Package 'automultinomial'

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Type Package

Title Models for Spatially Correlated Data

Version 2.0.0

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Imports Matrix, igraph, numDeriv, stats

Suggests utils, rmarkdown, knitr, ggplot2

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Description Fits the autologistic model described in Besag's famous 1974 paper on auto- models <http://www.jstor.org/stable/2984812>. Fits a multicategory generalization of the autologistic model when there are more than 2 response categories. Provides support for both asymptotic and bootstrap confidence intervals. For full model descriptions and a guide to the use of this package, please see the vignette.

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Encoding UTF-8

LazyData true

RoxygenNote 6.1.0

BugReports https://github.com/stephenberg/automultinomial/issues

VignetteBuilder knitr

NeedsCompilation no

Repository CRAN

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R topics documented:

drawSamples *Simulate data from auto- models*

Description

Generates data from the autologistic and automultinomial models via Gibbs sampling. See the vignette for an example of use.

Usage

```
drawSamples(beta, gamma, X, A, burnIn = 300, nSamples, y = NULL)
```

Arguments

beta	coefficient vector (for the autologistic model) or matrix (for the automultinomial model)
gamma	the value of the autocorrelation parameter
X	the design matrix
A	the (square symmetric) adjacency matrix encoding the neighborhood structure
burnIn	the number of burnin samples to be used. Defaults to 300
nSamples	the number of samples to draw
y	optional starting configuration, in factor form. Defaults to NULL

Value

simulated samples

Examples

```
##########generating coefficient values and data
#adjacency matrix A
A=igraph::get.adjacency(igraph::make_lattice(c(40,40)))

#design matrix
X=cbind(rep(1,1600),matrix(rnorm(1600*4),ncol=4))

#correlation parameter
gamma=0.6

#2 response categories (1 column in coefficient matrix)
beta2=matrix(rnorm(5)*0.3,ncol=1)
#This example uses a short burnIn period. Use a longer burnIn in practice.
y2=drawSamples(beta2,gamma,X,A,burnIn=1,nSamples=1)

#3 response categories (2 columns in coefficient matrix)
beta3=matrix(rnorm(10)*0.3,ncol=2)
y3=drawSamples(beta3,gamma,X,A,burnIn=1,nSamples=1)
##########
```

MPLE *Maximum pseudolikelihood estimation*

Description

Fits an autologistic model or automultinomial model. Takes as arguments a design matrix X, a response vector y (in factor form), and a square symmetric adjacency matrix encoding the neighborhood structure. When the number of levels of the response y is >2, the function fits a multicategory generalization of the autologistic model. For a full description of the models the package fits and a user guide, please see the vignette.

Usage

```
MPLE(X, y, A, ciLevel = 0.95, method = "asymptotic", burnIn = 300,
  nBoot = 500)
```

Arguments

X	the n-by-p design matrix
y	the response vector (required to be a factor)
A	the square symmetric adjacency matrix A encoding the neighborhood structure
ciLevel	the confidence level to be used for inference. Defaults to 0.95 for 95 percent intervals.
method	"boot" for parametric bootstrap and "asymptotic" for asymptotic confidence intervals.
burnIn	the number of burnin samples to use for the Gibbs sampler when method="boot"
nBoot	the number of bootstrap samples to use when method="boot"

Value

a fitted auto- model MPLE object

Examples

```
##########generating coefficient values and data
A=igraph::get.adjacency(igraph::make_lattice(c(40,40))) #adjacency matrix A
X=cbind(rep(1,1600),matrix(rnorm(1600*4),ncol=4)) #design matrix
gamma=0.6 #correlation parameter
beta=matrix(rnorm(5)*0.3,ncol=1) #covariate parameters
y=drawSamples(beta,gamma,X,A,burnIn=10,nSamples=1)

##########fitting model
fit=MPLE(X = X,y=factor(y),A = A,ciLevel = 0.99,method = "asymptotic")
```

MPLE_summary *Summarize MPLE fits*

Description

Prints out summary tables of fitted model objects from MPLE. Also returns knitr::kable() summary tables.

Usage

```
MPLE_summary(fit)
```

Arguments

fit	a fitted MPLE object

Value

tables based on the model fit

Examples

```
##########generating model fit to summarize
#adjacency matrix A
A=igraph::get.adjacency(igraph::make_lattice(c(40,40)))
X=cbind(rep(1,1600),matrix(rnorm(1600*4),ncol=4))
gamma=0.6
beta=matrix(rnorm(5)*0.3,ncol=1)
y=drawSamples(beta,gamma,X,A,burnIn=10,nSamples=1)
fit=MPLE(X = X,y=factor(y),A = A,ciLevel = 0.99,method = "asymptotic")
##########

##########summarizing model fit
MPLE_summary(fit)
```

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