Package 'ERPeq'

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Title Probabilistic Hazard Assessment

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Description Computes the probability density and cumulative distribution functions of fourteen distributions used for the probabilistic hazard assessment. Estimates the model parameters of the distributions using the maximum likelihood and reports the goodness-of-fit statistics. The recurrence interval estimations of earthquakes are computed for each distribution.
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Description

cdfbsgdp

Cumulative distribution function of the Birnbaum-Saunders-Generalized Pareto distribution

Generalized Pareto distribution

Usage

```
cdfbsgdp(par, x)
```

Arguments

par parameter vector of the Birnbaum-Saunders-Generalized Pareto distribution. First

parameter is the shape, second parameter is the scale parameter. Third parameter

Cumulative distribution function of the Birnbaum-Saunders-

is the lower bound parameter.

x vector of observations or single value

Value

return the value of the cdf of the Birnbaum-Saunders-Generalized Pareto distribution

References

Altun, E., Ozel, G. A novel approach to probabilistic hazard assessment: BSGPD model. (Under Review)

```
cdfbsgdp(c(0.5,2,0.5),3)
```

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cdfeexp	Cumulative distribution function of the exponentiated exponential distribution

Description

Cumulative distribution function of the exponentiated exponential distribution

Usage

```
cdfeexp(par, x)
```

Arguments

par parameter vector of the exponentiated exponential distribution. First parameter

is the shape, second is the scale parameter.

x vector of observations or single value

Value

return the value of the pdf of the exponentiated exponential distribution

References

Gupta, R. D., & Kundu, D. (1999). Theory & methods: Generalized exponential distributions. Australian & New Zealand Journal of Statistics, 41(2), 173-188.

Examples

```
cdfeexp(c(0.5,0.3),2)
```

cdfer

Cumulative distribution function of the exponentiated Rayleigh distribution

Description

Cumulative distribution function of the exponentiated Rayleigh distribution

```
cdfer(par, x)
```

cdfew 5

Arguments

par parameter vector of the exponentiated Rayleigh distribution. First parameter is

the scale, second is the shape parameter.

x vector of observations or single value

Value

return the value of the pdf of the exponentiated Rayleigh distribution

References

Vodă, V. G. (1976). Inferential procedures on a generalized Rayleigh variate. I. Aplikace matematiky, 21(6), 395-412.

Examples

```
cdfer(c(0.5,0.3),2)
```

cdfew

Cumulative distribution function of the exponentiated Weibull distribution

Description

Cumulative distribution function of the exponentiated Weibull distribution

Usage

```
cdfew(par, x)
```

Arguments

par parameter vector of the exponentiated Weibull distribution. First parameter is

the shape, second is the scale parameter and third parameter is shape parameter.

x vector of observations or single value

Value

return the value of the pdf of the exponentiated Weibull distribution

References

Mudholkar, G. S., & Srivastava, D. K. (1993). Exponentiated Weibull family for analyzing bathtub failure-rate data. IEEE transactions on reliability, 42(2), 299-302.

```
cdfew(c(0.5,0.3,0.6),2)
```

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	_	
\sim d	fgamma	

Cumulative distribution function of the Gamma distribution

Description

Cumulative distribution function of the Gamma distribution

Usage

```
cdfgamma(par, x)
```

Arguments

par

parameter vector of the gamma distribution. First parameter is the shape and

second is the scale parameter

Χ

vector of quantiles

Value

return the value of the cdf of the gamma distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
cdfgamma(c(2,3),5)
```

cdfggamma

Cumulative distribution function of the generalized gamma distribution

Description

Cumulative distribution function of the generalized gamma distribution

Usage

```
cdfggamma(par, x)
```

Arguments

par

parameter vector of the generalized gamma distribution. First parameter is the dispersion, second is the location parameter and third is the family parameter.

Χ

vector of observations or single value

cdfgumbel 7

Value

return the value of the pdf of the generalized gamma distribution

References

Stacy, E. W. (1962). A generalization of the gamma distribution. The Annals of mathematical statistics, 1187-1192.

Examples

```
pdfggamma(c(2,5,3),3)
```

cdfgumbel

Cumulative distribution function of the gumbel distribution

Description

Cumulative distribution function of the gumbel distribution

Usage

```
cdfgumbel(par, x)
```

Arguments

par parameter vector of the gumbel distribution. First parameter is the location,

second is the scale parameter.

x vector of observations or single value

Value

return the value of the pdf of the gumbel distribution

References

Gumbel, E. J. (1941). The return period of flood flows. The annals of mathematical statistics, 12(2), 163-190.

```
pdfgumbel(c(0.5,0.3),2)
```

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cdfinvgamma

Cumulative distribution function of the inverse gamma distribution

Description

Cumulative distribution function of the inverse gamma distribution

Usage

```
cdfinvgamma(par, x)
```

Arguments

par parameter vector of the inverse gamma distribution. First parameter is the shape,

second is the rate parameter.

x vector of observations or single value

Value

return the value of the pdf of the inverse gamma distribution

References

Cook, J. D. (2008). Inverse gamma distribution. online: http://www. johndcook. com/inverse gamma. pdf, Tech. Rep.

Examples

```
cdfinvgamma(c(2,5,3),3)
```

cdfiwweibull

Cumulative distribution function of the inverse Weibull distribution

Description

Cumulative distribution function of the inverse Weibull distribution

Usage

```
cdfiwweibull(par, x)
```

Arguments

par parameter vector of the inverse Weibull distribution. First parameter is the shape

and second is the scale parameter

x vector of quantiles

cdflevy 9

Value

return the value of the cdf of the inverse Weibull distribution

References

Mudholkar, G. S., & Kollia, G. D. (1994). Generalized Weibull family: a structural analysis. Communications in statistics-theory and methods, 23(4), 1149-1171.

Examples

```
cdfiwweibull(c(2,3),5)
```

cdflevy

Cumulative distribution function of the Levy distribution

Description

Cumulative distribution function of the Levy distribution

Usage

```
cdflevy(par, x)
```

Arguments

par parameter vector of the Levy distribution. First parameter is the location, second

is the scale parameter.

x vector of observations or single value

Value

return the value of the pdf of the Levy distribution

References

Nolan, J. P. (2003). Modeling financial data with stable distributions. In Handbook of heavy tailed distributions in finance (pp. 105-130). North-Holland.

```
cdflevy(c(0.5,0.3),2)
```

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cdflnormal

Cumulative distribution function of the log-normal distribution

Description

Cumulative distribution function of the log-normal distribution

Usage

```
cdflnormal(par, x)
```

Arguments

par parameter vector of the log-normal distribution. First parameter is the shape and

second is the scale parameter

x vector of quantiles

Value

return the value of the cdf of the log-normal distribution

References

Heyde, C. C. (1963). On a property of the lognormal distribution. Journal of the Royal Statistical Society: Series B (Methodological), 25(2), 392-393.

Examples

```
cdflnormal(c(2,3),5)
```

cdfpareto

Cumulative distribution function of the Pareto distribution

Description

Cumulative distribution function of the Pareto distribution

Usage

```
cdfpareto(par, x)
```

Arguments

par parameter vector of the Pareto distribution. First parameter is the shape and

second is the scale parameter

x vector of quantiles

cdfrayleigh 11

Value

return the value of the cdf of the Pareto distribution

References

Arnold, B. C. (1983). Pareto Distributions, International Cooperative Publishing House.

Examples

```
cdfpareto(c(2,5),2)
```

cdfrayleigh

Cumulative distribution function of the Rayleigh distribution

Description

Cumulative distribution function of the Rayleigh distribution

Usage

```
cdfrayleigh(par, x)
```

Arguments

par scale parameter vector of the Rayleigh distribution.

x vector of quantiles

Value

return the value of the cdf of the Rayleigh distribution

References

Siddiqui, M. M. (1964). Statistical inference for Rayleigh distributions. Journal of Research of the National Bureau of Standards, Sec. D, 68(9), 1005-1010.

```
cdfrayleigh(c(2),5)
```

cdfweibull

Cumulative distribution function of the Weibull distribution

Description

Cumulative distribution function of the Weibull distribution

Usage

```
cdfweibull(par, x)
```

Arguments

par parameter vector of the Weibull distribution. First parameter is the shape and

second is the scale parameter

x vector of quantiles

Value

return the value of the cdf of the weibull distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
cdfweibull(c(2,3),5)
```

data_earthquake_6.5_7 Earthquake dataset

Description

The elapsed time (year) between the earthquakes with 6.5 and 7 magnitudes in Turkey occured between the years of 1990-2021

Usage

```
data_earthquake_6.5_7
```

Format

A numeric vector

data_earthquake_6_6.5

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data_earthquake_6_6.5 Earthquake dataset

Description

The elapsed time (year) between the earthquakes with 6 and 6.5 magnitudes in Turkey occured between the years of 1990-2021

Usage

```
data_earthquake_6_6.5
```

Format

A numeric vector

data_earthquake_7

Earthquake dataset

Description

The elapsed time (year) between the earthquakes having the magnitudes higher than 7 in Turkey occured between the years of 1990-2021

Usage

```
data_earthquake_7
```

Format

A numeric vector

expexpcp

Probabilistic estimation of earthquake recurrence interval using exponentiated exponential distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

```
expexpcp(fit, r, te)
```

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Arguments

fit Fit is the fitexpexp object. See ?fitexpexp for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

Examples

```
fit=fitexpexp(c(1,1),data=data_earthquake_7)
expexpcp(fit,r=2,te=5)
```

expraycp

Probabilistic estimation of earthquake recurrence interval using exponentiated Rayleigh distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
expraycp(fit, r, te)
```

Arguments

fit Fit is the fitexprayleigh object. See ?fitexprayleigh for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

expweicp 15

Examples

```
fit=fitexprayleigh(c(0.5,0.5),data=data_earthquake_7)
expraycp(fit,r=2,te=5)
```

expweicp

Probabilistic estimation of earthquake recurrence interval using exponentiated Weibull distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
expweicp(fit, r, te)
```

Arguments

fit Fit is the fitexpweibull object. See ?fitexpweibull for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

```
\label{lem:condition} \begin{split} &\text{fit=fitexpweibull(c(1,1,1),data=data\_earthquake\_7)}\\ &\text{expweicp(fit,r=2,te=5)} \end{split}
```

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fitbsgpd

Fitting the Birnbaum-Saunders-Generalized Pareto distribution

Description

Fitting the Birnbaum-Saunders-Generalized Pareto distribution

Usage

```
fitbsgpd(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(VGAM)
data=ERPeq::rbsgpd(500,5,0.7,0.2)
fitbsgpd(starts =c(1,1),data=data)
```

fitexpexp

Fitting the exponentiated exponential distribution

Description

Fitting the exponentiated exponential distribution

Usage

```
fitexpexp(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

fitexprayleigh 17

Examples

```
data=rexpexp(500,2,3)
fitexpexp(starts =c(2,2),data=data)
```

fitexprayleigh

Fitting the exponentiated exponentiated Rayleigh distribution

Description

Fitting the exponentiated exponentiated Rayleigh distribution

Usage

```
fitexprayleigh(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
data=rexprayleigh(500,2,3)
fitexprayleigh(starts =c(2,2),data=data)
```

fitexpweibull

Fitting the exponentiated Weibull distribution

Description

Fitting the exponentiated Weibull distribution

Usage

```
fitexpweibull(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

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Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
data=rexpweibull(500,2,3,5)
fitexpweibull(starts =c(2,2,2),data=data)
```

fitgamma

Fitting the gamma distribution

Description

Fitting the gamma distribution

Usage

```
fitgamma(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
datagamma=rgamma(500,2,2)
fitgamma(starts =c(2,2),data=datagamma)
```

fitggamma

Fitting the generalized gamma distribution

Description

Fitting the generalized gamma distribution

```
fitggamma(starts, data)
```

fitgumbel 19

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(rmutil)
data=rggamma(500,2,2,2)
fitggamma(starts =c(1,1,1),data=data)
```

fitgumbel

Fitting the Gumbel distribution

Description

Fitting the Gumbel distribution

Usage

```
fitgumbel(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

```
library(VGAM)
data=rgumbel(500,2,0.5)
fitgumbel(starts =c(2,2),data=data)
```

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fitinvgamma

Fitting the inverse gamma distribution

Description

Fitting the inverse gamma distribution

Usage

```
fitinvgamma(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(invgamma)
data=rinvgamma(500,2,0.5)
fitinvgamma(starts =c(2,2),data=data)
```

fitiweibull

Fitting the gamma distribution

Description

Fitting the gamma distribution

Usage

```
fitiweibull(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

fitlevy 21

Examples

```
set.seed(7)
data=rgamma(500,shape=1,scale=1)
fitiweibull(starts =c(0.5,0.5),data=data)
```

fitlevy

Fitting the Levy distribution

Description

Fitting the Levy distribution

Usage

```
fitlevy(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(VGAM)
data=ERPeq::rlevy(100,2,0.1)
fitlevy(starts =c(0.1),data=data)
```

fitlnormal

Fitting the log-normal distribution

Description

Fitting the log-normal distribution

Usage

```
fitlnormal(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

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Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
data=rlnorm(500,2,0.5)
fitlnormal(starts =c(2,2),data=data)
```

fitpareto

Fitting the Pareto distribution

Description

Fitting the Pareto distribution

Usage

```
fitpareto(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(VGAM)
data=VGAM::rpareto(500,5,2)
fitpareto(starts =c(2),data=data)
```

fitrayleigh

Fitting the Rayleigh distribution

Description

Fitting the Rayleigh distribution

```
fitrayleigh(starts, data)
```

fitweibull 23

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

Examples

```
library(VGAM)
data=rrayleigh(500,2)
fitrayleigh(starts =c(2),data=data)
```

fitweibull

Fitting the Weibull distribution

Description

Fitting the Weibull distribution

Usage

```
fitweibull(starts, data)
```

Arguments

starts A vector defining the starting values for the Nelder-Mead algorithm.

data A vector containing the observations

Value

List the estimated parameters of the distribution with standard errors and goodness-of-fit statistics.

```
dataweibull=rweibull(500,2,2)
fitweibull(starts =c(2,2),data=dataweibull)
```

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gammacp	Probabilistic estimation of earthquake recurrence interval using
	gamma distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
gammacp(fit, r, te)
```

Arguments

fit Fit is the fitgamma object. See ?fitgamma for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

Examples

```
fit=fitgamma(c(1,1),data=data_earthquake_6_6.5)
gammacp(fit,r=2,te=5)
```

ggammacp Probabilistic estimation of earthquake recurrence interval using generalized gamma distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

```
ggammacp(fit, r, te)
```

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Arguments

fit	Fit is the fitggamma	object. See	?fitggamma for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

Examples

gumbelcp

Probabilistic estimation of earthquake recurrence interval using Gumbel distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
gumbelcp(fit, r, te)
```

Arguments

fit Fit is the fitgumbel object. See ?fitgumbel for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

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Examples

```
fit=fitgumbel(c(1,1),data=data_earthquake_7)
gumbelcp(fit,r=2,te=5)
```

invgammacp

Probabilistic estimation of earthquake recurrence interval using inverse gamma distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
invgammacp(fit, r, te)
```

Arguments

fit Fit is the fitinygamma object. See ?fitinygamma for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

```
fit=fitinvgamma(c(1,1),data=data_earthquake_7)
invgammacp(fit,r=2,te=5)
```

iweibullcp 27

iweibullcp	Probabilistic estimation of earthquake recurrence interval using inverse Weibull distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
iweibullcp(fit, r, te)
```

Arguments

fit Fit is the fitiwebull object. See ?fitiwebull for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

Examples

```
fit=fitiweibull(c(1,1),data=data_earthquake_6.5_7)
iweibullcp(fit,r=2,te=5)
```

levycp	Probabilistic estimation of earthquake recurrence interval using Levy
	distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

```
levycp(fit, r, te)
```

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Arguments

fit Fit is the fitlevy object. See ?fitlevy for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

Examples

```
fit=fitlevy(c(1),data=data_earthquake_7)
levycp(fit,r=2,te=5)
```

Probabilistic estimation of earthquake recurrence interval using lognormal distribution

Description

lnormalcp

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
lnormalcp(fit, r, te)
```

Arguments

fit Fit is the fitlnormal object. See ?fitlnormal for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

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Examples

```
fit=fitInormal(c(1,1),data=data\_earthquake\_6.5\_7)\\ Inormalcp(fit,r=2,te=5)
```

paretocp Probabilistic estimation of earthquake recurrence interval using Pareto distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
paretocp(fit, r, te)
```

Arguments

fit Fit is the fitpareto object. See ?fitpareto for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

```
library(VGAM)
data=VGAM::rpareto(200,2,5)
fit=fitpareto(c(0.5),data=data)
paretocp(fit,r=2,te=5)
```

30 pdfeexp

pdfbsgdp	Probability density function of the Birnbaum-Saunders-Generalized Pareto distribution

Description

Probability density function of the Birnbaum-Saunders-Generalized Pareto distribution

Usage

```
pdfbsgdp(par, x)
```

Arguments

par

parameter vector of the Birnbaum-Saunders-Generalized Pareto distribution. First

parameter is the shape, second parameter is the scale parameter. Third parameter

is the lower bound parameter.

Χ

vector of observations or single value

Value

return the value of the pdf of the Birnbaum-Saunders-Generalized Pareto distribution.

References

Altun, E., Ozel, G. A novel approach to probabilistic hazard assessment: BSGPD model. (Under Review)

Examples

```
pdfbsgdp(c(2,0.5,0.5),1)
```

pdfeexp

Probability density function of the exponentiated exponential distribution

Description

Probability density function of the exponentiated exponential distribution

```
pdfeexp(par, x)
```

pdfer 31

Arguments

par	parameter vector of the exponentiated exponential distribution. First parameter
	is the shape, second is the scale parameter.
Х	vector of observations or single value

Value

return the value of the pdf of the exponentiated exponential distribution

References

Gupta, R. D., & Kundu, D. (1999). Theory & methods: Generalized exponential distributions. Australian & New Zealand Journal of Statistics, 41(2), 173-188. Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
pdfeexp(c(0.5,0.3),2)
```

pdfer

Probability density function of the exponentiated Rayleigh distribution

Description

Probability density function of the exponentiated Rayleigh distribution

Usage

```
pdfer(par, x)
```

Arguments

par	parameter vector of the exponentiated Rayleigh distribution. First parameter is
	the scale, second is the shape parameter.
X	vector of observations or single value

Value

return the value of the pdf of the exponentiated Rayleigh distribution

References

Vodă, V. G. (1976). Inferential procedures on a generalized Rayleigh variate. I. Aplikace matematiky, 21(6), 395-412.

```
pdfer(c(0.5,0.3),2)
```

32 pdfgamma

pdfew

Probability density function of the exponentiated Weibull distribution

Description

Probability density function of the exponentiated Weibull distribution

Usage

```
pdfew(par, x)
```

Arguments

par parameter vector of the exponentiated Weibull distribution. First parameter is

the shape, second is the scale parameter and third parameter is shape parameter.

x vector of observations or single value

Value

return the value of the pdf of the exponentiated Weibull distribution

References

Mudholkar, G. S., & Srivastava, D. K. (1993). Exponentiated Weibull family for analyzing bathtub failure-rate data. IEEE transactions on reliability, 42(2), 299-302.

Examples

```
pdfew(c(0.5,0.3,0.6),2)
```

pdfgamma

Probability density function of the Gamma distribution

Description

Probability density function of the Gamma distribution

Usage

```
pdfgamma(par, x)
```

Arguments

par parameter vector of the gamma distribution. First parameter is the shape and

second is the scale parameter

x vector of observations or single value

pdfggamma 33

Value

return the value of the pdf of the gamma distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
pdfgamma(c(2,3),5)
```

pdfggamma

Probability density function of the generalized gamma distribution

Description

Probability density function of the generalized gamma distribution

Usage

```
pdfggamma(par, x)
```

Arguments

par parameter vector of the generalized gamma distribution. First parameter is the dispersion, second is the location parameter and third is the family parameter.

x vector of observations or single value

Value

return the value of the pdf of the generalized gamma distribution

References

Stacy, E. W. (1962). A generalization of the gamma distribution. The Annals of mathematical statistics, 1187-1192.

```
pdfggamma(c(2,5,3),3)
```

34 pdfinvgamma

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Dui	≰ UIII	NCT

Probability density function of the gumbel distribution

Description

Probability density function of the gumbel distribution

Usage

```
pdfgumbel(par, x)
```

Arguments

par parameter vector of the gumbel distribution. First parameter is the location,

second is the scale parameter.

x vector of observations or single value

Value

return the value of the pdf of the gumbel distribution

References

Gumbel, E. J. (1941). The return period of flood flows. The annals of mathematical statistics, 12(2), 163-190.

Examples

```
pdfgumbel(c(0.5,0.3),2)
```

pdfinvgamma

Probability density function of the inverse gamma distribution

Description

Probability density function of the inverse gamma distribution

Usage

```
pdfinvgamma(par, x)
```

Arguments

par parameter vector of the inverse gamma distribution. First parameter is the shape,

second is the rate parameter.

x vector of observations or single value

pdfiweibull 35

Value

return the value of the pdf of the inverse gamma distribution

References

Cook, J. D. (2008). Inverse gamma distribution. online: http://www. johndcook. com/inverse gamma. pdf, Tech. Rep.

Examples

```
pdfinvgamma(c(2,5,3),3)
```

pdfiweibull

Probability density function of the inverse Weibull distribution

Description

Probability density function of the inverse Weibull distribution

Usage

```
pdfiweibull(par, x)
```

Arguments

par parameter vector of the inverse Weibull distribution. First parameter is the shape

and second is the scale parameter

x vector of observations or single value

Value

return the value of the pdf of the inverse Weibull distribution

References

Mudholkar, G. S., & Kollia, G. D. (1994). Generalized Weibull family: a structural analysis. Communications in statistics-theory and methods, 23(4), 1149-1171.

```
pdfiweibull(c(2,3),5)
```

36 pdflnormal

pdflevy

Probability density function of the Levy distribution

Description

Probability density function of the Levy distribution

Usage

```
pdflevy(par, x)
```

Arguments

par parameter vector of the Levy distribution. First parameter is the location, second

is the scale parameter.

x vector of observations or single value

Value

return the value of the pdf of the Levy distribution

References

Nolan, J. P. (2003). Modeling financial data with stable distributions. In Handbook of heavy tailed distributions in finance (pp. 105-130). North-Holland.

Examples

```
pdflevy(c(0.5,0.3),2)
```

pdflnormal

Probability density function of the log-normal distribution

Description

Probability density function of the log-normal distribution

Usage

```
pdflnormal(par, x)
```

Arguments

par parameter vector of the log-normal distribution. First parameter is the shape and

second is the scale parameter

x vector of observations or single value

pdfpareto 37

Value

return the value of the pdf of the log-normal distribution

References

Heyde, C. C. (1963). On a property of the lognormal distribution. Journal of the Royal Statistical Society: Series B (Methodological), 25(2), 392-393.

Examples

```
pdflnormal(c(2,3),5)
```

pdfpareto

Probability density function of the Pareto distribution

Description

Probability density function of the Pareto distribution

Usage

```
pdfpareto(par, x)
```

Arguments

par parameter vector of the Pareto distribution. First parameter is the scale and

second is the shape parameter

x vector of observations or single value

Value

return the value of the pdf of the Pareto distribution

References

Arnold, B. C. (1983). Pareto Distributions, International Cooperative Publishing House.

```
pdfpareto(c(2,5),3)
```

38 pdfweibull

pdfrayleigh

Probability density function of the Rayleigh distribution

Description

Probability density function of the Rayleigh distribution

Usage

```
pdfrayleigh(par, x)
```

Arguments

par scale parameter vector of the Rayleigh distribution.

x vector of observations or single value

Value

return the value of the pdf of the Rayleigh distribution

References

Siddiqui, M. M. (1964). Statistical inference for Rayleigh distributions. Journal of Research of the National Bureau of Standards, Sec. D, 68(9), 1005-1010.

Examples

```
pdfrayleigh(c(2),5)
```

pdfweibull

Probability density function of the Weibull distribution

Description

Probability density function of the Weibull distribution

Usage

```
pdfweibull(par, x)
```

Arguments

par parameter vector of the weibull distribution. First parameter is the shape and

second is the scale parameter

x vector of observations or single value

rayleighcp 39

Value

return the value of the pdf of the weibull distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
pdfweibull(c(2,3),5)
```

rayleighcp

Probabilistic estimation of earthquake recurrence interval using Rayleigh distribution

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
rayleighcp(fit, r, te)
```

Arguments

fit Fit is the fitrayleigh object. See ?fitrayleigh for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

```
fit=fitrayleigh(c(1),data=data_earthquake_7)
rayleighcp(fit,r=2,te=5)
```

40 rexpexp

rbsgpd	Generate random observations from Birnbaum-Saunders-Generalized Pareto distribution

Description

Generate random observations from Birnbaum-Saunders-Generalized Pareto distribution

Usage

```
rbsgpd(n, beta, alpha, gamma)
```

Arguments

n	number of observations to be generated from the Birnbaum-Saunders-Generalized Pareto
beta	lower bound parameter of the
alpha	scale parameter of the Birnbaum-Saunders-Generalized Pareto distribution
gamma	shape parameter of the Birnbaum-Saunders-Generalized Pareto distribution

Value

return the random sample generated from scale parameter of the Birnbaum-Saunders-Generalized Pareto distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
rbsgpd(100,2,3,5)
```

гехрехр	Generate random observations from exponentiated exponential distribution

Description

Generate random observations from exponentiated exponential distribution

```
rexpexp(n, alpha, lambda)
```

rexprayleigh 41

Arguments

n number of observations to be generated	n	number of	observations	to be	generated
--	---	-----------	--------------	-------	-----------

alpha shape parameter of the exponential distribution scale parameter of the exponential distribution

Value

return the random sample generated from exponentiated exponential distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
rexpexp(100,2,3)
```

rexprayleigh	Generate random observations from exponentiated Rayleigh distribution
rexprayleigh	

Description

Generate random observations from exponentiated Rayleigh distribution

Usage

```
rexprayleigh(n, alpha, beta)
```

Arguments

n number of observations to be generated

alpha shape parameter of the exponentiated Rayleigh distribution beta scale parameter of the exponentiated Rayleigh distribution

Value

return the random sample generated from exponentiated exponential distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

```
rexprayleigh(100,2,3)
```

42 rlevy

rexpweibull	Generate random observations from exponentiated Weibull distribution

Description

Generate random observations from exponentiated Weibull distribution

Usage

```
rexpweibull(n, alpha, beta, theta)
```

Arguments

n	number of observations to be generated
---	--

alpha shape parameter of the exponentiated Weibull distribution beta scale parameter of the exponentiated Weibull distribution theta shape parameter of the exponentiated Weibull distribution

Value

return the random sample generated from exponentiated Weibull distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
rexpweibull(100,2,3,2)
```

rlevy

Generate random observations from Levy distribution

Description

Generate random observations from Levy distribution

```
rlevy(n, mu, c)
```

weibullcp 43

Arguments

n	number of observations to be generated
mu	location parameter of the Levy distribution
С	scale parameter of the Levy distribution

Value

return the random sample generated from Levy distribution

References

Johnson, N. L., Kotz, S. and Balakrishnan, N. (1995) Continuous Univariate Distributions, volume 1, chapter 21. Wiley, New York.

Examples

```
rlevy(500,2,3)
```

	weibullcp	Probabilistic estimation of earthquake recurrence interval using Weibull distribution
--	-----------	---

Description

Computes the probability of an earthquake within a specified time "r" and elapsed time "te".

Usage

```
weibullcp(fit, r, te)
```

Arguments

fit Fit is the fitweibull object. See ?fitweibull for details.

r The specified time in which the probability of an earthquake is desired to be

calculated.

te Elapsed time since the last earthquake

Value

A numeric value

References

Pasari, S. and Dikshit, O. (2014). Impact of three-parameter Weibull models in probabilistic assessment of earthquake hazards. Pure and Applied Geophysics, 171, 1251-1281.

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