Package ‘NegBinBetaBinreg’

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Description The Negative Binomial regression with mean and shape modeling and mean and variance modeling and Beta Binomial regression with mean and dispersion modeling.
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Repository CRAN
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NegBinBetaBinreg-package

NegBinBetaBinreg

Description

Function to estimate a Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Details

Package: NegBinBetaBinreg
Type: Package
Version: 1.0
Date: 2016-10-8
License: GPL-2
LazyLoad: yes

Author(s)

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criteria

criteria for comparison the Bayesian Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Description

Performs the comparison criterias for the Bayesian Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

criteria(objeto)

Arguments

objeto object of class NegBinBetaBinreg
Details

This function calculates the information criteria for a Bayesian Negative Binomial regression with mean and shape modeling and mean and variance modeling and Beta Binomial regression with mean and dispersion modeling.

Value

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC</td>
<td>the AiC criteria</td>
</tr>
<tr>
<td>BIC</td>
<td>the BIC criteria</td>
</tr>
</tbody>
</table>

Author(s)

Edilberto Cepeda-Cuervo <ecopedac@unal.edu.co>, Maria Victoria Cifuentes-Amado <mvcifuentesa@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>

Usage

dpostb(y, x, z, betas, gammas, bpri, Bpri, model, m)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>object of class matrix, with the dependent variable</td>
</tr>
<tr>
<td>x</td>
<td>object of class matrix, with the variables for modelling the mean</td>
</tr>
<tr>
<td>z</td>
<td>object of class matrix, with the variables for modelling the variance</td>
</tr>
<tr>
<td>betas</td>
<td>a vector with the previous proposal beta parameters</td>
</tr>
<tr>
<td>gammas</td>
<td>a vector with the previous proposal gamma parameters</td>
</tr>
<tr>
<td>bpri</td>
<td>a vector with the initial values of beta</td>
</tr>
<tr>
<td>Bpri</td>
<td>a matrix with the initial values of the variance of beta</td>
</tr>
<tr>
<td>model</td>
<td>it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).</td>
</tr>
<tr>
<td>m</td>
<td>It is a positive integer that indicates the number of trials. By default, is the number of data</td>
</tr>
</tbody>
</table>

Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda and Gamerman(2005).
Value
value a matrix with the proposal for beta

Author(s)
Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>, Maria Victoria Cifuentes-Amado <mvcifuentesa@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>

References

dpostg  

Posterior value of gamma

Description
Propose a value for posterior distribution of the gamma parameter

Usage
dpostg(y,x,z,betas,gammas,gpri,Gpri,model,m)

Arguments
y object of class matrix, with the dependent variable
x object of class matrix, with the variables for modelling the mean
z object of class matrix, with the variables for modelling the variance
betas a vector with the previous proposal beta parameters
gammas a vector with the previous proposal gamma parameters
gpri a vector with the initial values of gamma
Gpri a matrix with the initial values of the variance of gamma
model it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
m It is positive integer that In the Beta Binomial model indicates the number of trials. By default, is the number of data
gammakernel

Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda(2001) and
Cepeda and Gamerman(2005).

Value

value a integer with the value of the posterior density for gamma

Author(s)

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Margarita Marin <mmarinj@unal.edu.co>

References

ology for modeling parameters in the two-parameter exponential family. Estadistica 57, 93 105. //

gammakernel the probability of a gamma parameter from the probability density func-
tion defined by old parameters

Description

evaluate the probability of a gamma parameter from the probability density function defined by old
parameters

Usage

gammakernel(y, x, z,betas.ini,gammas.now,gammas.old,gpri,Gpri,model,m,ni)

Arguments

y object of class matrix, with the dependent variable
x object of class matrix, with the variables for modelling the mean
z object of class matrix, with the variables for modelling the variance
betas.ini a vector with the beta that define the old p.d.f
gammas.now a vector with the gamma parameter - new parameters - to evaluate in the old
p.d.f
gammaproposal

- `gammas.old`: a vector with the gamma that define the old p.d.f
- `gpri`: a vector with the initial values of gamma
- `Gpri`: a matrix with the initial values of the variance of gamma
- `model`: it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
- `m`: It is a positive integer that in the Beta Binomial model indicates the number of trials. By default, is the number of data
- `ni`: It is a vector of positive integer that in the Beta Binomial model indicates the number of trials to each individual. By default, is a vector of `m`

**Details**

Evaluate the probability of a gamma parameter from the probability density function defined by old parameters, according with the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

**Value**

- `value`: a vector with the probability for the gamma parameter from the probability density function defined by old parameters

**Author(s)**

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**References**


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**Description**

Propose a value for the gamma parameter
Usage

gammaproposal(y, x, z, betas.ini, gammas.ini, gpri, Gpri, model, m, ni)

Arguments

y object of class matrix, with the dependent variable
x object of class matrix, with the variables for modelling the mean
z object of class matrix, with the variables for modelling the variance
betas.ini a vector with the previous proposal beta parameters
gammas.ini a vector with the previous proposal gamma parameters
gpri a vector with the initial values of gamma
Gpri a matrix with the initial values of the variance of gamma
model it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
m It is a positive integer that indicates the number of trials. By default, is the number of data
ni It is a vector of positive integer that indicates the number of trials to each individual. By default, is a vector of m

Details

Generate a proposal for the gamma parameter according to the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

value a number with the proposal for the gamma parameter

Author(s)

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References

**mukernel**

*the probability of a beta parameter from the probability density function defined by old parameters*

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**Description**

evaluate the probability of a beta parameter from the probability density function defined by old parameters

**Usage**

```
mukernel(y, x, z, betas.now, betas.old, gammas.ini, bpri, Bpri, model, m, ni)
```

**Arguments**

- **y**: object of class matrix or vector, with the dependent variable.
- **x**: object of class matrix, with the variables for modelling the mean.
- **z**: object of class matrix, with the variables for modelling the shape, variance or dispersion.
- **betas.now**: a vector with the beta parameter, new parameter, to evaluate in the old p.d.f
- **betas.old**: a vector with the beta that define the old p.d.f
- **gammas.ini**: a vector with the gamma that define the old p.d.f
- **bpri**: a vector with the prior values of beta.
- **Bpri**: a matrix with the prior values of the variance of beta.
- **model**: it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
- **m**: It is positive integer that In the Beta Binomial model indicates the number of trials. By default, is the number of data
- **ni**: It is a vector of positive integer that In the Beta Binomial model indicates the number of trials to each individual. By default, is a vector of m

**Details**

Evaluate the probability of a beta parameter from the probability density function defined by old parameters, according with the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

**Value**

- **value**: a matrix with the probability for the beta parameter from the probability density function defined by old parameters
muproposal

Description
Propose a value for the beta parameter

Usage
muproposal(y, x, z, betas.ini, gammas.ini, bpri, Bpri, model, m, ni)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>object of class matrix or vector, with the dependent variable.</td>
</tr>
<tr>
<td>x</td>
<td>object of class matrix, with the variables for modelling the mean.</td>
</tr>
<tr>
<td>z</td>
<td>object of class matrix, with the variables for modelling the shape, variance or dispersion.</td>
</tr>
<tr>
<td>betas.ini</td>
<td>a vector with the beta that define the old p.d.f</td>
</tr>
<tr>
<td>gammas.ini</td>
<td>a vector with the gamma that define the old p.d.f</td>
</tr>
<tr>
<td>bpri</td>
<td>a vector with the prior values of beta.</td>
</tr>
<tr>
<td>Bpri</td>
<td>a matrix with the prior values of the variance of beta.</td>
</tr>
<tr>
<td>model</td>
<td>it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).</td>
</tr>
<tr>
<td>m</td>
<td>It is positive integer that In the Beta Binomial model indicates the number of trials. By default, is the number of data</td>
</tr>
<tr>
<td>ni</td>
<td>It is a vector of positive integer that In the Beta Binomial model indicates the number of trials to each individual. By default, is a vector of m</td>
</tr>
</tbody>
</table>

References
Details

Generate a proposal for the beta parameter according to the model proposed by Cepeda(2001) and Cepeda and Gamerman(2005).

Value

value a matrix with the proposal for beta

Author(s)

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References


Description

Function to estimate a Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

NegBinBetaBinreg(y,x,z,nsim,bpri,Bpri,
gpri,Gpri,burn,jump,bini,gini,model,m,ni,graph1,graph2)

Arguments

y object of class matrix or vector, with the dependent variable.

x object of class matrix, with the variables for modelling the mean.

z object of class matrix, with the variables for modelling the shape, variance or dispersion.

nsim a number that indicate the number of iterations.

bpri a vector with the prior values of beta.
NegBinBetaBinreg

8pri  a matrix with the prior values of the variance of beta.
gpri  a vector with the prior values of gamma.
Gpri  a matrix with the prior values of the variance of gamma.
burn  a proportion that indicate the number of iterations to be burn at the beginning of the chain.
jump  a number that indicate the distance between samples of the autocorrelated the chain, to be excluded from the final chain.
bini  a vector with the initial values of beta.
gini  a vector with the initial values of gamma.
model  it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
m  Is positive integer that In the Beta Binomial model indicates the number of trials. By default, is the number of data
ni  Is a vector of positive integer that In the Beta Binomial model indicates the number of trials to each individual. By default, is a vector of m
graph1  if it is TRUE present the graph of the chains without jump and burn.
graph2  if it is TRUE present the graph of the chains with jump and burn.

Details

The Bayesian Negative Binomial regression allow the joint modelling of mean and shape or variance of a negative binomial distributed variable, as is proposed in Cepeda (2001), with exponential link for the mean and the shape or variance. The Bayesian Beta Binomial regression allow the joint modelling of mean and precision of a beta binomial distributed variable, as is proposed in Cepeda (2001), with logit link for the mean and exponential link for the precision.

Value

object of class NegBinBetaBinreg with:

coefficients  object of class matrix with the estimated coefficients of beta and gamma.
desv  object of class matrix with the estimated deviations of beta and gamma.
dev  object of class matrix with the estimated confidence intervals of beta and gamma.
fitted.values  object of class matrix with the fitted values of y.
residuals  object of class matrix with the residuals of the regression.
estresiduals  object of class matrix with the standardized residuals of the regression.
beta.mcmc  object of class matrix with the complete chains for beta.
gamma.mcmc  object of class matrix with the complete chains for gamma.
beta.mcmc.shor  object of class matrix with the chains for beta after the burned process.
gamma.mcmc.shor  object of class matrix with the chains for gamma after the burned process.
acceptbeta  object of class integer with the acceptance rate for the beta values.
acceptgamma  object of class integer with the acceptance rate for the gamma values.
call  Call.
Author(s)

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References


Examples

```r
c(6, 6, 9, 13, 23, 25, 32, 53, 54, 5, 11, 17, 19, 2, 8, 13, 14, 20, 47, 48, 60, 81, 6, 17, 67, 0, 2, 7, 11, 12, 0, 0, 5, 5, 11, 17, 3, 4, 22, 30, 36, 0, 1, 5, 7, 8, 16, 27, 25, 10, 11, 20, 33, 0, 1, 5, 5, 5, 5, 7, 7, 11, 15, 5, 6, 6, 7, 14)
y <- y[1:68]
x0 <- rep(1, times = 68)
x2 <- c(0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1) x3 <- c(0, 0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1) x <- cbind(x0, x2, x3) z0 <- rep(1, times = 68) z <- cbind(z0, x2)
Bpri = diag(rep(1, 3)) bpri = rep(8, 3) Gpri = diag(rep(1, 2)) gpri = rep(8, 2) Bini = diag(rep(1, 3)) bini = c(3, -1, -0.5) Gini = diag(rep(1, 2)) gini = c(3, -1)
nsim = 300
```
negbinbetabinregest

burn <- 0.1
jump <- 5
model <- "NB1"
m <- 360
ni <- NULL
re <- negbinbetabinregest (y, x, z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, bini, gini, model, m, ni, graph1=FALSE, graph2=FALSE)
summary(re)

negbinbetabinregest  Negative Binomial and Beta Binomial regression

Description

Function to estimate a Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

negbinbetabinregest(y, x, z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, bini, gini, model, m, ni, graph1, graph2)

Arguments

y object of class matrix or vector, with the dependent variable.
x object of class matrix, with the variables for modelling the mean.
z object of class matrix, with the variables for modelling the shape, variance or dispersion.
nsim a number that indicate the number of iterations.
bpri a vector with the prior values of beta.
Bpri a matrix with the prior values of the variance of beta.
gpri a vector with the prior values of gamma.
Gpri a matrix with the prior values of the variance of gamma.
burn a proportion that indicate the number of iterations to be burn at the beginning of the chain.
jump a number that indicate the distance between samples of the autocorrelated the chain, to be excluded from the final chain.
bini a vector with the initial values of beta.
gini a vector with the initial values of gamma.
model it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
NegBinBetaBinregEst

m
Is positive integer that in the Beta Binomial model indicates the number of trials. By default, is the number of data.

ni
Is a vector of positive integer that in the Beta Binomial model indicates the number of trials to each individual. By default, is a vector of m.

graph1
If it is TRUE present the graph of the chains without jump and burn.

graph2
If it is TRUE present the graph of the chains with jump and burn.

Details
The Bayesian Negative Binomial regression allow the joint modelling of mean and shape or variance of a negative binomial distributed variable, as is proposed in Cepeda (2001), with exponential link for the mean and the shape or variance. The Bayesian Beta Binomial regression allow the joint modelling of mean and precision of a beta binomial distributed variable, as is proposed in Cepeda (2001), with logit link for the mean and exponential link for the precision.

Value
object of class bayesbetareg with the following:

Bestimado
object of class matrix with the estimated coefficients of beta.

Gammaest
object of class matrix with the estimated coefficients of gamma.

X
object of class matrix, with the variables for modelling the mean.

Z
object of class matrix, with the variables for modelling the shape, variance or dispersion.

DesvBeta
object of class matrix with the estimated deviations of beta.

DesvGamma
object of class matrix with the estimated deviations of gamma.

B
object of class matrix with the B values of the confidence intervals for beta.

G
object of class matrix with the G values of the confidence intervals for gamma.

Yestimado
object of class matrix with the fitted values of y.

Residuales
object of class matrix with the residuals of the regression.

Residuales
object of class matrix with the standardized residuals of the regression.

beta.mcmc
object of class matrix with the complete chains for beta.

gamma.mcmc
object of class matrix with the complete chains for gamma.

beta.mcmc.auto
object of class matrix with the chains for beta after the burned process.

gamma.mcmc.auto
object of class matrix with the chains for gamma after the burned process.

AceptBeta
object of class matrix with the acceptance rate for the betas.

AceptGamma
object of class matrix with the acceptance rate for the gammas.

Author(s)
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References


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print.NegBinBetaBinreg

print.NegBinBetaBinreg

Description

Print the Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

```r
## S3 method for class 'NegBinBetaBinreg'
print(x,...)
```

Arguments

- `x` object of class NegBinBetaBinreg
- `...` not used.

Value

print the Negative Binomial regression with mean and shape modeling and mean and variance modeling and Beta Binomial regression with mean and dispersion modeling

Author(s)

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References

Description

Print the summary for a Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

### S3 method for class 'summary.NegBinBetaBinreg'

```r
print(x, ...)  
```

Arguments

- `x` object of class NegBinBetaBinreg
- `...` not used.

Value

Print the summary for a Negative Binomial regression with mean and shape modeling and mean and variance modeling and Beta Binomial regression with mean and dispersion modeling.

Author(s)

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References

Description

Print the Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

```r
## S3 method for class 'NegBinBetaBinreg'
summary(object, ...)```

Arguments

- `object` an object of class NegBinBetaBinreg
- `...` not used.

Value

- `call` Call
- `coefficients` Coefficients
- `AIC` AIC
- `BIC` BIC

Author(s)

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References

veros

Likelihood

Description

calculate the likelihood value for the Negative Binomial regression models with mean and shape (or variance) regression structures, and Beta Binomial regression with mean and dispersion regression structures.

Usage

veros(y,x,z,betas,gammas,model,m)

Arguments

y          object of class matrix, with the dependent variable
x          object of class matrix, with the variables for modelling the mean
z          object of class matrix, with the variables for modelling the variance
betas      a vector with the previous proposal beta parameters
gammas     a vector with the previous proposal gamma parameters
model      it indicates the model that will be used. By default, is the Beta Binomial model (BB), but it could also be the Negative Binomial with mean and shape (NB1) or the Negative Binomial with mean and variance (NB2).
m          It is positive integer that In the Beta Binomial model indicates the number of trials. By default, is the number of data

Details

calculate the likelihood value for the Negative Binomial regression with mean and shape modeling and mean and variance modeling and Beta Binomial regression with mean and dispersion modeling.

Value

value      a integer with the likelihood

Author(s)

Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>, Maria Victoria Cifuentes-Amado <mvcifuentesa@unal.edu.co>, Margarita Marin <mmarinj@unal.edu.co>
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