Package 'DTS'

May 26, 2025

Title Discrete Tempered Stable Distributions

Version 0.1.1

Description Methods for evaluating the probability mass function, cumulative distribution function, and generating random samples from discrete tempered stable distributions. For more details see Grabchak (2021) <doi:10.1007/s11009-021-09904-3>.

License GPL (>= 3)

Encoding UTF-8

RoxygenNote 7.3.2

Imports actuar, expint, stats

NeedsCompilation no

Author Sina Saba [aut, cre, cph]

Maintainer Sina Saba <sabasina22@gmail.com>

Repository CRAN

Date/Publication 2025-05-26 12:50:06 UTC

Contents

`ddts` *The probability mass function of the discrete tempered stable distribution.*

Description

The probability mass function of the discrete tempered stable distribution.

Usage

```
ddts(x, alpha, eta, tp = c(1, 1), tf = "poisson-tweedie", zt = FALSE)
```

Arguments

x	vector of points.
alpha	Index of stability; Number in (0,1)
eta	A parameter, eta>0.
tp	A vector of tempering parameters.
tf	Tempering function. It can be one of the "discrete-stable", "discrete-truncated-stable", "discrete-pRDTS", "poisson-tweedie", "exp-tempering", "beta-prime-tempering", "Pareto-tempering".
zt	Logical. If True it calculates zero-truncated probabilities.

Value

A vector of probabilities.

References

M. Grabchak. Discrete tempered stable distributions. Methodology and Computing in Applied Probability, 24(3):1877-1890, 2021.

Examples

```
x <- 0:10
ddts(x, 0.5, 1)
```

---

edts *Log-likelihood function for a discrete tempered stable distribution.*

Description

Log-likelihood function for a discrete tempered stable distribution.

Usage

```
edts(pv, smpl, tf = "poisson-tweedie", zt = FALSE)
```

Arguments

pv	A vector of parameters.
smpl	A sample data to be used for estimation.
tf	Tempering function. It can be one of the "discrete-stable", "discrete-truncated-stable", "discrete-pRDTS", "poisson-tweedie", "exp-tempering", "beta-prime-tempering", "Pareto-tempering".
zt	Logical. If True it calculates zero-truncated probabilities.

Value

A number. Negative of likelihood function.

References

M. Grabchak. Discrete tempered stable distributions. Methodology and Computing in Applied Probability, 24(3):1877-1890, 2021.

Examples

```
pv <- c(0.5, 1, 1)
n <- 100
smpl <- rdts(n, 0.5, 1)
edts(pv, smpl)
```

`pdts` *The probability distribution of the discrete tempered stable distribution.*

Description

The probability distribution of the discrete tempered stable distribution.

Usage

```
pdts(x, alpha, eta, tp = c(1, 1), tf = "poisson-tweedie", zt = FALSE)
```

Arguments

`x`	vector of points.
`alpha`	Index of stability; Number in (0,1)
`eta`	A parameter, eta>0.
`tp`	A vector of tempering parameters.
`tf`	Tempering function. It can be one of the "discrete-stable", "discrete-truncated-stable", "discrete-pRDTS", "poisson-tweedie", "exp-tempering", "beta-prime-tempering", "Pareto-tempering".
`zt`	Logical. If True it calculates zero-truncated probabilities.

Value

A vector of numbers.

References

M. Grabchak. Discrete tempered stable distributions. Methodology and Computing in Applied Probability, 24(3):1877-1890, 2021.

Examples

```
x <- 0:10
pdts(x, 0.5, 1)
```

`rdts` *Simulation from a discrete tempered stable distribution.*

Description

Simulation from a discrete tempered stable distribution.

Usage

```
rdts(n, alpha, eta, tp = c(1, 1), tf = "poisson-tweedie", c = 1, zt = FALSE)
```

Arguments

`n`	Number of observations.
`alpha`	Index of stability; Number in (0,1)
`eta`	A parameter, eta>0.
`tp`	A vector of tempering parameters.
`tf`	Tempering function. It can be one of the "discrete-stable", "discrete-truncated-stable", "discrete-pRDTS", "poisson-tweedie", "exp-tempering", "beta-prime-tempering", "Pareto-tempering".
`c`	The essential supremum of the tempering function.
`zt`	Logical. If True it calculates zero-truncated probabilities.

Value

A vector of observations from a DTS distributions.

References

M. Grabchak. Discrete tempered stable distributions. Methodology and Computing in Applied Probability, 24(3):1877-1890, 2021.

Examples

```
n <- 10
rdts(n, 0.5, 1)
```

Index