

Package ‘ExGaussEstim’

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Title Quantile Maximization Likelihood Estimation and Bayesian
Ex-Gaussian Estimation

Version 0.1

Description Presents two methods to estimate the parameters 'mu', 'sigma', and 'tau' of an ex-Gaussian distribution. Those methods are Quantile Maximization Likelihood Estimation ('QMLE') and Bayesian. The 'QMLE' method allows a choice between three different estimation algorithms for these parameters : 'neldermead' ('NEMD'), 'fmin-search' ('FMIN'), and 'nlminb' ('NLMI'). For more details about the methods you can refer at the following list: Brown, S., & Heathcote, A. (2003) <[doi:10.3758/BF03195527](https://doi.org/10.3758/BF03195527)>; McCormack, P. D., & Wright, N. M. (1964) <[doi:10.1037/h0083285](https://doi.org/10.1037/h0083285)>; Van Zandt, T. (2000) <[doi:10.3758/BF03214357](https://doi.org/10.3758/BF03214357)>; El Haj, Aret, C. (2021) <[doi:10.19139/soic-2310-5070-1251](https://doi.org/10.19139/soic-2310-5070-1251)>; Gilks, W. R., Best, N. G., & Tan, K. K. C. (1995) <[doi:10.2307/2986138](https://doi.org/10.2307/2986138)>.

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LazyLoad true

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Imports pracma, stats, nloptr, invgamma, HI, fitdistrplus, gamlss.dist

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Author Yousri SLAOUI [aut, cre] (<<https://orcid.org/0000-0001-5295-3311>>),
Abir EL HAJ [aut, ctb] (<<https://orcid.org/0000-0003-3210-9097>>),
Caroline BORDES [aut, ctb],
Cyril PERRET [aut] (<<https://orcid.org/0000-0002-4552-9093>>)

Maintainer Yousri SLAOUI <Yousri.Slaoui@math.univ-poitiers.fr>

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BayesianExgaussian *Bayesian Ex-gaussian Estimate*

Description

Estimates the mu, sigma, and tau parameters of an ex-Gaussian distribution using a bayesian method.

Usage

```
BayesianExgaussian(n, x, nSamples = 5000, Ti = 2500)
```

Arguments

n	the data size
x	the data. Must be a vector, with no missing values
nSamples	number of Samples
Ti	burn-in

Value

BayesianExgaussian() returns an object "theta" which is a list with components: estimates of mu, sigma, and tau

References

- Brown, S., & Heathcote, A. (2003). QMLE: Fast, robust, and efficient estimation of distribution functions based on quantiles. *Behavior Research Methods, Instruments, & Computers*, **35**, 485-492.
- McCormack, P. D., & Wright, N. M. (1964). The positive skew observed in reaction time distributions. *Canadian Journal of Psychology/Revue canadienne de psychologie*, **18**, 43-51.
- Van Zandt, T. (2000). How to fit a response time distribution. *Psychonomic Bulletin & Review*, **7**, 424-465.
- El Haj, A., Slaoui, Y., Solier, C., & Perret, C. (2021). Bayesian Estimation of The Ex-Gaussian distribution. *Statistics, Optimization & Information Computing*, **9**(4), 809-819.
- Gilks, W. R., Best, N. G., & Tan, K. K. C. (1995). Adaptive rejection Metropolis sampling within Gibbs sampling. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, **44**, 455-472.

Examples

```
library(gamlss.dist)
set.seed(2703)
data<-rexGAUS(n=100, mu = 500, sigma = 150, nu = 100)
BayesianExgaussian(n = 100, x = data)
```

`QMLEEstim`*Ex-Gaussian Quantile Maximum Likelihood Estimate*

Description

Estimates the mu, sigma, and tau parameters of an ex-Gaussian distribution. 3 different algorithms can be used : neldermead ('NEMD'), fminsearch ('FMIN') and nlminb ('NLMI').

Usage

```
QMLEEstim(y, func)
```

Arguments

<code>y</code>	the data. Must be a vector with no missing values
<code>func</code>	the function selected for the estimation. 'NEMD' for neldermead, 'FMIN' for fminsearch, and 'NLMI' for nlminb.

Value

`QMLEEstim()` returns an object "valEstim" which is a list with components: estimates of mu, sigma, and tau

References

- Brown, S., & Heathcote, A. (2003). QMLE: Fast, robust, and efficient estimation of distribution functions based on quantiles. *Behavior Research Methods, Instruments, & Computers*, **35**, 485-492.
- McCormack, P. D., & Wright, N. M. (1964). The positive skew observed in reaction time distributions. *Canadian Journal of Psychology/Revue canadienne de psychologie*, **18**, 43-51.
- Van Zandt, T. (2000). How to fit a response time distribution. *Psychonomic Bulletin & Review*, **7**, 424-465.
- El Haj, A., Slaoui, Y., Solier, C., & Perret, C. (2021). Bayesian Estimation of The Ex-Gaussian distribution. *Statistics, Optimization & Information Computing*, **9**(4), 809-819.
- Gilks, W. R., Best, N. G., & Tan, K. K. C. (1995). Adaptive rejection Metropolis sampling within Gibbs sampling. *Journal of the Royal Statistical Society: Series C (Applied Statistics)*, **44**, 455-472.

Examples

```
library(gamlss.dist)
set.seed(2703)
data<-rexGAUS(n=100, mu = 500, sigma = 150, nu = 100)
QMLEEstim(data, 'NEMD')
```

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