeric vector containing the robust estimates of the spectral density

Author(s)

Valderio Reisen, Céline Lévy-Leduc and Higor Cotta.

References


Examples

```r
PerioMrob(ldeaths)
```
PerQn

Robust periodogram based on the Robust ACF

Description


Usage

\texttt{perqn(x, window = "truncated", bandw.rob = 0.7)}

Arguments

- \texttt{x} \hspace{1cm} \text{univariate time series}
- \texttt{window} \hspace{1cm} \text{character string giving the type of the window. Allowed values are "truncated" (the default) or "NULL".}
- \texttt{bandw.rob} \hspace{1cm} \text{is a numeric value giving the truncation point.}

Value

A numeric vector containing the values of the robust periodogram proposed by Molinares (2009).

Author(s)

Valderio Reisen and Higor Cotta

References


Examples

\texttt{perqn(1deaths)}
Description

Plot method for objects of class "robacf".

Usage

```r
## S3 method for class 'robacf'
plot(x, type = "h", xlab = "Lag", ylab = NULL,
     ylim = NULL, main = NULL, max.mfrow = 6, ask = Npgs > 1 &&
     dev.interactive(), mar = if (nser > 2) c(3, 2, 2, 0.8) else par("mar"),
     oma = if (nser > 2) c(1, 1.2, 1, 1) else par("oma"), mgp = if (nser > 2)
     c(1.5, 0.6, 0) else par("mgp"), xpd = par("xpd"), cex.main = if (nser > 2)
     1 else par("cex.main"), verbose = getOption("verbose"), ...)  
```

Arguments

- `x`: an object of class "robacf".
- `type`: the type of plot to be drawn, default to histogram like vertical lines.
- `xlab`: the x label of the plot.
- `ylab`: the y label of the plot.
- `ylim`: numeric of length 2 giving the y limits for the plot.
- `main`: overall title for the plot.
- `max.mfrow`: positive integer; for multivariate x indicating how many rows and columns of plots should be put on one page, using `par(mfrow = c(m,m))(see par).
- `ask`: logical; if TRUE, the user is asked before a new page is started.
- `mar`, `oma`, `mgp`, `xpd`, `cex.main`: graphics parameters as in `par(*)`, by default adjusted to use smaller than default margins for multivariate x only.
- `verbose`: logical. Should R report extra information on progress?
- `...`: graphics parameters to be passed to the plotting routines.

Value

None

Contributions

- `plot.acf (stats) - R Core`

Examples

```r
robacf(cbind(ldeaths,mdeaths))
```
robacf

Robust autocorrelation or autocovariance function estimation

Description

This function computer and plots(by default) the robust estimates of the autocovariance or the autocorrelation function based on the Qn.

Usage

robacf(x, lag.max = NULL, type = c("correlation", "covariance"),
       plot = TRUE, na.action = na.fail, demean = TRUE, ...)

Arguments

x a numeric vector or matrix.
lag.max maximum lag at which to calculate the acf. Default is 10*log10(N/m) where N is the number of observations and m the number of series. Will be automatically limited to one less than the number of observations in the series.
type character string giving the type of acf to be computed. Allowed values are "correlation" (the default) or "covariance". Accepts parcial names.
plot logical. If TRUE (the default) the acf is plotted.
na.action function to be called to handle missing values. na.pass can be used.
demean logical. Should the covariances be about the sample means?
... further arguments to be passed to plot.acf.

Value

An object of class "robacf", which is a list with the following elements:
lag A three dimensional array containing the lags at which the acf is estimated.
acf An array with the same dimensions as lag containing the estimated acf.
type The type of correlation (same as the type argument).
n.used The number of observations in the time series.
series The name of the series x.
snames The series names for a multivariate time series.
The result is returned invisibly if plot is TRUE.

Author(s)

Higor Cotta, Valderio Reisen and Pascal Bondon
References


Examples

```r
data.set <- cbind(fdeaths,mdeaths)
robacf(data.set)
robacf(data.set,type="covariance",lag.max=10)
```

TimeSeriesQn

Applications of the Qn estimator to time series (univariate and multivariate)

Description

This package contains applications of the Qn estimator of Rousseeuw and Croux(1993) to univariate and multivariate Time Series in time and frequency domains. More specifically, the robust estimation of autocorrelation or autocovariance matrix functions from Ma and Genton (2000,2001) and Cotta et. al. (2017). The robust periodogram of Molinares et. al. (2009) and the M-Periodogram of Reisen et. al. (2017). The robust GPH estimator of d considering robust periodogram approach.

Details

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Author(s)

Higor Cotta, Valderio Reisen, Pascal Bondon and Céline Lévy-Leduc

Maintainer: Higor Cotta <otta.higor@gmail.com>
References


Examples

```r
x <- rnorm(1000, 10, 1)
y <- rnorm(1000, 100, 10)
xy <- cbind(x,y)

covQn(x,y)
corQn(x,y)
covMatQn(xy)
corMatQn(xy)

robacf(x)

dataset <- cbind(fdeaths, mdeaths)
robacf(dataset)
robacf(dataset, type="covariance", lag.max=10)

PerQn(fdeaths)

library(fracdiff)
simseries <- fracdiff.sim(1500, d = 0.3)
GPH_estimate(simseries$series, method="GPH")$d
GPH_estimate(simseries$series, method="GPH-Qn")$d
```
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