Package 'BGFD'

April 7, 2023

Type Package

Title Bell-G and Complementary Bell-G Family of Distributions

Version 0.1

Date 2023-04-06

Author Michail Tsagris [aut, cre],
Muhammad Imran [aut],
M.H. Tahir [ctb]

Maintainer Michail Tsagris <mtsagris@uoc.gr>

Depends R (>= 4.0)

Imports AdequacyModel, graphics, stats

Description Evaluates the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates for the following distributions: Bell exponential, Bell extended exponential, Bell Weibull, Bell extended Weibull, Bell-Fisk, Bell-Lomax, Bell Burr-XII, Bell Burr-X, complementary Bell exponential, complementary Bell extended exponential, complementary Bell Weibull, complementary Bell extended Weibull, complementary Bell-Fisk, complementary Bell-Lomax, complementary Bell Burr-XII and complementary Bell Burr-X distribution. Related work includes:
a) Fayomi A., Tahir M. H., Algarni A., Imran M. and Jamal F. (2022). ``A new useful exponential model with applications to quality control and actuarial data''. Computational Intelligence and Neuroscience, 2022. <doi:10.1155/2022/2489998>.
b) Alanzi, A. R., Imran M., Tahir M. H., Chesneau C., Jamal F. Shakoor S. and Sami, W. (2023). ``Simulation analysis, properties and applications on a new Burr XII model based on the Bell-X functionalities''. AIMS Mathematics, 8(3): 6970-7004. <doi:10.3934/math.2023352>.
c) Algarni A. (2022). ``Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model''. Axioms, 11(9): 438. <doi:10.3390/axioms11090438>.

RoxygenNote 7.1.1

NeedsCompilation no

Repository CRAN

Date/Publication 2023-04-07 08:50:13 UTC

R topics documented:

`BGFD-package` *Fitting of Bell-G and Complementary Bell-G family of Distributions*

Description

Evaluates the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates for the following distributions: Bell exponential, Bell extended exponential, Bell Weibull, Bell extended Weibull, Bell-Fisk, Bell-Lomax, Bell Burr-XII, Bell Burr-X, complementary Bell exponential, complementary Bell extended exponential, complementary Bell Weibull, complementary Bell extended Weibull, complementary Bell-Fisk, complementary Bell-Lomax, complementary Bell Burr-XII and complementary Bell Burr-X distribution.

Details

Package:	BGFD
Type:	Package
Version:	0.1
Date:	2023-04-06
License:	GPL-2

Maintainers

Michail Tsagris <mtsagris@uoc.gr>

Note

Acknowledgments:

Muhammad Imran would like to express his acknowledgments to Dr. Farukh Jamal, his PhD co-supervisor, and the Islamia University of Bahawalpur, Pakistan.

Author(s)

Michail Tsagris <mtsagris@uoc.gr>, Muhammad Imran <imranshakoor84@yahoo.com> and M.H. Tahir <mht@iub.edu.pk>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience, 2022.

Alanzi, A. R., Imran, M., Tahir, M. H., Chesneau, C., Jamal, F., Shakoor, S. and Sami, W. (2023). Simulation analysis, properties and applications on a new Burr XII model based on the Bell-X functionalities, AIMS Mathematics, 8(3): 6970-7004.

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

The Bell Burr-12 distribution

The Bell Burr-12 distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell Burr-12 distribution.

Usage

```
dBellB(x, a, b, k, lambda, log = FALSE)
pBellB(x, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
qBellB(p, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
rBellB(n, a, b, k, lambda)
sBellB(x, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
hBellB(x, a, b, k, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellB(x, a, b, k, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell Burr-12 distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`a`	The strictly positive scale parameter of the baseline Burr-12 distribution ($a > 0$).
`b`	The strictly positive shape parameter of the baseline Burr-12 distribution ($b > 0$).
`k`	The strictly positive shape parameter of the baseline Burr-12 distribution ($k > 0$).
`lower.tail`	If FALSE then $1 - F(x)$ are returned and quantiles are computed $1 - p$.
`log`	If TRUE, probabilities p are given as log(p).
`log.p`	If TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell Burr-12 distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell-Burr-12 distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellB gives the (log) probability function. pBellB gives the (log) distribution function. qBellB gives the quantile function. rBellB generates random values. sBellB gives the survival function. hBellB gives the hazard rate function. mBellB gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Zimmer, W. J., Keats, J. B. and Wang, F. K. (1998). The Burr XII distribution in reliability analysis. Journal of Quality Technology, 30(4): 386-394.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

pBellEW

Examples

```
x<-rBellB(20,2,0.4,1.2,1.5)
dBellB(x,2,1,2,1.5)
pBellB(x,2,1,2,1.5)
qBellB(0.7,2,1,2,1.5)
sBellB(x,2,1,2,1.5)
hBellB(x,2,1,2,1.5)
mBellB(x, 0.2,0.4,1.5,1.2, method="B")
```

The Bell Burr-X distribution

The Bell Burr-X distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell Burr-X distribution.

Usage

```
dBellBX(x, a, lambda, log = FALSE)
pBellBX(x, a, lambda, log.p = FALSE, lower.tail = TRUE)
qBellBX(p, a, lambda, log.p = FALSE, lower.tail = TRUE)
rBellBX(n, a, lambda)
sBellBX(x, a, lambda, log.p = FALSE, lower.tail = TRUE)
hBellBX(x, a, lambda, log = FALSE, log.p = FALSE, lower.tail = TRUE)
mBellBX(x, a, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the Bell Burr-X distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
a	The strictly positive shape parameter of the baseline Burr-X distribution ($a > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p).
log.p	if TRUE, probabilities p are given for exp(p).
method	the procedure for optimizing the log likelihood function after setting the intial values of the parameters and data values for which the BellBurr-X distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell-Burr-X distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellBX gives the (log) probability function. pBellBX gives the (log) distribution function. qBellBX gives the quantile function. rBellBX generates random values. sBellBX gives the survival function. hBellBX gives the hazard rate function. mBellBX gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Kleiber, C. and Kotz, S. (2003). Statistical size distributions in economics and actuarial sciences. John Wiley & Sons.

Castellares, F., Ferrari, S. L. and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

pBellBX

Examples

```
x<-rBellBX(20,2,1)
dBellBX(x,2,1)
pBellBX(x,2,1)
qBellBX(0.7,2,1)
sBellBX(x,2,1)
hBellBX(x,2,1)
mBellBX(x, 0.2,0.1, method="B")
```

`The Bell exponential distribution`

The Bell exponential distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell exponential distribution.

Usage

```
dBellE(x, alpha, lambda, log = FALSE)
pBellE(x, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
qBellE(p, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
rBellE(n, alpha, lambda)
sBellE(x, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
hBellE(x, alpha, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellE(x, alpha,lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell exponential distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive parameter of the baseline exponential distribution ($\alpha > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell exponential distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell exponential distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellE gives the (log) probability function. pBellE gives the (log) distribution function. qBellE gives the quantile function. rBellE generates random values. sBellE gives the survival function. hBellE gives the hazard rate function. mBellE gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

pBellW

Examples

```
x<-rBellE(20,2,1)
dBellE(x,2,1)
pBellE(x,2,1)
qBellE(0.7,2,1)
sBellE(x,2,1)
hBellE(x,2,1)
mBellE(x, 0.2,0.1, method="B")
```

`The Bell exponentiated Weibull distribution`
The Bell exponentiated Weibull distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell exponentiated Weibull distribution.

Usage

```
dBellEW(x, alpha, beta, theta, lambda, log = FALSE)
pBellEW(x, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
qBellEW(p, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
rBellEW(n, alpha, beta, theta, lambda)
sBellEW(x, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
hBellEW(x, alpha, beta, theta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellEW(x, alpha, beta, theta, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell exponentiated Weibull distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive scale parameter of the baseline exponentiated Weibull distribution ($\alpha > 0$).
`beta`	The strictly positive shape parameter of the baseline exponentiated Weibull distribution ($\beta > 0$).
`theta`	The strictly positive shape parameter of the baseline exponentiated Weibull distribution ($\theta > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell exponentiated Weibull distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell exponentiated Weibull distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellEW gives the (log) probability function. pBellEW gives the (log) distribution function. qBellEW gives the quantile function. rBellEW generates random values. sBellEW gives the survival function. hBellEW gives the hazard rate function. mBellEW gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Nadarajah, S., Cordeiro, G. M. and Ortega, E. M. (2013). The exponentiated Weibull distribution: a survey. Statistical Papers, 54: 839-877.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

pBellEE

Examples

```
x<-rBellEW(20,2,1,1.2,0.2)
dBellEW(x,2,1,1.2,0.2)
pBellEW(x,2,1,1.2,0.2)
qBellEW(0.7,2,1,1.2,0.2)
sBellEW(x,2,1,1.2,0.2)
hBellEW(x,2,1,1.2,0.2)
mBellEW(x, 0.2,0.1,1.2,0.2, method="B")
```

The Bell extended exponential distribution

The Bell extended exponential distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell extended exponential distribution.

Usage

```
dBellEE(x, alpha, beta, lambda, log = FALSE)
pBellEE(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
qBellEE(p, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
rBellEE(n, alpha, beta, lambda)
sBellEE(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
hBellEE(x, alpha, beta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellEE(x, alpha, beta, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell extended exponential distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive scale parameter of the baseline extended exponential distribution ($\alpha > 0$).
`beta`	The strictly positive shape parameter of the baseline extended exponential distribution ($\beta > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell extended exponential distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell extended exponential distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellEE gives the (log) probability function. pBellEE gives the (log) distribution function. qBellEE gives the quantile function. rBellEE generates random values. sBellEE gives the survival function. hBellEE gives the hazard rate function. mBellEE gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience, 2022.

Nadarajah, S. (2011). The exponentiated exponential distribution: a survey. AStA Advances in Statistical Analysis, 95: 219-251.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

pBellE

Examples

```
x<-rBellEE(20,2,1,1)
dBellEE(x,2,1,1.2)
pBellEE(x,2,1,1.2)
qBellEE(0.7,2,1,1.2)
sBellEE(x,2,1,1.2)
hBellEE(x,2,1,1.2)
mBellEE(x, 0.2,0.1,1.2, method="B")
```

The Bell Fisk distribution

The Bell Fisk distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell Fisk distribution.

Usage

```
dBellF(x, a, b, lambda, log = FALSE)
pBellF(x, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
qBellF(p, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
rBellF(n, a, b, lambda)
sBellF(x, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
hBellF(x, a, b, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellF(x, a, b, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the Bell Fisk distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
a	The strictly positive scale parameter of the baseline Fisk distribution ($a > 0$).
b	The strictly positive shape parameter of the baseline Fisk distribution ($b > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p).
log.p	if TRUE, probabilities p are given for exp(p).
method	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell Fisk distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell Fisk distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellF gives the (log) probability function. pBellF gives the (log) distribution function. qBellF gives the quantile function. rBellF generates random values. sBellF gives the survival function. hBellF gives the hazard rate function. mBellF gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience, 2022.

Kleiber, C. and Kotz, S. (2003). Statistical size distributions in economics and actuarial sciences. John Wiley & Sons.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185

See Also

pBellW

Examples

```
x<-rBellF(20,2,1,1.7)
x
dBellF(x,2,1,1)
pBellF(x,2,1,1)
qBellF(0.7,2,1,1)
sBellF(x,2,1,1.2)
hBellF(x,2,1,1.2)
mBellF(x, 0.2,1.1,0.7, method="B")
```

The Bell Lomax distribution

The Bell Lomax distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell Lomax distribution.

Usage

```
dBellL(x, b, q, lambda, log = FALSE)
pBellL(x, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
qBellL(p, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
rBellL(n, b, q, lambda)
sBellL(x, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
hBellL(x, b, q, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellL(x, b, q, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell Lomax distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`b`	The strictly positive parameter of the baseline Lomax distribution ($b > 0$).
`q`	The strictly positive shapes parameter of the baseline Lomax distribution ($q > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell Lomax distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell Lomax distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellL gives the (log) probability function. pBellL gives the (log) distribution function. qBellL gives the quantile function. rBellL generates random values. sBellL gives the survival function. hBellL gives the hazard rate function. mBellL gives the maximum likelihood estimates and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Kleiber, C. and Kotz, S. (2003). Statistical size distributions in economics and actuarial sciences. John Wiley & Sons.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185.

See Also

pBellF

Examples

```
x<-rBellL(20,2,1,0.7)
dBellL(x,2,1,1)
pBellL(x,2,1,1)
qBellL(0.7,2,1,1)
sBellL(x,2,1,1.2)
hBellL(x,2,1,1.2)
mBellL(x, 0.2,0.1,1.2, method="B")
```

The Bell Weibull distribution

The Bell Weibull distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the Bell Weibull distribution.

Usage

```
dBellW(x, alpha, beta, lambda, log = FALSE)
pBellW(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
qBellW(p, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
rBellW(n, alpha, beta, lambda)
sBellW(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
hBellW(x, alpha, beta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mBellW(x, alpha, beta, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the Bell Weibull distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive scale parameter of the baseline Weibull distribution ($\alpha > 0$).
`beta`	The strictly positive shape parameter of the baseline Weibull distribution ($\beta > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the Bell Weibull distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the compounded Bell Weibull distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dBellW gives the (log) probability function. pBellW gives the (log) distribution function. qBellW gives the quantile function. rBellW generates random values. sBellW gives the survival function. hBellW gives the hazard rate function. mBellW gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Fayomi, A., Tahir, M. H., Algarni, A., Imran, M. and Jamal, F. (2022). A new useful exponential model with applications to quality control and actuarial data. Computational Intelligence and Neuroscience.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185.

See Also

pBellE

Examples

```
x<-rBellW(20,2,1,0.7)
dBellW(x,2,1,1)
pBellW(x,2,1,1)
qBellW(0.7,2,1,1)
sBellW(x,2,1,1.2)
hBellW(x,2,1,1.2)
mBellW(x, 0.2,0.1,1.2, method="B")
```

The complementary Bell Burr-12 distribution

The complementary Bell Burr-12 distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell Burr-12 distribution.

Usage

```
dCBellB(x, a, b, k, lambda, log = FALSE)
pCBellB(x, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellB(p, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellB(n, a, b, k, lambda)
sCBellB(x, a, b, k, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellB(x, a, b, k, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellB(x, a, b, k, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the complementary Bell Burr-12 distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
a	The strictly positive scale parameter of the baseline Burr-12 distribution ($a > 0$).
b	The strictly positive shape parameter of the baseline Burr-12 distribution ($b > 0$).

`k`	The strictly positive shape parameter of the baseline Burr-12 distribution ($k > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell Burr-12 distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell Burr-12 distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellB gives the (log) probability function. pCBellB gives the (log) distribution function. qCBellB gives the quantile function. rCBellB generates random values. sCBellB gives the survival function. hCBellB gives the hazard rate function. mCBellB gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Zimmer, W. J., Keats, J. B. and Wang, F. K. (1998). The Burr XII distribution in reliability analysis. Journal of Quality Technology, 30(4), 386-394.

Castellares, F., Ferrari, S. L. and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185.

See Also

`pBellBX`

Examples

```
x<-rCBellB(20,2,1,0.7,1)
dCBellB(x,2,1,1,0.2)
pCBellB(x,2,1,1,0.2,1)
qCBellB(0.7,2,1,1,0.2,1)
sCBellB(x,2,1,1,0.2,1)
hCBellB(x,2,1,1,0.2,1)
mCBellB(x, 0.2,0.1,1.2,0.2,method="B")
```

The complementary Bell Burr-X distribution

The complementary Bell Burr-X distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell Burr-X distribution.

Usage

```
dCBellBX(x, a, lambda, log = FALSE)
pCBellBX(x, a, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellBX(p, a, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellBX(n, a, lambda)
sCBellBX(x, a, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellBX(x, a, lambda, log = FALSE, log.p = FALSE, lower.tail = TRUE)
mCBellBX(x, a, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the complementary Bell Burr-X distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`a`	The strictly positive shape parameter of the baseline Burr-X distribution ($a > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell Burr-X distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell Burr-X distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellBX gives the (log) probability function. pCBellBX gives the (log) distribution function. qCBellBX gives the quantile function. rCBellBX generates random values. sCBellBX gives the survival function. hCBellBX gives the hazard rate function. mCBellBX gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Zimmer, W. J., Keats, J. B. and Wang, F. K. (1998). The Burr XII distribution in reliability analysis. Journal of Quality Technology, 30(4), 386-394.

Castellares, F., Ferrari, S. L. and Lemonte, A. J. (2018). On the bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185.

See Also

`pBellB`

Examples

```
x<-rCBellBX(20,0.2,1)
dCBellBX(x,2,1)
pCBellBX(x,2,1)
qCBellBX(0.7,2,1)
sCBellBX(x,2,1)
hCBellBX(x,2,1)
mCBellBX(x, 0.2,0.1, method="B")
```

The complementary Bell exponential distribution
The complementary Bell exponential distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell exponential distribution.

Usage

```
dCBellE(x, alpha, lambda, log = FALSE)
pCBellE(x, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellE(p, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellE(n, alpha, lambda)
sCBellE(x, alpha, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellE(x, alpha, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellE(x, alpha,lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the complementary Bell exponential distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
alpha	The strictly positive parameter of the baseline exponential distribution ($\alpha > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p).
log.p	if TRUE, probabilities p are given for exp(p).
method	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell exponential distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell exponential distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellE gives the (log) probability function. pCBellE gives the (log) distribution function. qCBellE gives the quantile function. rCBellE generates random values. sCBellE gives the survival function. hCBellE gives the hazard rate function. mCBellE gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56:172-185.

See Also

pCBellEE

Examples

```
x<-rCBellE(20,2,1)
dCBellE(x,2,1)
pCBellE(x,2,1)
qCBellE(0.7,2,1)
sCBellE(x,2,1)
hCBellE(x,2,1)
mCBellE(x, 0.2,0.1, method="B")
```

The complementary Bell exponentiated Weibull distribution
The complementary Bell exponentiated Weibull distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell exponentiated Weibull distribution.

Usage

```
dCBellEW(x, alpha, beta, theta, lambda, log = FALSE)
pCBellEW(x, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellEW(p, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellEW(n, alpha, beta, theta, lambda)
sCBellEW(x, alpha, beta, theta, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellEW(x, alpha, beta, theta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellEW(x, alpha, beta, theta, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the complementary Bell exponentiated Weibull distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
alpha	The strictly positive scale parameter of the baseline exponentiated Weibull distribution ($\alpha > 0$).
beta	The strictly positive shape parameter of the baseline exponentiated Weibull distribution ($\beta > 0$).
theta	The strictly positive shape parameter of the baseline exponentiated Weibull distribution ($\theta > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p).
log.p	if TRUE, probabilities p are given for exp(p).
method	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell exponentiated Weibull distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell exponentiated Weibull distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellEW gives the (log) probability function. pCBellEW gives the (log) distribution function. qCBellEW gives the quantile function. rCBellEW generates random values. sCBellEW gives the survival function. hCBellEW gives the hazard rate function. mCBellEW gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Nadarajah, S., Cordeiro, G. M. and Ortega, E. M. (2013). The exponentiated Weibull distribution: a survey. Statistical Papers, 54, 839-877.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56, 172-185.

See Also

pBellW

Examples

```
x<-rCBellEW(20,2,1,0.2,2.2)
dCBellEW(x,2,1,0.5,0.2)
pCBellEW(x,2,1,0.5,0.2)
qCBellEW(0.7,2,1,0.5,0.1)
sCBellEW(x,2,1,0.5,0.2)
hCBellEW(x,2,1,0.5,0.5)
mCBellEW(x, 0.2,0.1,0.8,0.5, method="B")
```

The complementary Bell extended exponential distribution

The complementary Bell extended exponential distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell extended exponential distribution.

Usage

```
dCBellEE(x, alpha, beta, lambda, log = FALSE)
pCBellEE(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellEE(p, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellEE(n, alpha, beta, lambda)
sCBellEE(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellEE(x, alpha, beta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellEE(x, alpha, beta, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the complementary Bell extended exponential distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive scale parameter of the baseline extended exponential distribution ($\alpha > 0$).
`beta`	The strictly positive shape parameter of the baseline extended exponential distribution ($\beta > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell extended exponential distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell extended exponential distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellEE gives the (log) probability function. pCBellEE gives the (log) distribution function. qCBellEE gives the quantile function. rCBellEE generates random values. sCBellEE gives the survival function. hCBellEE gives the hazard rate function. mCBellEE gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Nadarajah, S. (2011). The exponentiated exponential distribution: a survey. AStA Advances in Statistical Analysis, 95, 219-251.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56, 172-185.

See Also

pCBellE

Examples

```
x<-rCBellEE(20,2,1,0.2)
dCBellEE(x,2,1,0.5)
pCBellEE(x,2,1,0.5)
qCBellEE(0.7,2,1,0.5)
sCBellEE(x,2,1,0.5)
hCBellEE(x,2,1,0.5)
mCBellEE(x, 0.2,0.1,0.8, method="B")
```

The complementary Bell Fisk distribution

The complementary Bell Fisk distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell Fisk distribution.

Usage

```
dCBellF(x, a, b, lambda, log = FALSE)
pCBellF(x, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellF(p, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellF(n, a, b, lambda)
sCBellF(x, a, b, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellF(x, a, b, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellF(x, a, b, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the complementary Bell Fisk distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
a	The strictly positive scale parameter of the baseline Fisk distribution ($a > 0$).

b	The strictly positive shape parameter of the baseline Fisk distribution ($b > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p).
log.p	if TRUE, probabilities p are given for exp(p).
method	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell Fisk distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell Fisk distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellF gives the (log) probability function. pCBellF gives the (log) distribution function. qCBellF gives the quantile function. rCBellF generates random values. sCBellF gives the survival function. hCBellF gives the hazard rate function. mCBellF gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Kleiber, C. and Kotz, S. (2003). Statistical size distributions in economics and actuarial sciences. John Wiley & Sons.

Castellares, F., Ferrari, S. L., and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56, 172- 185.

See Also

pBellL

Examples

```
x<-rCBellF(20,2,1,0.2)
dCBellF(x,2,1,0.5)
pCBellF(x,2,1,0.5)
qCBellF(0.7,2,1,0.5)
sCBellF(x,2,1,0.5)
hCBellF(x,2,1,0.5)
mCBellF(x, 0.2,0.1,0.8, method="B")
```

The complementary Bell Lomax distribution
The complementary Bell Lomax distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell Lomax distribution.

Usage

```
dCBellL(x, b, q, lambda, log = FALSE)
pCBellL(x, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellL(p, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellL(n, b, q, lambda)
sCBellL(x, b, q, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellL(x, b, q, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellL(x, b, q, lambda, method="B")
```

Arguments

x	A vector of (non-negative integer) quantiles.
p	A vector of probablities.
n	The number of random values to be generated under the complementary Bell Lomax distribution.
lambda	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
b	The strictly positive parameter of the baseline Lomax distribution ($b > 0$).
q	The strictly positive shapes parameter of the baseline Lomax distribution ($q > 0$).
lower.tail	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
log	if TRUE, probabilities p are given as log(p)
log.p	if TRUE, probabilities p are given for exp(p)
method	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell Lomax distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell Lomax distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellL gives the (log) probability function. pCBellL gives the (log) distribution function. qCBellL gives the quantile function. rCBellL generates random values. sCBellL gives the survival function. hCBellL gives the hazard rate function. mCBellL gives the maximum likelihood estimates and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran <imranshakoor84@yahoo.com> and Michail Tsagris <mtsagris@uoc.gr>.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Kleiber, C. and Kotz, S. (2003). Statistical size distributions in economics and actuarial sciences. John Wiley & Sons.

Castellares, F., Ferrari, S. L. and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56, 172-185.

See Also

pCBellF

Examples

```
x<-rCBellL(20,2,1,1.2)
dCBellL(x,2,1,0.5)
pCBellL(x,2,1,0.5)
qCBellL(0.7,2,1,0.5)
sCBellL(x,2,1,0.5)
hCBellL(x,2,1,0.5)
mCBellL(x, 0.2,0.1,0.8, method="B")
```

The complementary Bell Weibull distribution
The complementary Bell Weibull distribution

Description

Density, probability, quantile function, random generation, survival function, hazard rate function and maximum likelihood estimates from the complementary Bell Weibull distribution.

Usage

```
dCBellW(x, alpha, beta, lambda, log = FALSE)
pCBellW(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
qCBellW(p, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
rCBellW(n, alpha, beta, lambda)
sCBellW(x, alpha, beta, lambda, log.p = FALSE, lower.tail = TRUE)
hCBellW(x, alpha, beta, lambda, log = FALSE,log.p = FALSE, lower.tail = TRUE)
mCBellW(x, alpha, beta, lambda, method="B")
```

Arguments

`x`	A vector of (non-negative integer) quantiles.
`p`	A vector of probablities.
`n`	The number of random values to be generated under the complementary Bell Weibull distribution.
`lambda`	The strictly positive parameter of the Bell distribution ($\lambda > 0$).
`alpha`	The strictly positive scale parameter of the baseline Weibull distribution ($\alpha > 0$).
`beta`	The strictly positive shape parameter of the baseline Weibull distribution ($\beta > 0$).
`lower.tail`	if FALSE then 1-F(x) are returned and quantiles are computed 1-p.
`log`	if TRUE, probabilities p are given as log(p).
`log.p`	if TRUE, probabilities p are given for exp(p).
`method`	the procedure for optimizing the log-likelihood function after setting the intial values of the parameters and data values for which the complementary Bell Weibull distribution is fitted. It could be "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", or "SANN". "BFGS" is set as the default.

Details

The functions allow fitting the complementary Bell Weibull distribution and evaluating the probability density function, cumulative distribution function, quantile function, random numbers, survival function, hazard rate function, and maximum likelihood estimates (MLEs) of the unknown parameters with standard error (SE) of the estimates. It also provides the goodness-of-fit measures such as the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), the minimum value of the negative log-likelihood function, Anderson-Darling (A) test, Cramer-Von-Mises (W) test, Kolmogorov-Smirnov test, P-value and convergence status.

Value

dCBellW gives the (log) probability function. pCBellW gives the (log) distribution function. qC-BellW gives the quantile function. rCBellW generates random values. sCBellW gives the survival function. hCBellW gives the hazard rate function. mCBellW gives the estimated parameters along with SE and goodness-of-fit measures.

Author(s)

Muhammad Imran and Michail Tsagris.

R implementation and documentation: Muhammad Imran `<imranshakoor84@yahoo.com>` and Michail Tsagris `<mtsagris@uoc.gr>`.

References

Algarni, A. (2022). Group Acceptance Sampling Plan Based on New Compounded Three-Parameter Weibull Model. Axioms, 11(9): 438.

Castellares, F., Ferrari, S. L. and Lemonte, A. J. (2018). On the Bell distribution and its associated regression model for count data. Applied Mathematical Modelling, 56: 172-185.

See Also

`pCBellEW`

Examples

```
x<-rCBellW(20,2,1,0.2)
dCBellW(x,2,1,0.5)
pCBellW(x,2,1,0.5)
qCBellW(0.7,2,1,0.5)
sCBellW(x,2,1,0.5)
hCBellW(x,2,1,0.5)
mCBellW(x, 0.2,0.1,0.8, method="B")
```

Index