# Package ‘NewDists’

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**Type** Package

**Title** The GOGaG and EEG family of distributions.

**Version** 0.1.0

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**Depends** R (>= 3.1.2), rjags, manipulate

**Description** This package performs computations for GOGaG and EEG family of distributions.



**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 6.1.1

**Suggests** knitr, rmarkdown

**VignetteBuilder** knitr

## R topics documented:

demo_JAGS_GOGaU *Demo of the JAGS GOGaU Module*

## Description

This function provide a demo of the calculation of the Bayesian estimator using the GOGaU distribution module in the **JAGS** software. Here, 300 observations will generate from GOGaU(5, 0.28, 0, 10) and the Bayesian estimators are calculated by Gibbs sampling in **JAGS** software.

## Usage

```
demo_JAGS_GOGaU()
```

## Arguments

This function has no parameter.

## Value

This function has no return value. The histogram of simulated data, The fitted GOGaU density of Bayesian estimators, and GOGaU(5, 0.28, 0, 10) density is drawn.

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Bistoon Hosseini, Mahmoud Afshari, and Morad Alizadeh. "The Generalized Odd Gamma-G Family of Distributions: Properties and Applications." Austrian Journal of Statistics 47.2 (2018): 69-89.

## Examples

```
demo_JAGS_GOGaU()
```

EEN *Extended Exp-Normal Distribution*

## Description

These functions provide information about the Extended Exp-Normal distribution. dEEN gives the density, pEEN gives the distribution function, qEEN gives the quantile function, rEEN generates random deviates, mEEN gives the mean function, vEEN gives the varince function, sEEN gives the skewness function, kEEN gives the kurtosis function, and entEEN gives the Rrnyi or Shannon entropy function due to Alizadeh et al. (2018) specified by the pdf

$$f(x;\alpha,\beta,\mu,\sigma) = \frac{\phi\left(\frac{x-\mu}{\sigma}\right)\Phi\left(\frac{x-\mu}{\sigma}\right)^{\alpha-1}\left[\alpha + (\beta-\alpha)\,\Phi\left(\frac{x-\mu}{\sigma}\right)^{\beta}\right]}{\left[\Phi\left(\frac{x-\mu}{\sigma}\right)^{\alpha} + 1 - \Phi\left(\frac{x-\mu}{\sigma}\right)^{\beta}\right]^{2}},$$

where $\alpha, \beta, \sigma > 0$.

### Usage

```
dEEN(x, alpha, beta, mu = 0, sigma = 1, log = FALSE)
pEEN(x, alpha, beta, mu = 0, sigma = 1)
qEEN(p, alpha, beta, mu = 0, sigma = 1)
rEEN(n, alpha, beta, mu = 0, sigma = 1)
mEEN(alpha, beta, mu = 0, sigma = 1)
vEEN(alpha, beta, mu = 0, sigma = 1)
sEEN(alpha, beta, mu = 0, sigma = 1)
kEEN(alpha, beta, mu = 0, sigma = 1)
entEEN(gamma, alpha, beta, mu = 0, sigma = 1, explain = FALSE)
```

### Arguments

| | |
|---|---|
| x | Scaler or vector of values at which the pdf or cdf needs to be computed |
| p | Scaler or vector of probabilities at which the quantile needs to be computed |
| n | Number of random numbers to be generated |
| alpha | The value of the first shape parameter. Must be positive and finite. |
| beta | The value of the second shape parameter. Must be positive and finite. |
| mu | Value of mean. Must be finite. |
| sigma | Value of standard deviations. Must be positive and finite. |
| log | Logical; if TRUE, probabilities p are given as log(p). |
| gamma | The gamma in Rrnyi entropy. if gamma = 1, the Shannon entropy is returned. |
| explain | Logical; if TRUE, explain Rrnyi or Shannon entropy is returned. |

### Value

An object of the same length as x, giving the pdf or cdf values computed at x or an object of the same length as p, giving the quantile values computed at p or an object of the same length as n, giving the random numbers generated or an object of the same length as gamma, giving the entropy (Rrnyi or Shannon) or an object giving the values of mean, varince, skewness, or kurtosis.

### Author(s)

Bistoon Hosseini, Mahmoud Afshari

### References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

### Examples

```
x = runif(10, min= -1 , max = 1)
dEEN(x, alpha = 0.5, beta = 1.2, mu = -2, sigma = 0.2, log = FALSE)
pEEN(x, alpha = 0.5, beta = 1.2, mu = 1, sigma = 1.1)
qEEN(x, alpha = 0.5, beta = 1.2, mu = .5, sigma = 11)
rEEN(n = 10, alpha = 0.5, beta = 1.2, mu = 0, sigma = 1)
mEEN(alpha = 0.5, beta = 1.2, mu = 10, sigma = .1)
vEEN(alpha = 0.5, beta = 1.2, mu = 2, sigma = 3)
sEEN(alpha = 0.5, beta = 1.2, mu = 1, sigma = 1)
```

```
kEEN(alpha = 0.5, beta = 1.2, mu = 0, sigma = 2)
entEEN(gamma = c(.5, 1, 1.5), alpha = 0.5, beta = 1.2, mu = 0, sigma = 1, explain = TRUE)
```

---

GOGaU *Generalized Odd Gamma Uniform Distribution*

---

## Description

These functions provide information about the Generalized Odd Gamma Uniform distribution. dGOGaU gives the density, pGOGaU gives the distribution function, qGOGaU gives the quantile function, rGOGaU generates random deviates, mGOGaU gives the mean function, vGOGaU gives the varince function, sGOGaU gives the skewness function, kGOGaU gives the kurtosis function, and entGOGaU gives the Rrnyi or Shannon entropy function due to Hosseini et al. (2018) specified by the pdf

$$f(x;\alpha,\beta,a,b) = \frac{\beta(b-a)^{\beta}(x-a)^{\alpha\beta-1}}{\Gamma(\alpha)\left[(b-a)^{\beta}-(x-a)^{\beta}\right]^{\alpha+1}} e^{\frac{-(x-a)^{\beta}}{(b-a)^{\beta}-(x-a)^{\beta}}}, a \le x \le b\,.$$

where $\alpha, \beta > 0$ and $a < b$.

## Usage

```
dGOGaU(x, alpha, beta, a = 0, b = 1, log = FALSE)
pGOGaU(x, alpha, beta, a = 0, b = 1)
qGOGaU(p, alpha, beta, a = 0, b = 1)
rGOGaU(n, alpha, beta, a = 0, b = 1)
mGOGaU(alpha, beta, a = 0, b = 1)
vGOGaU(alpha, beta, a = 0, b = 1)
sGOGaU(alpha, beta, a = 0, b = 1)
kGOGaU(alpha, beta, a = 0, b = 1)
entGOGaU(gamma, alpha, beta, a = 0, b = 1, explain = FALSE)
```

## Arguments

| | |
|---|---|
| x | Scaler or vector of values at which the pdf or cdf needs to be computed |
| p | Scaler or vector of probabilities at which the quantile needs to be computed |
| n | Number of random numbers to be generated |
| alpha | The value of the first shape parameter. Must be finite. |
| beta | The value of the second shape parameter. Must be finite. |
| a, b | Lower and upper limits of the distribution. Must be finite. |
| log | Logical; if TRUE, probabilities p are given as log(p). |
| gamma | The gamma in Rrnyi entropy. if gamma = 1, the Shannon entropy is returned. |
| explain | Logical; if TRUE, explain Rrnyi or Shannon entropy is returned. |

## Value

An object of the same length as x, giving the pdf or cdf values computed at x or an object of the same length as p, giving the quantile values computed at p or an object of the same length as n, giving the random numbers generated or an object of the same length as gamma, giving the entropy (Rrnyi or Shannon) or an object giving the values of mean, varince, skewness, or kurtosis.

### Author(s)

Bistoon Hosseini, Mahmoud Afshari

### References

Hosseini, Bistoon, Mahmoud Afshari, and Morad Alizadeh. "The Generalized Odd Gamma-G Family of Distributions: Properties and Applications." Austrian Journal of Statistics 47.2 (2018): 69-89.

### Examples

```
x=runif(10,min=0,max=1)
dGOGaU(x, alpha = 0.5, beta = 1.2, a = 0, b = 1, log = FALSE)
pGOGaU(x, alpha = 0.5, beta = 1.2, a = 0, b = 1)
qGOGaU(x, alpha = 0.5, beta = 1.2, a = 0, b = 1)
rGOGaU(n = 10, alpha = 0.5, beta = 1.2, a = 0, b = 1)
mGOGaU(alpha = 0.5, beta = 1.2, a = 0, b = 1)
vGOGaU(alpha = 0.5, beta = 1.2, a = 0, b = 1)
sGOGaU(alpha = 0.5, beta = 1.2, a = 0, b = 1)
kGOGaU(alpha = 0.5, beta = 1.2, a = 0, b = 1)
entGOGaU(gamma = c(.5, 1, 1.5), alpha = 0.5, beta = 1.2, a = 0, b = 1, explain = TRUE)
```

---

`LEEW` *Log-Extended Exp-Weibull Distribution*

---

### Description

These functions provide density and distribution function of the Log-Extended Exp-Weibull distribution due to Alizadeh et al. (2018) specified by the pdf

$$f(y;\alpha,\beta,\mu,\sigma)=\frac{\exp\left(\frac{y-\mu}{\sigma}-\mathrm{e}^{\frac{y-\mu}{\sigma}}\right)\left[1-\exp\left(-\mathrm{e}^{\frac{y-\mu}{\sigma}}\right)\right]^{\alpha-1}\left\{\alpha+(\beta-\alpha)\left[1-\exp\left(-\mathrm{e}^{\frac{y-\mu}{\sigma}}\right)\right]^{\beta}\right\}}{\sigma\left\{\left[1-\exp\left(-\mathrm{e}^{\frac{y-\mu}{\sigma}}\right)\right]^{\alpha}+1-\left[1-\exp\left(-\mathrm{e}^{\frac{y-\mu}{\sigma}}\right)\right]^{\beta}\right\}^{2}},$$

where $\alpha,\beta,\sigma>0$.

### Usage

```
dLEEW(x, alpha, beta, mu = 0, sigma = 1, log = FALSE)
pLEEW(x, alpha, beta, mu = 0, sigma = 1, log = FALSE)
```

### Arguments

| | |
|---|---|
| `x` | Scaler or vector of values at which the pdf or cdf needs to be computed |
| `alpha` | The value of the first shape parameter. Must be positive and finite. |
| `beta` | The value of the second shape parameter. Must be positive and finite. |
| `mu` | Value of mean. Must be finite. |
| `sigma` | Value of standard deviations. Must be positive and finite. |
| `log` | Logical; if TRUE, probabilities p are given as log(p). |

## Value

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

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

## Examples

```
x = sort(rnorm(10, mean = -2 , sd = 1))
dLEEW(x, alpha = 0.5, beta = 1.2, mu = -2, sigma = 0.2, log = FALSE)
dLEEW(x, alpha = 0.5, beta = 1.2, mu = -2, sigma = 0.2, log = TRUE)
pLEEW(x, alpha = 0.5, beta = 1.2, mu = -2, sigma = 0.2)
```

---

# mleEEN *The MLEs of EEN*

---

## Description

This function calculates the MLEs of EEN distribution.

## Usage

```
mleEEN(x, par0 = c(1, 1, mean(x), sd(x)), fitplot = TRUE)
```

## Arguments

| | |
|---|---|
| x | The value of the first shape parameter. Must be finite. |
| par0 | Initial values for the parameters to be optimized over. If a/b is equal to **NA**, it is estimated as the unknown parameter. |

## Value

| | |
|---|---|
| par | The MLEs of parameters. |
| loglike | The log-likelihood value corresponding to MLEs. |
| convergence | An integer code. 0 indicates successful completion. To see possible error codes, see the optim function. |
| W | The statistic Cramér-von Misses. |
| A | The statistic Anderson Darling. |
| KS | Kolmogorov Smirnov test. |
| AIC | The value of Akaike Information Criterion. |
| BIC | The value of Bayesian Information Criterion. |

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

## Examples

```
x = rEEN(n = 1000, alpha = 1.5, beta = 1.5, mu = 0, sigma = 1)
mleEEN(x)
```

---

# mleGOGaU *The MLEs of GOGaU*

---

## Description

This function calculates the MLEs of GOGaU distribution.

## Usage

```
mleGOGaU(x, par0 = c(1 , 1, min(x)-1, max(x)+1), a = NA, b = NA, fitplot = TRUE)
```

## Arguments

| | |
|---|---|
| `x` | The value of the first shape parameter. Must be finite. |
| `par0` | Initial values for the parameters to be optimized over. |
| `a, b` | Values for fixed lower or upper limits of the GOGaU distribution. If a/b is equal to **NA**, it is estimated as the unknown parameter. |

## Value

| | |
|---|---|
| `par` | The MLEs of parameters. |
| `loglike` | The log-likelihood value corresponding to MLEs. |
| `convergence` | An integer code. 0 indicates successful completion. To see possible error codes, see the optim function. |
| `W` | The statistic Cramér-von Misses. |
| `A` | The statistic Anderson Darling. |
| `KS` | Kolmogorov Smirnov test. |
| `AIC` | The value of Akaike Information Criterion. |
| `BIC` | The value of Bayesian Information Criterion. |

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

### References

Bistoon Hosseini, Mahmoud Afshari, and Morad Alizadeh. "The Generalized Odd Gamma-G Family of Distributions: Properties and Applications." Austrian Journal of Statistics 47.2 (2018): 69-89.

### Examples

```
x = rGOGaU(n = 1000, alpha = 0.5, beta = 1.5, a = 0, b = 4.5)
mleGOGaU(x = x, a = NA, b = 4.5)
```

---

## mleLEEW *The MLEs of LEEW*

---

### Description

This function calculates the MLEs of LEEW distribution.

### Usage

```
mleLEEW(x, model = "LEEW", fitplot = TRUE)
```

### Arguments

| | |
|---|---|
| x | The value of the first shape parameter. Must be finite. |
| model | "LEEW" (Log-Extended Exp-Weibull) or "LW" (Log-Weibull) model. |
| fitplot | Logical; if TRUE, histogram and fitted LEEW density is drawn. |

### Value

| | |
|---|---|
| par | The MLEs of parameters. |
| loglike | The log-likelihood value corresponding to MLEs. |
| convergence | An integer code. 0 indicates successful completion. To see possible error codes, see the optim function. |
| KS | Kolmogorov Smirnov test. |
| AIC | The value of Akaike Information Criterion. |
| BIC | The value of Bayesian Information Criterion. |

### Author(s)

Bistoon Hosseini, Mahmoud Afshari

### References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

### Examples

```
x = rweibull(n = 200, shape = 1.5, scale = 0.65)
x = log(x)
mleLEEW(x, model = "LW", fitplot = TRUE)
mleLEEW(x, model = "LEEW", fitplot = TRUE)
```

---

`supEEN` *Support of EEN Distribution*

---

## Description

This function provide useful support of EEN distribution for integration.

## Usage

```
supEEN(alpha, beta, mu = 0, sigma = 1)
```

## Arguments

| | |
|---|---|
| `alpha` | The value of the first shape parameter. Must be positive and finite. |
| `beta` | The value of the second shape parameter. Must be positive and finite. |
| `mu` | Value of mean. Must be finite. |
| `sigma` | Value of standard deviations. Must be positive and finite. |

## Value

| | |
|---|---|
| `lower` | The lower of EEN distribution useful support. |
| `upper` | The upper of EEN distribution useful support. |

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

## Examples

```
supEEN(alpha = 0.5, beta = 1.5, mu = 2, sigma = .5)
```

---

`supGOGaU` *Support of GOGaU Distribution*

---

## Description

This function provide useful support of GOGaU distribution for integration.

## Usage

```
supGOGaU(alpha, beta, a = 0, b = 1)
```

### Arguments

| | |
|---|---|
| `alpha` | The value of the first shape parameter. Must be positive and finite. |
| `beta` | The value of the second shape parameter. Must be positive and finite. |
| `a, b` | Lower and upper limits of the distribution. Must be finite. |

### Value

| | |
|---|---|
| `lower` | The lower of GOGaU distribution useful support. |
| `upper` | The upper of GOGaU distribution useful support. |

### Author(s)

Bistoon Hosseini, Mahmoud Afshari

### References

Bistoon Hosseini, Mahmoud Afshari, and Morad Alizadeh. "The Generalized Odd Gamma-G Family of Distributions: Properties and Applications." Austrian Journal of Statistics 47.2 (2018): 69-89.

### Examples

```
supGOGaU(alpha = 0.5, beta = 1.5, a = 1, b = 4.5)
```

---

## `viewEEG` *Draw up Manipulative Plot of EEG family*

---

### Description

This function provide manipulative plot of the Extended Exp-G family (Normal and Weibull) distribution. With the help of sliders, you can draw different plot of density and hazard function. You need the **manipulate** package and run function in **RStudio** because the **manipulate** package must be run from within **RStudio**.

### Usage

```
viewEEG()
```

### Arguments

This function has no parameter.

### Value

This function has no return value.

### Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

## Examples

```
viewEEG()
```

---

`viewGOGaG` *Draw up Manipulative Plot of GOGaG family*

---

## Description

This function provide manipulative plot of the Generalized Odd Gamma Uniform/Weibull distribution. With the help of sliders, you can draw different plot of density and hazard function. You need the **manipulate** package and run function in **RStudio** because the **manipulate** package must be run from within **RStudio**.

## Usage

```
viewGOGaG()
```

## Arguments

This function has no parameter.

## Value

This function has no return value.

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Bistoon Hosseini, Mahmoud Afshari, and Morad Alizadeh. "The Generalized Odd Gamma-G Family of Distributions: Properties and Applications." Austrian Journal of Statistics 47.2 (2018): 69-89.

## Examples

```
viewGOGaG()
```

`viewLEEW` *Draw up Manipulative Plot of LEEW family*

## Description

This function provide manipulative plot of the Log-Extended Exp-Weibull distribution. With the help of sliders, you can draw different plot of density and hazard function. You need the **manipulate** package and run function in **RStudio** because the **manipulate** package must be run from within **RStudio**.

## Usage

```
viewLEEW()
```

## Arguments

This function has no parameter.

## Value

This function has no return value.

## Author(s)

Bistoon Hosseini, Mahmoud Afshari

## References

Alizadeh, Morad, Mahmoud Afshari, Bistoon Hosseini, and Thiago G. Ramires. "Extended exp-G family of distributions: Properties, applications and simulation." Communications in Statistics-Simulation and Computation (2018): 1-16.

## Examples

```
viewLEEW()
```

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