Package 'gendist'

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Type Package

Title Generated Probability Distribution Models

Version 2.0

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Description

Computes the probability density function (pdf), cumulative distribution function (cdf), quantile function (qf) and generates random values (rg) for the following general models : mixture models, composite models, folded models, skewed symmetric models and arc tan models.

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NeedsCompilation no

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`gendist-package` *Generated Probability Distribution Models*

Description

Computes the probability density function (pdf), cumulative distribution function (cdf), quantile function (qf) and generates random values (rg) for the following general models : mixture models, composite models, folded models, skewed symmetric models and arc tan models.

Details

Package:	gendist
Type:	Package
Version:	2.0
Date:	2019-01-30
License:	GPL (>=2)

All the models use parent distribution(s) and thus flexible to incorporate many exisiting probability distributions.

Author(s)

Shaiful Anuar Abu Bakar

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References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Gomez-Deniz, E., & Calderin-Ojeda, E. Modelling insurance data with the pareto arctan distribution. ASTIN Bulletin, 1-22.
Cooray, K., & Ananda, M. M. (2005). Modeling actuarial data with a composite lognormal-Pareto model. Scandinavian Actuarial Journal, 2005(5), 321-334.
Scollnik, D. P. (2007). On composite lognormal-Pareto models. Scandinavian Actuarial Journal, 2007(1), 20-33.
Nadarajah, S., & Bakar, S. A. A. (2014). New composite models for the Danish fire insurance data. Scandinavian Actuarial Journal, 2014(2), 180-187.

Bakar, S. A., Hamzah, N. A., Maghsoudi, M., & Nadarajah, S. (2015). Modeling loss data using composite models. Insurance: Mathematics and Economics, 61, 146-154.
Brazauskas, V., & Kleefeld, A. (2011). Folded and log-folded-t distributions as models for insurance loss data. Scandinavian Actuarial Journal, 2011(1), 59-74.
Pearson, K. (1894). Contributions to the mathematical theory of evolution. Philosophical Transactions of the Royal Society of London. A, 71-110.
Azzalini, A. (1985). A class of distributions which includes the normal ones. Scandinavian journal of statistics, 171-178.

`darctan` *Probabilty density function of arc tan model.*

Description

Computes pdf of the arc tan model.

Usage

```
darctan(x, alpha, spec, arg, log = FALSE)
```

Arguments

`x`	scalar or vector of values to compute the pdf.
`alpha`	the value of α parameter, $\alpha > 0$.
`spec`	a character string specifying the parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg`	list of arguments/parameters of the parent distribution.
`log`	logical; if `TRUE`, log(pdf) are returned.

Details

The pdf of arc tan model with parameter α has a general form of:

$$f(x) = \frac{1}{\arctan(\alpha)} \frac{\alpha g(x)}{1 + (\alpha(1 - G(x)))^2}$$

for $a \leq x \leq b$ where a and b follow the support of $g(x)$. $\arctan$ denote the inverse function of tangent. $g(x)$ and $G(x)$ are the pdf and cdf of parent distribution, respectively. Note also that $\alpha > 0$.

Value

An object of the same length as `x`, giving the pdf values computed at `x`.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Gomez-Deniz, E., & Calderin-Ojeda, E. Modelling insurance data with the pareto arctan distribution. ASTIN Bulletin, 1-22.

Examples

```
x=runif(10, min=0, max=1)
y=darctan(x, alpha=0.5, spec="lnorm", arg=list(meanlog=1,sdlog=2) )
```

`dcomposite` *Probabilty density function of composite model.*

Description

Computes pdf of the composite model.

Usage

```
dcomposite(x, spec1, arg1, spec2, arg2, initial = 1, log = FALSE)
```

Arguments

`x`	scalar or vector of values to compute the pdf.
`spec1`	a character string specifying the head parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg1`	list of arguments/parameters of the head parent distribution.
`spec2`	a character string specifying the tail parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
`arg2`	list of arguments/parameters of the tail parent distribution.
`initial`	initial values of the threshold, θ.
`log`	logical; if `TRUE`, log(pdf) are returned.

Details

The pdf of composite model has a general form of:

$$f(x) = \frac{1}{1+\phi} f_1^*(x), \text{ if } \quad x \leq \theta,$$

$$= \frac{\phi}{1+\phi} f_2^*(x), \text{ if } \quad x > \theta,$$

whereby ϕ is the weight component, θ is the threshold and $f_i^*(x)$ for $i = 1, 2$ are the truncated pdfs correspond to head and tail parent distributions defined by

$$f_1^*(x) = \frac{f_1(x)}{F_1(\theta)}$$

and

$$f_2^*(x) = \frac{f_2(x)}{1 - F_2(\theta)}$$

respectively.

Value

An object of the same length as x, giving the pdf values computed at x.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Cooray, K., & Ananda, M. M. (2005). Modeling actuarial data with a composite lognormal-Pareto model. Scandinavian Actuarial Journal, 2005(5), 321-334.
Scollnik, D. P. (2007). On composite lognormal-Pareto models. Scandinavian Actuarial Journal, 2007(1), 20-33.
Nadarajah, S., & Bakar, S. A. A. (2014). New composite models for the Danish fire insurance data. Scandinavian Actuarial Journal, 2014(2), 180-187.
Bakar, S. A., Hamzah, N. A., Maghsoudi, M., & Nadarajah, S. (2015). Modeling loss data using composite models. Insurance: Mathematics and Economics, 61, 146-154.

Examples

```
x=runif(10, min=0, max=1)
y=dcomposite(x, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
             arg2=list(rate=0.5) )
```

---

dfolded *Probabilty density function of folded model.*

Description

Computes pdf of the folded model.

Usage

```
dfolded(x, spec, arg, log = FALSE)
```

Arguments

x	scale or vector of values to compute the pdf.
spec	a character string specifying the parent distribution (for example, "norm" if the parent disstribution correspond to the normal).
arg	list of arguments/parameters of the parent distribution.
log	logical; if TRUE, log(pdf) are returned.

Details

The pdf of folded model has a general form of:

$$f(x) = g(x) + g(-x) \quad x > 0$$

where $G(x)$ is the cdf of parent distribution.

Value

An object of the same length as x, giving the pdf values computed at x.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Brazauskas, V., & Kleefeld, A. (2011). Folded and log-folded-t distributions as models for insurance loss data. Scandinavian Actuarial Journal, 2011(1), 59-74.

Examples

```
x=runif(10, min=0, max=1)
y=dfolded(x, spec="norm", arg=list(mean=1,sd=2) )
```

---

dmixt *Probabilty density function of mixture model.*

Description

Computes pdf of the mixture model.

Usage

```
dmixt(x, phi, spec1, arg1, spec2, arg2, log = FALSE)
```

Arguments

x	scalar or vector of values to compute the pdf.
phi	the value of ϕ parameter, $\phi > 0$.
spec1	a character string specifying the first parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg1	list of arguments/parameters of the first parent distribution.
spec2	a character string specifying the second parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
arg2	list of arguments/parameters of the second parent distribution.
log	logical; if TRUE, log(pdf) are returned.

Details

The pdf of mixture model with parameter phi has a general form of:

$$f(x) = \frac{1}{1+\phi}\left(g_1(x) + \phi g_2(x)\right)$$

where x follows the support of parent distributions, ϕ is the weight component and $g_i(x)$ for $i = 1, 2$ are the pdfs of first and second parent distributions, respectively.

Value

An object of the same length as x, giving the pdf values computed at x.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Pearson, K. (1894). Contributions to the mathematical theory of evolution. Philosophical Transactions of the Royal Society of London. A, 71-110.

Examples

```
x=runif(10, min=0, max=1)
y=dmixt(x, phi=0.5, spec1="lnorm", arg1=list(meanlog=1,sdlog=2), spec2="exp",
        arg2=list(rate=2) )
```

dskew *Probabilty density function of skewed symmetric model.*

Description

Computes pdf of the skewed symmetric model.

Usage

```
dskew(x, spec1, arg1, spec2, arg2, log = FALSE)
```

Arguments

x	scalar or vector of values to compute the pdf.
spec1	a character string specifying the parent distribution $g(x)$ (for example, "norm" if the parent distribution corresponds to the normal).
arg1	list of arguments/parameters of the parent distribution $g(x)$.
spec2	a character string specifying the parent distribution $H(x)$ (for example, "logis" if the parent distribution corresponds to the logistic).
arg2	list of arguments/parameters of the parent distribution $H(x)$.
log	logical; if TRUE, log(pdf) are returned.

Details

The pdf of skewed symmetric model has a general form of:

$$f(x) = 2h(x)G(x), \quad -\infty < x < \infty$$

where $h(x)$ and $G(x)$ are the pdf and cdf of parent distributions, respectively.

Value

An object of the same length as x, giving the pdf values computed at x.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Azzalini, A. (1985). A class of distributions which includes the normal ones. Scandinavian journal of statistics, 171-178.

Examples

```
x=runif(10, min=0, max=1)
y=dskew(x, spec1="norm", arg1=list(mean=0,sd=1), spec2="logis",
        arg2=list(location=0,scale=2) )
```

---

parctan *Cumulative distribution function of arc tan model.*

Description

Computes cdf of the arc tan model.

Usage

```
parctan(q, alpha, spec, arg, lower.tail = TRUE, log.p = FALSE)
```

Arguments

q	scalar or vector of values to compute the cdf.
alpha	the value of α parameter, $\alpha > 0$.
spec	a character string specifying the parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg	list of arguments/parameters of the parent distribution.
lower.tail	logical; if TRUE, cdf are returned, otherwise 1-cdf.
log.p	logical; if TRUE, probabilities returned are given as log(cdf).

Details

The cdf of arc tan model with parameter α has a general form of:

$$F(q) = 1 - \frac{\arctan(\alpha(1 - G(q)))}{\arctan(\alpha)}$$

for $a \leq x \leq b$ where a and b follow the support of $g(q)$. $\arctan$ denote the inverse function of tangent. $g(q)$ and $G(q)$ are the pdf and cdf of parent distribution, respectively. Note also that $\alpha > 0$.

Value

An object of the same length as q, giving the cdf values computed at q.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Gomez-Deniz, E., & Calderin-Ojeda, E. Modelling insurance data with the pareto arctan distribution. ASTIN Bulletin, 1-22.

Examples

```
x=runif(10, min=0, max=1)
y=parctan(x, alpha=0.5, spec="lnorm", arg=list(meanlog=1,sdlog=2) )
```

`pcomposite` *Cumulative distribution function of composite model.*

Description

Computes cdf of the composite model.

Usage

```
pcomposite(q, spec1, arg1, spec2, arg2, initial = 1, lower.tail = TRUE, log.p = FALSE)
```

Arguments

`q`	scalar or vector of values to compute the cdf.
`spec1`	a character string specifying the head parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg1`	list of arguments/parameters of the head parent distribution.
`spec2`	a character string specifying the tail parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
`arg2`	list of arguments/parameters of the tail parent distribution.
`initial`	initial values of the threshold, θ.
`lower.tail`	logical; if `TRUE`, cdf are returned, otherwise 1-cdf.
`log.p`	logical; if `TRUE`, probabilities returned are given as log(cdf).

Details

The cdf of composite model has a general form of:

$$F(x) = \frac{1}{1+\phi}\frac{F_1(x)}{F_1(\theta)} \text{ if } \quad x \leq \theta,$$

$$= \frac{1}{1+\phi}\left(1+\phi\frac{F_2(x)-F_2(\theta)}{1-F_2(\theta)}\right) \text{ if } \quad x > \theta,$$

whereby ϕ is the weight component, θ is the threshold and $F_i(x)$ for $i = 1, 2$ are the cdfs correspond to head and tail parent distributions, respectively.

Value

An object of the same length as q, giving the cdf values computed at q.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Cooray, K., & Ananda, M. M. (2005). Modeling actuarial data with a composite lognormal-Pareto model. Scandinavian Actuarial Journal, 2005(5), 321-334.
Scollnik, D. P. (2007). On composite lognormal-Pareto models. Scandinavian Actuarial Journal, 2007(1), 20-33.
Nadarajah, S., & Bakar, S. A. A. (2014). New composite models for the Danish fire insurance data. Scandinavian Actuarial Journal, 2014(2), 180-187.
Bakar, S. A., Hamzah, N. A., Maghsoudi, M., & Nadarajah, S. (2015). Modeling loss data using composite models. Insurance: Mathematics and Economics, 61, 146-154.

Examples

```
x=runif(10, min=0, max=1)
y=pcomposite(x, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
             arg2=list(rate=0.5) )
```

---

pfolded *Cumulative distribution function of folded model.*

Description

Computes cdf of the folded model.

Usage

```
pfolded(q, spec, arg, lower.tail = TRUE, log.p = FALSE)
```

Arguments

q	scale or vector of values to compute the cdf.
spec	a character string specifying the parent distribution (for example, "norm" if the parent distribution correspond to the normal).
arg	list of arguments/parameters of the parent distribution.
lower.tail	logical; if TRUE, cdf are returned, otherwise 1-cdf.
log.p	logical; if TRUE, probabilities returned are given as log(cdf).

Details

The cdf of folded model has a general form of:

$$F(x) = G(x) - G(-x) \quad x > 0$$

where $G(x)$ is the cdf of parent distribution.

Value

An object of the same length as q, giving the cdf values computed at q.

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Brazauskas, V., & Kleefeld, A. (2011). Folded and log-folded-t distributions as models for insurance loss data. Scandinavian Actuarial Journal, 2011(1), 59-74.

Examples

```
x=runif(10, min=0, max=1)
y=pfolded(x, spec="norm", arg=list(mean=1,sd=2) )
```

---

pmixt *Cumulative distribution function of mixture model.*

Description

Computes cdf of the mixture model.

Usage

```
pmixt(q, phi, spec1, arg1, spec2, arg2, lower.tail = TRUE, log.p = FALSE)
```

Arguments

q	scalar or vector of values to compute the cdf.
phi	the value of ϕ parameter, $\phi > 0$.
spec1	a character string specifying the first parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg1	list of arguments/parameters of the first parent distribution.
spec2	a character string specifying the second parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
arg2	list of arguments/parameters of the second parent distribution.
lower.tail	logical; if TRUE, cdf are returned, otherwise 1-cdf.
log.p	logical; if TRUE, probabilities returned are given as log(cdf).

Details

The cdf of mixture model has a general form of:

$$F(x) = frac11 + \phi\left(G_1(x) + \phi G_2(x)\right)$$

where x follows the support of parent distributions, ϕ is the weight component and $G_i(x)$ for $i = 1, 2$ are the cdfs of first and second parent distributions, respectively.

Value

An object of the same length as q, giving the cdf values computed at q.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Pearson, K. (1894). Contributions to the mathematical theory of evolution. Philosophical Transactions of the Royal Society of London. A, 71-110.

Examples

```
x=runif(10, min=0, max=1)
y=pmixt(x, phi=0.5, spec1="lnorm", arg1=list(meanlog=1,sdlog=2), spec2="exp",
        arg2=list(rate=2) )
```

---

pskew *Cumulative distribution function of skewed symmetric model.*

Description

Computes cdf of the skewed symmetric model.

Usage

```
pskew(q, spec1, arg1, spec2, arg2, lower.tail = TRUE, log.p = FALSE)
```

Arguments

q	scale or vector of values to compute the cdf.
spec1	a character string specifying the parent distribution $g(x)$ (for example, "norm" if the parent distribution corresponds to the normal).
arg1	list of arguments/parameters of the parent distribution $g(x)$.
spec2	a character string specifying the parent distribution $H(x)$ (for example, "logis" if the parent distribution corresponds to the logistic).

arg2	list of arguments/parameters of the parent distribution $H(x)$.
lower.tail	logical; if TRUE, cdf are returned, otherwise 1-cdf.
log.p	logical; if TRUE, probabilities returned are given as log(cdf).

Details

The cdf of skewed symmetric model has a general form of:

$$F(x) = \int_{-\infty}^{x} 2h(y)G(y)dy, \quad -\infty < x < \infty$$

where $h(x)$ and $G(x)$ are the pdf and cdf of parent distributions, respectively.

Value

An object of the same length as q, giving the cdf values computed at q.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Azzalini, A. (1985). A class of distributions which includes the normal ones. Scandinavian journal of statistics, 171-178.

Examples

```
x=runif(10, min=0, max=1)
y=pskew(x, spec1="norm", arg1=list(mean=0,sd=1), spec2="logis",
        arg2=list(location=0,scale=2) )
```

---

qarctan *Quantile function of arc tan model.*

Description

Computes qf of the arc tan model.

Usage

```
qarctan(p, alpha, spec, arg, lower.tail = TRUE, log.p = FALSE)
```

Arguments

p	scalar or vector of probabilities to compute the qf.
alpha	the value of α parameter, $\alpha > 0$.
spec	a character string specifying the parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg	list of arguments/parameters of the parent distribution.
lower.tail	logical; if TRUE, probabilities are p, otherwise 1-p.
log.p	logical; if TRUE, probabilities p are returned as log(p).

Details

The qf of arc tan model with parameter α has a general form of:

$$Q(p) = G^{-1}\left(1 - \frac{1}{\alpha}\tan((1-p)\arctan(\alpha))\right)$$

for $a \leq x \leq b$ where a and b follow the support of $G(x)$. $\arctan$ denote the inverse function of tangent and G^{-1} is the inverse cdf of parent distribution, respectively. Note also that $\alpha > 0$.

Value

An object of the same length as p, giving the qf values computed at p.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Gomez-Deniz, E., & Calderin-Ojeda, E. Modelling insurance data with the pareto arctan distribution. ASTIN Bulletin, 1-22.

Examples

```
x=runif(10, min=0, max=1)
y=qarctan(x, alpha=0.5, spec="lnorm", arg=list(meanlog=1,sdlog=2) )
```

qcomposite *Quantile function of composite model.*

Description

Computes qf of the composite model.

Usage

```
qcomposite(p, spec1, arg1, spec2, arg2, initial = 1, lower.tail = TRUE, log.p = FALSE)
```

Arguments

p	scalar or vector of probabilities to compute the qf.
spec1	a character string specifying the head parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg1	list of arguments/parameters of the head parent distribution.
spec2	a character string specifying the tail parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
arg2	list of arguments/parameters of the tail parent distribution.
initial	initial values of the threshold, θ.
lower.tail	logical; if TRUE, probabilities are p, otherwise 1-p.
log.p	logical; if TRUE, probabilities p are returned as log(p).

Details

The qf of composite model has a general form of:

$$Q(p) = Q_1(p(1+\phi)F_1(\theta)) \text{ if } \quad p \leq \frac{1}{1+\phi},$$

$$= Q_2\left(F_2(\theta) + (1 - F_2(\theta))\left(\frac{p(1+\phi)-1}{\phi}\right)\right) \text{ if } \quad p > \frac{1}{1+\phi}$$

whereby ϕ is the weight component, θ is the threshold and $F_i(x)$ for $i = 1, 2$ are the qfs correspond to head and tail parent distributions, respectively.

Value

An object of the same length as p, giving the qf values computed at p.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Cooray, K., & Ananda, M. M. (2005). Modeling actuarial data with a composite lognormal-Pareto model. Scandinavian Actuarial Journal, 2005(5), 321-334.
Scollnik, D. P. (2007). On composite lognormal-Pareto models. Scandinavian Actuarial Journal, 2007(1), 20-33.
Nadarajah, S., & Bakar, S. A. A. (2014). New composite models for the Danish fire insurance data. Scandinavian Actuarial Journal, 2014(2), 180-187.
Bakar, S. A., Hamzah, N. A., Maghsoudi, M., & Nadarajah, S. (2015). Modeling loss data using composite models. Insurance: Mathematics and Economics, 61, 146-154.

Examples

```
x=runif(10, min=0, max=1)
y=qcomposite(x, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
             arg2=list(rate=0.5) )
```

`qfolded` *Quantile function of folded model.*

Description

Computes cdf of the folded model.

Usage

```
qfolded(p, spec, arg, interval = c(0, 100), lower.tail = TRUE, log.p = FALSE)
```

Arguments

`p`	scalar or vector of probabilities to compute the qf.
`spec`	a character string specifying the parent distribution (for example, "norm" if the parent distribution correspond to the normal).
`arg`	list of arguments/parameters of the parent distribution.
`interval`	a vector of interval end-points for `p` to search for the function root.
`lower.tail`	logical; if `TRUE`, probabilities are `p`, otherwise 1-`p`.
`log.p`	logical; if `TRUE`, probabilities `p` are returned as log(`p`).

Value

An object of the same length as `p`, giving the qf values computed at `p`.

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Brazauskas, V., & Kleefeld, A. (2011). Folded and log-folded-t distributions as models for insurance loss data. Scandinavian Actuarial Journal, 2011(1), 59-74.

Examples

```
x=runif(10, min=0, max=1)
y=qfolded(x, spec="norm", arg=list(mean=1,sd=2), interval=c(0,100) )
```

`qmixt` *Quantile function of mixture model.*

Description

Computes qf of the mixture model.

Usage

```
qmixt(p, phi, spec1, arg1, spec2, arg2, interval = c(0, 100),
      lower.tail = TRUE, log.p = FALSE)
```

Arguments

`p`	scalar or vector of probabilities to compute the qf.
`phi`	the value of ϕ parameter, $\phi > 0$.
`spec1`	a character string specifying the first parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg1`	list of arguments/parameters of the first parent distribution.
`spec2`	a character string specifying the second parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
`arg2`	list of arguments/parameters of the second parent distribution.
`interval`	a vector of interval end-points for `p` to search for the function root.
`lower.tail`	logical; if `TRUE`, probabilities are `p`, otherwise 1-`p`.
`log.p`	logical; if `TRUE`, probabilities `p` are returned as log(`p`).

Value

An object of the same length as `p`, giving the qf values computed at `p`.

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Pearson, K. (1894). Contributions to the mathematical theory of evolution. Philosophical Transactions of the Royal Society of London. A, 71-110.

Examples

```
x=runif(10, min=0, max=1)
y=qmixt(x, phi=0.5, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
        arg2=list(rate=0.5))
```

---

qskew *Quantile function of skewed symmetric model.*

Description

Computes qf of the skewed symmetric model.

Usage

```
qskew(p, spec1, arg1, spec2, arg2, interval = c(1, 10), lower.tail = TRUE, log.p = FALSE)
```

Arguments

p	scalar or vector of probabilities to compute the qf.
spec1	a character string specifying the parent distribution $g(x)$ (for example, "norm" if the parent distribution corresponds to the normal).
arg1	list of arguments/parameters of the parent distribution $g(x)$.
spec2	a character string specifying the parent distribution $H(x)$ (for example, "logis" if the parent distribution corresponds to the logistic).
arg2	list of arguments/parameters of the parent distribution $H(x)$.
interval	a vector of interval end-points for p to search for the function root.
lower.tail	logical; if TRUE, probabilities are p, otherwise 1-p.
log.p	logical; if TRUE, probabilities p are returned as log(p).

Value

An object of the same length as p, giving the qf values computed at p.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Azzalini, A. (1985). A class of distributions which includes the normal ones. Scandinavian journal of statistics, 171-178.

Examples

```
x=runif(10, min=0, max=1)
y=qskew(x, spec1="norm", arg1=list(mean=0,sd=0.1), spec2="logis",
        arg2=list(location=0,scale=0.2))
```

`rarctan` *Random generation of arc tan model.*

Description

Computes rg of the arc tan model.

Usage

```
rarctan(n, alpha, spec, arg)
```

Arguments

`n`	number of random generated values.
`alpha`	the value of α parameter, $\alpha > 0$.
`spec`	a character string specifying the parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg`	list of arguments/parameters of the parent distribution.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Gomez-Deniz, E., & Calderin-Ojeda, E. Modelling insurance data with the pareto arctan distribution. ASTIN Bulletin, 1-22.

Examples

```
y=rarctan(10, alpha=0.5, spec="lnorm", arg=c(meanlog=1,sdlog=2) )
```

`rcomposite` *Random generation of composite model.*

Description

Computes rg of the composite model.

Usage

```
rcomposite(n, spec1, arg1, spec2, arg2, initial = 1)
```

Arguments

`n`	number of random generated values.
`spec1`	a character string specifying the head parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
`arg1`	list of arguments/parameters of the head parent distribution.
`spec2`	a character string specifying the tail parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
`arg2`	list of arguments/parameters of the tail parent distribution.
`initial`	initial values of the threshold, θ.

Value

An object of the length `n`, giving the random generated values for the composite model.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Cooray, K., & Ananda, M. M. (2005). Modeling actuarial data with a composite lognormal-Pareto model. Scandinavian Actuarial Journal, 2005(5), 321-334.
Scollnik, D. P. (2007). On composite lognormal-Pareto models. Scandinavian Actuarial Journal, 2007(1), 20-33.
Nadarajah, S., & Bakar, S. A. A. (2014). New composite models for the Danish fire insurance data. Scandinavian Actuarial Journal, 2014(2), 180-187.
Bakar, S. A., Hamzah, N. A., Maghsoudi, M., & Nadarajah, S. (2015). Modeling loss data using composite models. Insurance: Mathematics and Economics, 61, 146-154.

Examples

```
y=rcomposite(10, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
             arg2=list(rate=0.5))
```

rfolded *Random generation of folded model.*

Description

Computes rg of the folded model.

Usage

```
rfolded(n, spec, arg, interval = c(0, 100))
```

Arguments

n	number of random generated values.
spec	a character string specifying the parent distribution (for example, "norm" if the parent distribution correspond to the normal).
arg	list of arguments/parameters of the parent distribution.
interval	a vector of interval end-points to search function root.

Value

An object of the length n, giving the random generated values for the folded model.

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Brazauskas, V., & Kleefeld, A. (2011). Folded and log-folded-t distributions as models for insurance loss data. Scandinavian Actuarial Journal, 2011(1), 59-74.

Examples

```
y=rfolded(10, spec="norm", arg=list(mean=1,sd=2), interval=c(0,100) )
```

rmixt *Random generation of mixture model.*

Description

Computes rg of the mixture model.

Usage

```
rmixt(n, phi, spec1, arg1, spec2, arg2, interval = c(0, 100))
```

Arguments

n	number of random generated values.
phi	the value of ϕ parameter, $\phi > 0$.
spec1	a character string specifying the first parent distribution (for example, "lnorm" if the parent distribution corresponds to the lognormal).
arg1	list of arguments/parameters of the first parent distribution.
spec2	a character string specifying the second parent distribution (for example, "exp" if the parent distribution corresponds to the exponential).
arg2	list of arguments/parameters of the second parent distribution.
interval	a vector of interval end-points to search function root.

Value

An object of the length n, giving the random generated values for the mixture model.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Pearson, K. (1894). Contributions to the mathematical theory of evolution. Philosophical Transactions of the Royal Society of London. A, 71-110.

Examples

```
y=rmixt(10, phi=0.5, spec1="lnorm", arg1=list(meanlog=0.1,sdlog=0.2), spec2="exp",
        arg2=list(rate=0.5) )
```

---

rskew *Random generation of skewed symmetric model.*

Description

Computes rg of the skewed symmetric model.

Usage

```
rskew(n, spec1, arg1, spec2, arg2, interval = c(1, 10))
```

Arguments

n	number of random generated values.
spec1	a character string specifying the parent distribution $g(x)$ (for example, "norm" if the parent distribution corresponds to the normal).
arg1	list of arguments/parameters of the parent distribution $g(x)$.
spec2	a character string specifying the parent distribution $H(x)$ (for example, "logis" if the parent distribution corresponds to the logistic).
arg2	list of arguments/parameters of the parent distribution $H(x)$.
interval	a vector of interval end-points to search function root.

Value

An object of the length n, giving the random generated values for the skewed symmetric model.

Author(s)

Shaiful Anuar Abu Bakar

References

Abu Bakar, S. A., Nadarajah, S., Adzhar, Z. A. A. K., & Mohamed, I. (2016). gendist: An R package for generated probability distribution models. PloS one, 11(6).
Azzalini, A. (1985). A class of distributions which includes the normal ones. Scandinavian journal of statistics, 171-178.

Examples

```
y=rskew(10, spec1="norm", arg1=list(mean=0,sd=0.1), spec2="logis",
        arg2=list(location=0,scale=0.2))
```

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