Package 'dstabledist'

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Type Package

Title The Discrete Stable Distribution Functions

Version 0.1.0

Maintainer Krutto Annika <annikakrutto@gmail.com>

Description Probability generating function, formulae for the probabilities (discrete density) and random generation for discrete stable random variables.

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Encoding UTF-8

Imports stabledist, stats, Rdpack

RdMacros Rdpack

RoxygenNote 7.2.3

NeedsCompilation no

Author Krutto Annika [aut, cre] (<https://orcid.org/0000-0001-7919-7683>)

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R topics documented:

ddstable — *The discrete stable distribution: formulae for the probabilities (density)*

Description

Computes the value of the formulae for the probabilities (density) of a discrete stable distribution `DS(alpha,lambda)`, by combining the explicit and fast asymptotic formulae.

Usage

```
ddstable(x, alpha, lambda)
```

Arguments

`x`	a vector of non-negative integer quantiles, `k>=0`
`alpha`	tail index parameter `alpha` in the interval= $(0, 1]$
`lambda`	positive location parameter `lambda>0`

Value

Returns the value of the formulae for the probabilities (density) of `DS(alpha,lambda)`.

References

Christoph G, Schreiber K (1998). "Discrete stable random variables." *Statistics & Probability Letters*, **37**(3), 243-247. ISSN 0167-7152, doi:10.1016/S01677152(97)001235.

Examples

```
ddstable(c(0,1,2,100),1,lambda=1)#This is Poisson with lambda=1
dpois(c(0,1,2,100),1)#Checking with dpois
ddstable(c(0,1,2,100),0.5,lambda=1) # tail is heavier
ddstable(c(0,1,2,3,6,100),0.5,lambda=3) # change in location
```

pgdstable — *The discrete stable distribution: probability generating function*

Description

Computes probability generating function of a discrete stable distribution `DS(alpha,lambda)`.

Usage

```
pgdstable(z, alpha, lambda = 1)
```

Arguments

z	argument of probability generating function, z in the interval= $[-1, 1]$.
alpha	tail index parameter alpha in the interval= $(0, 1]$.
lambda	positive location parameter lambda>0.

Value

Returns value of probability generating function of DS(alpha,lambda). A warning is displayed for invalid parameter values.

References

Steutel FW, van Harn K (1979). "Discrete Analogues of Self-Decomposability and Stability." *The Annals of Probability*, **7**(5), 893 – 899. doi:10.1214/aop/1176994950.

Examples

```
pgdstable(c(-1,0,1),0.5,1)
pgdstable(c(-1,0,1),1,1) #This is Poisson
 curve(pgdstable(x,1,lambda=1), c(-1,1),col=1,ylab='prob. gen. fun.',xlab='z')
 curve(pgdstable(x,0.5,lambda=1), c(-1,1),col=2,add=TRUE)
 curve(pgdstable(x,0.2,lambda=1), c(-1,1),col=4,add=TRUE)
legend('topleft',legend=c(1,0.5,0.1), col=c(1,2,4), lty = 1, title='alpha')
```

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rdstable *The discrete stable distribution: random generation*

Description

Generates random variates from a discrete stable distribution DS(alpha,lambda).

Usage

```
rdstable(n, alpha, lambda = 1)
```

Arguments

n	number of random values to return.
alpha	tail index parameter alpha in the interval= $(0, 1]$
lambda	positive location parameter lambda>0

Value

returns random variates from DS(alpha,lambda). A warning is displayed for invalid parameter values.

References

Devroye L (1993). "A triptych of discrete distributions related to the stable law." *Statistics & Probability Letters*, **18**(5), 349-351. ISSN 0167-7152, doi:10.1016/01677152(93)90027G.

Examples

```
rdstable(10,alpha=1,lambda=1) #this is Poisson
rdstable(10,alpha=0.5,lambda=1) # heavier tail more prone to extremes
rdstable(10,alpha=0.1,lambda=1) # heavier tail more prone to extremes
```

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