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

Repository CRAN

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R topics documented:

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)
```

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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

m	pseudo-correlation matrix to correct.
method	optionally, correction method to use.
...	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

x	a univariate numeric time series object or a numeric vector.
lag.max	maximum lag at which to calculate the acf. Default is `10*log10(N)` where `N` is the number of observations. 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"`.
plot	logical. If `TRUE` (the default) the acf is plotted.
scaler	location-scale estimator to use in the algorithm. By default, `s_FastQn()` is used.
...	further arguments to be passed to `plot.acf`.

Details

This function is a robust replacement for [acf](acf)().

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

Value

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

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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.

Index