Package 'CompPareto'

October 17, 2023

Type Package

Title Discrete Composite Distributions with Pareto Tails

Version 0.1.0

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Description Contains the probability density function, cumulative distribution function, quantile function, and random number generator for composite and discrete composite distributions with Pareto tails. The detailed description of the methods and the applications of the methods can be found in Bowen Liu, Malwane M.A. Ananda (2023) <arXiv:2309.16443>.

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Encoding UTF-8

Imports actuar, stats

RoxygenNote 7.2.3

NeedsCompilation no

Repository CRAN

Date/Publication 2023-10-17 09:50:11 UTC

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dcomppareto — *The probability density function (pdf) of a composite distribution with Pareto tail*

Description

dcomppareto returns the density of a composite distribution with a Pareto upper tail at a point x, with a specified distribution at the lower tail.

Usage

```
dcomppareto(x, spec, alpha = 1, theta = 1, log = FALSE, ...)
```

Arguments

x	A scalar or vector of positive values at which the density needs to be evaluated
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
log	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the density evaluated at x

Examples

```
x<-1:100
dcomppareto(x, "lnorm", 0.4, 1, meanlog = 1, sdlog = 0.8)
dcomppareto(x, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

dwdcomppareto — *The probability mass function (pmf) of a discrete composite distribution with Pareto tail*

Description

dwdcomppareto returns the pmf of a discrete composite distribution with a Pareto upper tail at a point x, with a specified distribution at the lower tail.

Usage

```
dwdcomppareto(x, spec, alpha, theta, log = FALSE, ...)
```

Arguments

x	A scalar or vector of nonnegative integer values at which the probability mass needs to be evaluated
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
log	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the probability mass evaluated at x

Examples

```
x<-1:100
dwdcomppareto(x, "lnorm", 0.4, 1, meanlog = 1, sdlog = 0.8)
dwdcomppareto(x, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

---

pcomppareto *The cumulative distribution function (CDF) of a composite distribution with Pareto tail*

Description

pcomppareto returns the CDF of a composite distribution with a Pareto upper tail at x, with a specified distribution at the lower tail.

Usage

```
pcomppareto(
  x,
  spec,
  alpha = 1,
  theta = 1,
  lower.tail = TRUE,
  log.p = FALSE,
  ...
)
```

Arguments

x	A scalar or vector of positive values at which the CDF needs to be evaluated
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
lower.tail	logical; if FALSE, the upper tail probability is provided
log.p	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the CDF evaluated at x

Examples

```
x<-1:100
pcomppareto(x, "lnorm", 0.4, 1, meanlog = 1, sdlog = 0.8)
pcomppareto(x, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

---

pwdcomppareto *The cumulative distribution function (CDF) of a discrete composite distribution with Pareto tail*

Description

pwdcomppareto returns the CDF of a discrete composite distribution with a Pareto upper tail at x, with a specified distribution at the lower tail.

Usage

```
pwdcomppareto(x, spec, alpha, theta, log.p = FALSE, ...)
```

Arguments

x	A scalar or vector of positive values at which the CDF needs to be evaluated
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
log.p	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the CDF evaluated at x

Examples

```
x<-1:100
pwdcomppareto(x, "lnorm", 0.4, 1, meanlog = 1, sdlog = 0.8)
pwdcomppareto(x, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

---

qcomppareto *The quantile function of a composite distribution with Pareto tail*

Description

qcomppareto returns the quantile of a composite distribution with a Pareto upper tail given p, with a specified distribution at the lower tail.

Usage

```
qcomppareto(p, spec, alpha = 1, theta = 1, log.p = FALSE, ...)
```

Arguments

p	vector of probabilities
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
log.p	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the CDF evaluated at x

Examples

```
p <-seq(0.01,0.99,b=0.01)
qcomppareto(p, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

qwdcomppareto *The quantile function of a discrete composite distribution with Pareto tail*

Description

qwdcomppareto returns the quantile of a composite distribution with a Pareto upper tail given p, with a specified distribution at the lower tail.

Usage

```
qwdcomppareto(p, spec, alpha, theta, log = FALSE, ...)
```

Arguments

p	vector of probabilities
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
log	logical; if TRUE, probability p are given as log(p)
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of x as the CDF evaluated at x

Examples

```
p <-seq(0.1,0.9,b=0.1)
qcomppareto(p, "weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

rcomppareto *Generating random number from a discrete composite distribution with Pareto tail*

Description

rcomppareto returns a random sample of a composite distribution with a Pareto upper tail, with a specified distribution at the lower tail.

Usage

```
rcomppareto(n, spec, alpha = 1, theta = 1, ...)
```

Arguments

n	number of observations
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of n

Examples

```
n<-100
rcomppareto(n,"weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

---

rwdcomppareto *Generating random number from a discrete composite distribution with Pareto tail*

Description

rwdcomppareto returns a random sample of a discrete composite distribution with a Pareto upper tail, with a specified distribution at the lower tail.

Usage

```
rwdcomppareto(n, spec, alpha = 1, theta = 1, ...)
```

Arguments

n	number of observations
spec	The selection of the lower tail (head) distribution
alpha	The shape parameter of the Pareto distribution
theta	The scale parameter of Pareto, also serve as the location parameter of the composite model
...	The parameter of the lower tail (head) distribution

Value

an object of the same length of n

Examples

```
n<-10
rcomppareto(n,"weibull", alpha = 1.5, theta = 1.5, shape = 2, scale = 2)
```

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