

Package ‘llbayesireg’

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Title The L-Logistic Bayesian Regression

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llbayesireg-package *The L-Logistic Bayesian Regression*

Description

Bayesian L-Logistic regression package, <URL:<https://www.imstat.org/wp-content/uploads/2018/05/BJPS397.pdf>>.

Details

Package to estimate an L-Logistic regression model with median and precision regression structures, diagnostics and HPD.

Package:	llbayesireg
Type:	Package
Version:	0.1.0
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LazyLoad:	yes

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Source

The L-Logistic distribution was introduced by Tadikamalla and Johnson (1982), which refer to this distribution as Logit-Logistic distribution. Here, we have a new parameterization of the Logit-Logistic with the median as a parameter.

References

Paz, R.F., Balakrishnan, N and Bazán, J.L. (2018). L-Logistic Distribution: Properties, Inference and an Application to Study Poverty and Inequality in Brazil.

EDI

Education Development Index

Description

EDI data set is the Education Development Index (EDI), Elementary School and High School of the municipalities of Sergipe state of Brazil.

Usage

```
data("EDI")
```

Format

A data frame containing 75 observations on 2 variables.

EDIES The format is: num [1:75] 3.6 3.6 3.8 3.1 3.5 3.7 3.8 3 3.2 0 ...

EDIHS The format is: num [1:75] 3.8 2.9 3 2.8 2.8 1.9 3 2.2 2.6 3.6 ...

Details

The quality of education is attributed by a statistical value to educational indicators. This value is assigned by the context economic and social development to which the schools are inserted, not only by the students' performances. The systems educational use mainly of them for the monitoring of educational quality.

References

Fundação Lemann e Meritt (2012): portal QEdu.org.br, acessado em 10/01/2019.

Examples

```
data(EDI)
## maybe str(EDI) ; plot(EDI) ...
```

llbayesireg

The L-Logistic Bayesian Regression

Description

Function to estimate a L-Logistic regression model with median and precision regression structures.

Usage

```
llbayesireg(y,X,W,niter=1000,chains=1,burn=floor(niter/2),jump=1)
```

Arguments

y	Object of class vector, with the response.
X	Object of class matrix, with the variables for modelling the meadian. The default is NULL.
W	Object of class matrix, with the variables for modelling the precision. The default is NULL.
niter	A positive integer specifying the number of iterations for each chain. The default is 1000.

chains	A positive integer specifying the number of Markov chains. The default is 1.
burn	A positive integer specifying the period sampling (known as the burn-in). The default is niter/2.
jump	A positive integer specifying the period for saving samples. The default is 1.

Details

See <https://cran.r-project.org/web/packages/llogistic/llogistic.pdf>.

Value

Object of the class matrix, if the user does not provide arguments X and W, with:

object	Object of "fitll".
betas	Object of class matrix with the samples of regression coefficient related to median.
deltas	Object of class matrix with the samples of regression coefficient related to precision parameter.
sample.m	Object of class matrix with the samples of median.
sample.phi	Object of class matrix with the samples of precision parameter.

Object of the class matrix, if the user provide arguments X and W, with:

object	Object of "fitll".
betas	Object of class matrix with the samples of regression coefficient related to median.
deltas	Object of class matrix with the samples of regression coefficient related to precision parameter.
sample.m	Object of class matrix with the samples of median.
sample.phi	Object of class matrix with the samples of precision parameter.
pred	Object of class matrix with predice vaules.
q	The number of columns of X.
d	The number of columns of W.

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The L-Logistic distribution was introduced by Tadikamalla and Johnson (1982), which refer to this distribution as Logit-Logistic distribution. Here, we have a new parameterization of the Logit-Logistic with the median as a parameter.

References

Paz, R.F., Balakrishnan, N and Bazán, J.L. (2018). L-Logistic Distribution: Properties, Inference and an Application to Study Poverty and Inequality in Brazil.

Examples

```
# Modelation the coeficient with generated data

library(llbayesireg)
library(llogistic)

# Number of elements to be generated

n=50

# Generated response

bin=2005
set.seed(bin)
y=rllogistic(n,0.5, 2)

fitll = llbayesireg(y, niter=100, jump=10)

m.hat=mean(fitll$sample.m); m.hat
phi.hat=mean(fitll$sample.phi); phi.hat

# Modelation the coeficient with real data
library(llbayesireg)

data("Votes", "MHDI")

y = Votes[,4]
X = MHDI

fitll = llbayesireg(y,X)

summary(fitll$object, pars = c("beta","delta"), probs = c(0.025,0.975))

plot(fitll$betas[,1,1], type = "l")
```

lldiagnostics

Diagnostics from a fitll object

Description

Prints diagnostics or extract those diagnostics from a fitll object.

Usage

```
lldiagnostics(object)
```

Arguments

object Object of "fitll".

Details

The function calls the `check_*` functions and the `get_*` functions are for access to the diagnostics. If the matrix `X` and `W` are missing, the coda package is used by test the convergence of the chains by Cramer-von-Mises statistic and an image of the correlation is show for both of generated chains.

Value

`lldiagnostics(object)` prints diagnostics or extract those diagnostics from a `fitll` object.

Author(s)

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Source

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References

Paz, R.F., Balakrishnan, N and Bazán, J.L. (2018). L-Logistic Distribution: Properties, Inference and an Application to Study Poverty and Inequality in Brazil. The Stan Development Team Stan Modeling Language User's Guide and Reference Manual. <http://mc-stan.org/>. Plummer, M., Best, N., Cowles, K., and Vines, K. (2006). Coda: Convergence diagnosis and output analysis for mcmc. R News, 6(1):7-11.

Examples

```
# Modelation the coeficient with generated data

library(llbayesireg)
library(llogistic)

# Number of elements to be generated

n=50

# Generated response

bin=2005
set.seed(bin)
```

```

y=rll logistic(n,0.5, 2)

fitll = llbayesireg(y, niter=100, jump=10)

lldiagnostics(fitll$object)

# Modelation the coeficient with real data
library(llbayesireg)

data("Votes", "MHDI")

y = Votes[,4]
X = MHDI

fitll = llbayesireg(y,X)

lldiagnostics(fitll$object)

```

llHPD

Highest Posterior Density for the L-Logistic Bayesian Regression

Description

Compute the highest posterior density for the L-Logistic Bayesian Regression intervals of betas and deltas.

Usage

```
llHPD(fitll, prob = 0.95, chain = 1)
```

Arguments

fitll	Object of class matrix with the llbayesireg function result.
prob	A number of quantiles of interest. The default is 0.95.
chain	Chain chosen for construction. The default is 1.

Details

This function compute the highest posterior density intervals for a Bayesian posterior distribution.

Value

Object of class matrix with:

betas	The highest posterior density intervals of betas.
deltas	The highest posterior density intervals of deltas.

Author(s)

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Source

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References

Paz, R.F., Balakrishnan, N and Bazán, J.L. (2018). L-Logistic Distribution: Properties, Inference and an Application to Study Poverty and Inequality in Brazil.

Examples

```
# Modelation the coeficient with generated data

library(llbayesireg)
library(llogistic)

# Number of elements to be generated

n=50

# Generated response

bin=2005
set.seed(bin)
y=rlllogistic(n,0.5, 2)

fit1l = llbayesireg(y, niter=100, jump=10)

llHPD(fit1l)

# Modelation the coeficient with real data
library(llbayesireg)

data("Votes", "MHDI")

y = Votes[,4]
X = MHDI

fit1l = llbayesireg(y,X)

llHPD(fit1l)
```

MHDI

Municipal Human Development Index

Description

MHDI data set is the Municipal Human Development Index (MHDI) of the municipalities of Sergipe state of Brazil.

Usage

```
data("MHDI")
```

Format

The format is: num [1:75] 0.611 0.578 0.77 0.595 0.579 0.649 0.604 0.54 0.621 0.569 ...

Details

The MHDI is a summary measure of long-term progress in three basic dimensions of human development that takes into account education, income and longevity indexes in municipalities. The MHDI data is the geometric mean of normalized indexes for each of the three dimensions of human development.

Source

PNUD, IPEA \& FJP. (2013).

References

PNUD, IPEA & FJP. (2013). Atlas do Desenvolvimento Humano no Brasil. PNUD, Brasilia, Brazil. Disponable in: <http://www.atlasbrasil.org.br/2013/pt/>.

Examples

```
data(MHDI)
## maybe str(MHDI) ; plot(MHDI) ...
```

Votes *Data of the votes in the presidential elections of the municipalities of Sergipe in the years 1994, 1998, 2002 and 2006*

Description

Proportion of votes for a political party (Partido dos Trabalhadores) in presidential elections in Brazil by the different municipalities of Sergipe state.

Usage

```
data("Votes")
```

Format

A data frame containing 75 observations on 4 variables.

Votes1994 The format is: num [1:75] 0.228 0.172 0.431 0.105 0.165 ...

Votes1998 The format is: num [1:75] 0.293 0.193 0.427 0.111 0.155 ...

Votes2002 The format is: num [1:75] 0.307 0.278 0.517 0.268 0.223 ...

Votes2006 The format is: num [1:75] 0.492 0.365 0.375 0.426 0.368 ...

Details

Proportion of votes for a political party (Partido dos Trabalhadores) in presidential elections in Brazil by the different municipalities of Sergipe state in the years 1994, 1998, 2002 and 2006.

References

Tribunal Superior Eleitoral. Reposit?rio de Dados Eleitorais: TSE website www.tse.jus.br, accessed 10/01/2018.

Examples

```
data(Votes)
## maybe str(Votes) ; plot(Votes) ...
```

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