Package ‘Bayesiangammareg’

February 6, 2020

Type Package
Title Bayesian Gamma Regression: Joint Mean and Shape Modeling
Version 0.1.0
Date 2020-01-24
Author Arturo Camargo Lozano [aut, cre], Edilberto Cepeda Cuervo [aut]
Maintainer Arturo Camargo Lozano <bacamargol@unal.edu.co>
Description Adjust the Gamma regression models from a Bayesian perspective described by Cepeda and Urdinola (2012) <doi:10.1080/03610918.2011.600500>, modeling the parameters of mean and shape and using different link functions for the parameter associated to the mean. And calculates different adjustment statistics such as the Akaike information criterion and Bayesian information criterion.
Depends R (>= 3.1.1), mvtnorm
License GPL (>= 2)
NeedsCompilation no
Repository CRAN
Date/Publication 2020-02-06 10:50:17 UTC
URL https://www.r-project.org

R topics documented:

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Bayesian Gamma Regression: Joint Mean and Shape Modeling

Description

Function to do Bayesian Gamma Regression: Joint Mean and Shape Modeling

Usage

Bayesian gammareg(y, x, z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, graph1, graph2, meanlink = "log")

Arguments

Y  object of class matrix, with the dependent variable.
X  object of class matrix, with the variables for modeling the mean.
Z  object of class matrix, with the variables for modeling the shape.
nsim a number that indicate the number of iterations.
bpri a vector with the initial values of beta.
Bpri a matrix with the initial values of the variance of beta.
gpri a vector with the initial values of gamma.
Gpri a matrix with the initial 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.
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.
meanlink represent the link function, logarithm or identity.

Details

The Bayesian Gamma regression allows the joint modeling of the mean and the shape of a gamma distributed variable, using a Bayesian estimation algorithm proposed by Cepeda-Cuervo (2001).

Value

object of class bayesian gammareg with:

coefficients object of class matrix with the estimated coefficients of beta and gamma.
desv object of class matrix with the estimated desviations of beta and gamma.
interv 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.
criteria

residuals  object of class matrix with the 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.short  object of class matrix with the chains for beta after the burned process.
gamma.mcmc.short object of class matrix with the chains for gamma after the burned process.
call  object of class matrix with the chains for gamma after the burned process.

Author(s)

Arturo Camargo Lozano <bacamargol@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References


Examples

X1 <- rep(1,50)
X2 <- runif(50,0,30)
X3 <- runif(50,0,20)
X4 <- runif(50,10,20)
mui <- 15 + 3*X2 + 2*X3
alphai <- exp(3 + 0.15*X2 + 0.15*X4)
Y <- rgamma(50,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
Z <- cbind(X1,X2,X4)
bpri <- c(1,1,1)
Bpri <- diag(10^3,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0,0)
Gpri <- diag(10^3,nrow=ncol(Z),ncol=ncol(Z))
burn <- 0
jump <- 1
nsim <- 300
graph1=FALSE
graph2=FALSE
Bayesiangammareg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,burn,jump,graph1,graph2,"ide")

criteria

Criteria for Comparison the Bayesian Gamma Regression.

Description

Performs the comparison criterias for the Bayesian Gamma regression


Usage

criteria(X, gammaresiduals)

Arguments

X object of class matrix, with the independent variable for the mean.

gammaresiduals object of class bayesiangammareg, with the residuals of the Bayesian Gamma regression, that can be calculated by the function gammaresiduals

Details

This function calculate the residuals of a Bayesian Gamma regression.

Value

deviance the deviance criteria
AIC the AIC criteria
BIC the BIC criteria

Author(s)

Arturo Camargo Lozano <bacamargol@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References


Description

Function to do Bayesian Gamma Regression link Identity: Joint Mean and Shape modeling with Identity link for Mean.

Usage

GammaIdentity(Y, X, Z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, graph1, graph2)
**GammaIdentity**

**Arguments**

- **Y**: Object of class matrix, with the dependent variable.
- **X**: Object of class matrix, with the variables for modeling the mean.
- **Z**: Object of class matrix, with the variables for modeling the shape.
- **nsim**: A number that indicate the number of iterations.
- **bPRI**: A vector with the initial values of beta.
- **BPri**: A matrix with the initial values of the variance of beta.
- **gPRI**: A vector with the initial values of gamma.
- **Gpri**: A matrix with the initial 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.
- **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.

**Value**

Object of class `bayesianGammaReg` 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 precision.
- **DesvBeta**: Object of class matrix with the estimated desviations of beta.
- **DesvGamma**: Object of class matrix with the estimated desviations of gamma.
- **B**: Object of class matrix with the B values.
- **G**: Object of class matrix with the G values.
- **yestimado**: Object of class matrix with the fitted values of y.
- **residuals**: Object of class matrix with the residuals of the regression.
- **phi**: Object of class matrix with the precision terms of the regression.
- **variance**: Object of class matrix with the variance terms 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.

**Author(s)**

Arturo Camargo Lozano <bacamargol@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>
References


Examples

```r
X1 <- rep(1,50)
X2 <- runif(50,0,30)
X3 <- runif(50,0,20)
X4 <- runif(50,10,20)
mui <- 15 + 3*X2 + 2*X3
alphai <- exp(3 + 0.15*X2 + 0.15*X4)
Y <- rgamma(50,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
Z <- cbind(X1,X2,X4)
bpri <- c(1,1,1)
Bpri <- diag(10^3,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0,0)
Gpri <- diag(10^3,nrow=ncol(Z),ncol=ncol(Z))
burn <- 0
jump <- 1
nsim <- 300
Bayesiangammareg(Y,X,nsim,bpri,Bpri,gpri,Gpri,burn,jump,graph1,graph2,ide)
```

Description

Function to do Bayesian Gamma Regression: Joint Mean and Shape modeling with Log link for Mean.

Usage

`GammaLog(Y, X, Z, nsim, bpri, Bpri, gpri, Gpri, burn, jump, graph1, graph2)`

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 shape.
\textit{GammaLog}

\begin{itemize}
\item \textbf{nsim} a number that indicate the number of iterations.
\item \textbf{bpri} a vector with the initial values of beta.
\item \textbf{Bpri} a matrix with the initial values of the variance of beta.
\item \textbf{gpri} a vector with the initial values of gamma.
\item \textbf{Gpri} a matrix with the initial values of the variance of gamma.
\item \textbf{burn} a proportion that indicate the number of iterations to be burn at the beginning of the chain.
\item \textbf{jump} a number that indicate the distance between samples of the autocorrelated the chain, to be excluded from the final chain.
\item \textbf{graph1} if it is TRUE present the graph of the chains without jump and burn.
\item \textbf{graph2} if it is TRUE present the graph of the chains with jump and burn.
\end{itemize}

\textbf{Value}

object of class \texttt{bayesian gammareg} with the following:

\begin{itemize}
\item \textbf{Bestimado} object of class matrix with the estimated coefficients of beta
\item \textbf{Gammaest} object of class matrix with the estimated coefficients of gamma
\item \textbf{X} object of class matrix, with the variables for modelling the mean
\item \textbf{Z} object of class matrix, with the variables for modelling the precision
\item \textbf{DesvBeta} object of class matrix with the estimated deviations of beta
\item \textbf{DesvGamma} object of class matrix with the estimated deviations of gamma
\item \textbf{B} object of class matrix with the B values
\item \textbf{G} object of class matrix with the G values
\item \textbf{yestimado} object of class matrix with the fitted values of y
\item \textbf{residuals} object of class matrix with the residuals of the regression
\item \textbf{phi} object of class matrix with the precision terms of the regression
\item \textbf{variance} object of class matrix with the variance terms of the regression
\item \textbf{beta.mcmc} object of class matrix with the complete chains for beta
\item \textbf{gamma.mcmc} object of class matrix with the complete chains for gamma
\item \textbf{beta.mcmc.auto} object of class matrix with the chains for beta after the burned process
\item \textbf{gamma.mcmc.auto} object of class matrix with the chains for gamma after the burned process
\end{itemize}

\textbf{Author(s)}

Arturo Camargo Lozano \texttt{<bacamargol@unal.edu.co>}, Edilberto Cepeda-Cuervo \texttt{<ecepedac@unal.edu.co>}

\textbf{References}

**Examples**

```r
X1 <- rep(1,50)
X2 <- runif(50,0,30)
X3 <- runif(50,0,20)
X4 <- runif(50,10,20)
mui<-exp(1 + 0.14*X2 + 0.05*X3)
alphai<-exp(0.1 + 0.01*X2 + 0.03*X4)
Y <- rgamma(50,shape=alphai,scale=mui/alphai)
X <- cbind(X1,X2,X3)
Z <- cbind(X1,X2,X4)
bpri <- c(1,1,1)
Bpri <- diag(10^3,nrow=ncol(X),ncol=ncol(X))
gpri <- c(0,0,0)
Gpri <- diag(10^3,nrow=ncol(Z),ncol=ncol(Z))
burn <- 0
jump <- 1
nsim <- 300
graph1=FALSE
graph2=FALSE
Bayesiangammarereg(Y,X,Z,nsim,bpri,Bpri,gpri,Gpri,burn,jump,graph1,graph2,"log")
```

---

**gammaresiduals**

*Residuals of the Gamma Regression*

**Description**

This function calculates the Gamma regression residuals.

**Usage**

```r
gammaresiduals(Y, X, model)
```

**Arguments**

- `Y`: object of class matrix, with the dependent variable.
- `X`: object of class matrix, with the independent variable.
- `model`: object of class Bayesiangammarereg.

**Value**

- `rabs`: Pearson absolute residuals
- `rp`: Pearson residuals
- `rd`: deviance residuals
- `rast`: Asteric residuals

**Author(s)**

Arturo Camargo Lozano <bacamargol@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>
References


Description

Print the Bayesian Gamma Regression for Joint modeling of Mean and Shape

Usage

## S3 method for class 'Bayesian gammareg'
print(x,...)

Arguments

x object of class Bayesian gammareg

... not used.

Value

print the Bayesian Gamma regression

Author(s)

Arturo Camargo Lozano <bacamargol@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

References

Print the Summary of the Bayesian Gamma Regression

Description
Print the summary Bayesian Gamma regression for Joint modeling of Mean and Shape parameters

Usage
## S3 method for class 'summary.Bayesiangammareg'
print(x, ...)

Arguments
x    object of class Bayesiangammareg
...  not used.

Value
Print the summary Bayesian Gamma Regression for Joint modeling of Mean and Shape parameters

Author(s)
Arturo Camargo <bacamargol@unal.edu.co>, Edilberto Cepeda-Cuervo <ecepedac@unal.edu.co>

References

Print the Bayesian Gamma Regression

Description
Summarized the Bayesian Gamma Regression for joint modeling of mean and variance

Usage
## S3 method for class 'Bayesiangammareg'
summary(object, ...)
summary.BayesiangammaReg

Arguments

object an object of class BayesiangammaReg
... not used.

Value

call Call
coefficients Coefficients
deviance deviance
AIC AIC
BIC BIC

Author(s)

Brayan Arturo Camargo <bacamargol@unal.edu.co>, Edilberto Cepeda Cuervo <ecepedac@unal.edu.co>

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