

Package ‘RCMinification’

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Title Random Coefficient Minification Time Series Models

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Description Functions and data sets for simulating and fitting minification and random coefficient minification time series models. The n th term in the model $X[n]$ is a nonnegative random variable defined as $A[n] \cdot \min(X[n-1], Y[n])$, where the A 's and Y 's are sequences of independent random variables. Example data sets are provided where this kind of model can be justified on physical grounds and fits well. Functions for simulating minification time series and for maximum likelihood estimation are included. More information can be found in Han, Braun and Loeppky (2018) <doi:10.1007/s00362-018-1000-6>.

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 FWI

Fire Weather Index Series

Description

The FWI list consists of 4 vectors containing daily Fire Weather Index observations.

Usage

```
data(FWI)
```

Format

This list contains the following vectors:

PG2008 FWI observations from Prince George, BC for 2008

PG2009 FWI observations from Prince George, BC for 2009

ED2013 FWI observations from Edmonton, AB for 2013

ED2014 FWI observations from Edmonton, AB for 2014

Examples

```
RCMTmle(FWI$PG2009[c(100:300)])
```

 RCMTmle

Tailed Exponential and Weibull Random Coefficient Minification Maximum Likelihood Estimation

Description

This function estimates parameters for tailed exponential and Weibull random coefficient minification process models from a nonnegative time series.

Usage

```
RCMTmle(y)
```

Arguments

y numeric vector of nonnegative observations.

Value

A list containing

n	the number of time series observations.
p	estimated power for transformation from exponential to Weibull.
p.eps	estimated tailed exponential probability parameter when preceding observation is nonzero.
p.delta	estimated tailed exponential probability parameter when preceding observation is 0
mu	estimated mu parameter for lognormal distribution used to simulated random coefficients.
sigma	estimated sigma parameter for lognormal distribution used to simulate random coefficients.
lambda	estimated tailed exponential rate parameter when preceding observation is nonzero.
gamma	estimated tailed exponential rate parameter when preceding observation is 0.
like	maximum value of likelihood.
y	original observations

Author(s)

L. Han

References

Han, L., Braun, W.J. and Loeppky (2018) Random Coefficient Minification Processes. Statistical Papers, pp 1-22.

rET

Tailed Exponential Random Number Generator

Description

This function simulates sequences of tailed exponential variates which have survivor function $P(X > x) = (1-p)\exp(-\lambda x)$, for $x > 0$ and $P(X = 0) = p$.

Usage

rET(n, prob, rate)

Arguments

n	number of observations.
prob	vector of probabilities.
rate	vector of exponential rate parameters.

Value

a numeric vector of length n

Author(s)

L. Han

References

Littlejohn, R.P. (1994) A Reversibility Relationship for Two Markovian Time Series Models with Stationary Exponential Tailed Distribution. *Journal of Applied Probability*. 31 pp 575-581.

robustSD

Tatum's Robust Estimate of the Standard Deviation

Description

Standard deviation estimate which is insensitive to outliers and random trends.

Usage

robustSD(x)

Arguments

x A numeric vector.

Value

a numeric vector of length 1.

Author(s)

L. Han

References

Tatum, L.G. (1997) Robust Estimation of the Process Standard Deviation for Control Charts. *Journal of the American Statistical Association* 39, pp 127-141.

Examples

```
robustSD(EuStockMarkets[,1])
```

rRCMT *Tailed Exponential and Weibull Random Coefficient Minification Process Simulator*

Description

This function simulates sequences of tailed exponential and Weibull random coefficient minification process variates. Random coefficients are lognormal distributed with parameters μ and σ . These are nonnegative time series.

Usage

```
rRCMT(n, p, p.delta, p.eps, lambda, gamma, mu, sigma, RCMTobj)
```

Arguments

n	number of observations.
p	power for transformation from exponential to Weibull.
p.delta	tailed exponential probability parameter when preceding observation is 0
p.eps	tailed exponential probability parameter when preceding observation is nonzero.
lambda	tailed exponential rate parameter when preceding observation is nonzero.
gamma	tailed exponential rate parameter when preceding observation is 0.
mu	mu parameter for lognormal distribution used to simulated random coefficients.
sigma	sigma parameter for lognormal distribution used to simulate random coefficients.
RCMTobj	list containing elements n, p, p.delta, p.eps, lambda and gamma

Value

a numeric vector of length n

Author(s)

L. Han

References

Han, L., Braun, W.J. and Loeppky (2018) Random Coefficient Minification Processes. Statistical Papers, pp 1-22.

Examples

```
RCsim <- rRCMT(100, 2, .05, .1, 1, 2, 1, 0.5)
ts.plot(RCsim)
```

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