Package: acfMPeriod (via r-universe)

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Type Package

Title Robust Estimation of the ACF from the M-Periodogram

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Depends R (>= 3.2.2), MASS

Description Non-robust and robust computations of the sample autocovariance (ACOVF) and sample autocorrelation functions (ACF) of univariate and multivariate processes. The methodology consists in reversing the diagonalization procedure involving the periodogram or the cross-periodogram and the Fourier transform vectors, and, thus, obtaining the ACOVF or the ACF as discussed in Fuller (1995) <doi:10.1002/9780470316917>. The robust version is obtained by fitting robust M-regressors to obtain the M-periodogram or M-cross-periodogram as discussed in Reisen et al. (2017) <doi:10.1016/j.jspi.2017.02.008>.

License GPL (>= 2)

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Contents

`CovCorMPer` *Robust covariance or correlation matrix from the MPer-ACF*

Description

Wrapper that computes the covariance or correlation matrix of `x` at lag 0 obtained from the robust MPer-ACF.

Usage

```
CovCorMPer(x, type = c("correlation", "covariance"))
```

Arguments

`x`	a numeric matrix
`type`	character string giving the type of acf to be computed. Allowed values are "correlation" (the default) or "covariance".

Value

a numeric matrix

Examples

```
data.set <- cbind(fdeaths, mdeaths)
CovCorMPer(data.set)
```

CovCorPer *Covariance or correlation matrix from the Per-ACF*

Description

Wrapper that computes the covariance or correlation matrix of x at lag 0 obtained from the Per-ACF.

Usage

```
CovCorPer(x, type = c("correlation", "covariance"))
```

Arguments

x	a numeric matrix
type	character string giving the type of acf to be computed. Allowed values are "correlation" (the default) or "covariance".

Value

a numeric matrix

Examples

```
data.set <- cbind(fdeaths, mdeaths)
CovCorPer(data.set)
```

CrossPeriodogram *Cross-periodogram*

Description

This function computes the cross-periodogram using harmonic regression.

Usage

```
CrossPeriodogram(series1, series2)
```

Arguments

series1	univariate time series
series2	univariate time series

Value

a numeric vector containing the estimates of the cross-spectral density

Author(s)

Higor Cotta, Valdério A. Reisen, Pascal Bondon and Céline Lévy-Leduc

References

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009.

`MCrossPeriodogram` *Robust M-cross-periodogram*

Description

This function computes the Robust M-cross-periodogram using M-regression.

Usage

```
MCrossPeriodogram(series1, series2)
```

Arguments

`series1`	univariate time series
`series2`	univariate time series

Value

a numeric vector containing the estimates of the cross-spectral density

Author(s)

Higor Cotta, Valdério A. Reisen, Pascal Bondon and Céline Lévy-Leduc

References

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009.

MPerACF — *Robust autocorrelation or autocovariance function estimation from the robust M-periodogram*

Description

This function computer and plots(by default) the robust estimates of the autocovariance or the autocorrelation function for univariate and multivariate time series based on the M-periodogram and the M-cross-periodogram.

Usage

```
MPerACF(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, Pascal Bondon and Céline Lévy-Leduc. Part of the code re-used from the acf() function.

References

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009

Examples

```
data.set <- cbind(fdeaths, mdeaths)
MPerACF(data.set)
```

`MPerioReg` *Robust M-periodogram*

Description

This function computes the univariate robust M-periodogram using M-regression.

Usage

```
MPerioReg(series)
```

Arguments

`series`	univariate time series

Value

a numeric vector containing the robust estimates of the spectral density

Author(s)

Higor Cotta, Valdério A. Reisen, Pascal Bondon and Céline Lévy-Leduc.

References

Reisen, V. A. and Lévy-Leduc, C. and Taqqu, M. (2017) An M-estimator for the long-memory parameter. *Journal of Statistical Planning and Inference*, 187, 44-55.

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009.

Examples

```
MPerioReg(ldeaths)
```

PerACF *Autocorrelation or autocovariance function estimation from the periodogram*

Description

This function computer and plots(by default) the estimates of the autocovariance or the autocorrelation function for univariate and multivariate time series based on the periodogram and the cross-periodogram..

Usage

```
PerACF(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 "acf", 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, Pascal Bondon and Céline Lévy-Leduc. Part of the code re-used from the acf() function.

References

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009.

Examples

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

PerioReg *Periodogram*

Description

This function computes the univariate periodogram using harmonic regression.

Usage

```
PerioReg(series)
```

Arguments

`series`	univariate time series

Value

a numeric vector containing the robust estimates of the spectral density

Author(s)

Higor Cotta, Valdério A. Reisen, Pascal Bondon and Céline Lévy-Leduc.

References

Reisen, V. A. and Lévy-Leduc, C. and Taqqu, M. (2017) An M-estimator for the long-memory parameter. *Journal of Statistical Planning and Inference*, 187, 44-55.

Fuller, Wayne A. Introduction to statistical time series. John Wiley & Sons, 2009.

Examples

```
PerioReg(ldeaths)
```

`plot.robacf` *Plot Robust Autocovariance and Robust Autocorrelation Functions*

Description

Plot method for objects of class "robacf". Mostly of the code re-used from the standard acf class.

Usage

```
## 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

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