

Package ‘robcor’

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Type Package

Title Robust Correlations

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Description Robust pairwise correlations based on estimates of scale,
particularly on ``FastQn'' one-step M-estimate.

Suggests MASS, robustbase, sfsmisc

Depends R (>= 2.10.0), stats

License GPL (>= 2)

NeedsCompilation no

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FastQn

*Robust, Efficient and Fast Scale Estimate***Description**

Compute the robust scale estimator FastQn, an efficient alternative to the MAD, a fast alternative to the Qn.

Usage

```
FastQn(x, center = median(x), scale = mad(x, center))
```

```
fqn(x, center = median(x), scale = mad(x, center))
```

```
s_FastQn(x, mu.too = FALSE, center = median(x), ...)
```

Arguments

x	numeric vector of observations.
center	optionally, the center: defaults to the median.
scale	optionally, the basic scale: defaults to the median absolute deviation.
mu.too	logical indicating if the center should also be returned for s_FastQn().
...	potentially further arguments for s_FastQn() passed to FastQn().

Details

This function computes one-step M-estimate of scale based on provided robust estimate (defaults to the MAD). It gives 50% breakdown point and Gaussian efficiency about 80%.

The fqn function is a shorter alias, like [sd](#) and [mad](#).

Value

FastQn() returns a number, the FastQn robust scale estimator.

s_FastQn(x, mu.too=TRUE) returns a length-2 vector with location and scale; this is typically only useful for [covOGK](#)(*, sigmamu = s_FastQn) or [robcor](#)(*, scaler = s_FastQn).

Author(s)

Paul Smirnov <s.paul@mail.ru>

References

Smirnov, P. O., Shevlyakov, G. L. (2010). *On Approximation of the Qn-Estimate of Scale by Fast M-Estimates*. In Book of Abstracts: International Conference on Robust Statistics (ICORS 2010) (pp. 94-95). Prague, Czech Republic.

See Also

[mad](#), [Qn](#).

Examples

```
set.seed(153)
x <- sort(c(rnorm(80), rt(20, df = 1)))
s_FastQn(x, mu.too=TRUE)
FastQn(x)
```

psdcor

Positive Semidefinite Correlation Matrix Correction

Description

Correct pseudo-correlation matrices to make them positive semidefinite ones.

Usage

```
psdcor(m, method = c("higham", "eigen"), ...)
```

Arguments

<code>m</code>	pseudo-correlation matrix to correct.
<code>method</code>	optionally, correction method to use.
<code>...</code>	potentially further arguments for the particular correction method.

Details

This function applies transformation to the given matrix in order to make it positive semidefinite correlation matrix.

When method is `higham`, use Higham projections algorithm via [nearPD\(\)](#) function.

When method is `eigen`, use direct eigenvalues correction via [posdefify\(\)](#) function.

Value

The corrected matrix.

Author(s)

Paul Smirnov <s.paul@mail.ru>

robacf

*Robust Autocovariance and Autocorrelation Function Estimation***Description**

Compute (and by default plot) an estimate of the autocovariance or autocorrelation function.

Usage

```
robacf(x, lag.max = NULL, type = c("correlation", "covariance"), plot = TRUE,
       scaler = "s_FastQn", ...)
```

Arguments

<code>x</code>	a univariate numeric time series object or a numeric vector.
<code>lag.max</code>	maximum lag at which to calculate the acf. Default is $10 \times \log_{10}(N)$ where N is the number of observations. Will be automatically limited to one less than the number of observations in the series.
<code>type</code>	character string giving the type of acf to be computed. Allowed values are "correlation" (the default) or "covariance".
<code>plot</code>	logical. If TRUE (the default) the acf is plotted.
<code>scaler</code>	location-scale estimator to use in the algorithm. By default, <code>s_FastQn()</code> is used.
<code>...</code>	further arguments to be passed to <code>plot.acf</code> .

Details

This function is a robust replacement for `acf()`.

Note, that implementation and documentation is not finished/polished yet.

Value

A list of class "acf". For description of elements see `acf()`.

Note

WORK-IN-PROGRESS status.

Author(s)

Paul Smirnov <s.paul@mail.ru>

References

Shevlyakov, G. L., Lyubomishchenko, N. S. and Smirnov, P. O. (2013). *Some remarks on robust estimation of power spectra*. Proceedings of the 11th International Conference on Computer Data Analysis and Modeling, Minsk, Belarus, 97–104.

robar*Robust Fit Autoregressive Models to Time Series*

Description

Fit an autoregressive time series model to the data using robust algorithms.

Usage

```
robar(x, order = 2, scaler = "s_FastQn")
```

Arguments

x	a univariate time series.
order	an order of model to fit.
scaler	location-scale estimator to use in the algorithm. By default, s_FastQn() is used.

Details

This function is a robust replacement for [ar\(\)](#).

Note, that implementation and documentation is not finished/polished yet.

Value

A list of class "ar". For description of elements see [ar\(\)](#).

Note

WORK-IN-PROGRESS status.

Author(s)

Paul Smirnov <s.paul@mail.ru>

References

Shevlyakov, G. L., Lyubomishchenko, N. S. and Smirnov, P. O. (2013). *Some remarks on robust estimation of power spectra*. Proceedings of the 11th International Conference on Computer Data Analysis and Modeling, Minsk, Belarus, 97–104.

Examples

```
n <- 100
set.seed(361)
eps <- as.ts(rnorm(n))
x <- arima.sim(list(ar=c(1,-0.9)), n, innov=eps) # basic signal
z <- as.ts(rbinom(n, 1, 0.1) * rnorm(n, sd=10)) # noise
y <- x + z
spec.ar(robar(y, order=2))
```

robcor

Robust Pairwise Correlations.

Description

Compute a robust estimate of the correlation coefficient or correlation matrix via pairwise correlations.

Usage

```
robcor(x, y = NULL, method = c("ssd", "quadrant", "mcd"), partial = FALSE,  
       post = "psdcor", scaler = "s_FastQn", regress = "lmrob")
```

Arguments

x	a numeric vector, matrix or data frame.
y	NULL (default) or a vector, matrix or data frame with compatible dimensions to x. The default is equivalent to y = x (but more efficient).
method	a character string indicating which correlation coefficient is to be computed.
partial	logical. Should a partial correlation algorithm be used?
post	function to apply after the matrix is built or NULL. By default, positive semidefinite correction is applied (psdcor()).
scaler	function to use as a location-scale estimator in "ssd" method. By default, s_FastQn() is used.
regress	function to use as a regression estimator in partial correlations algorithm. By default, lmrob() is used.

Details

This function is a robust replacement for [cor\(\)](#).

Note, that implementation and documentation is not finished/polished yet.

Value

Either a single correlation coefficient or a correlation matrix estimate.

Note

WORK-IN-PROGRESS status.

Author(s)

Paul Smirnov <s.paul@mail.ru>

References

Shevlyakov, G. L., Smirnov, P. O. (2011). *Robust Estimation of the Correlation Coefficient: An Attempt of Survey*. Austrian Journal of Statistics, 40(1&2), 147-156.

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