Package ‘GlarmaVarSel’

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GlarmaVarSel-package

Variable Selection in Sparse GLARMA Models

Description

GlarmaVarSel consists of four functions: "variable_selection.R", "grad_hess_beta.R", "grad_hess_gamma.R" and "NR_gamma.R" For further information on how to use these functions, we refer the reader to the vignette of the package.

Details

GlarmaVarSel consists of four functions: "variable_selection.R", "grad_hess_beta.R", "grad_hess_gamma.R" and "NR.gamma.R" For further information on how to use these functions, we refer the reader to the vignette of the package.

Author(s)

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References


Examples

```r
n=50
p=30
X = matrix(NA,(p+1),n)
f = 1/0.7
for(t in 1:n){X[,t]<-c(1,cos(2*pi*(1:(p/2))*t*f/n),sin(2*pi*(1:(p/2))*t*f/n))}
gamma0 = c(0)
data(Y)
result = variable_selection(Y, X, gamma0, k_max=2, n_iter=100, method="min",
                          nb_rep_ss=1000, threshold=0.7, parallel=FALSE, nb.cores=1)
beta_est = result$beta_est
Estim_active = result$estim_active
gamma_est = result$gamma_est
```
Description

This function calculates the gradient and Hessian of the log-likelihood with respect to beta.

Usage

```r
grad_hess_beta(Y, X, beta0, gamma0)
```

Arguments

- `Y`: Observation matrix
- `X`: Design matrix
- `beta0`: Initial beta vector
- `gamma0`: Initial gamma vector

Value

- `grad_L_beta`: Vector of the gradient of L with respect to beta
- `hess_L_beta`: Matrix of the Hessian of L with respect to beta

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References


Examples

```r
n=50
p=30
X = matrix(NA,(p+1),n)
f = 1/0.7
for(t in 1:n){X[,t]<-c(1,cos(2*pi*(1:(p/2))*t*f/n),sin(2*pi*(1:(p/2))*t*f/n))}
gamma0 = c(0)
data(Y)
glm_pois<-glm(Y~t(X)[,2:(p+1)],family = poisson)
beta0<-as.numeric(glm_pois$coefficients)
result = grad_hess_beta(Y, X, beta0, gamma0)
grad = result$grad_L_beta
Hessian = result$hess_L_beta
```
Gradient and Hessian of the log-likelihood with respect to gamma

Description

This function calculates the gradient and Hessian of the log-likelihood with respect to gamma.

Usage

\[
\text{grad\_hess\_gamma}(Y, X, \beta_0, \gamma_0)
\]

Arguments

- \(Y\): Observation matrix
- \(X\): Design matrix
- \(\beta_0\): Initial beta vector
- \(\gamma_0\): Initial gamma vector

Value

- \(\text{grad\_L\_gamma}\): Vector of the gradient of \(L\) with respect to gamma
- \(\text{hess\_L\_gamma}\): Matrix of the Hessian of \(L\) with respect to gamma

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References


Examples

```r
n = 50
p = 30
X = matrix(NA, (p+1), n)
f = 1/0.7
for(t in 1:n){X[,t]<-c(1, cos(2*pi*(1:(p/2))*t*f/n), sin(2*pi*(1:(p/2))*t*f/n))}
gamma0 = c(0)
data(Y)
glm_pois <- glm(Y~t(X)[,2:(p+1)], family = poisson)
beta0 <- as.numeric(glm_pois$coefficients)
result = grad_hess_gamma(Y, X, beta0, gamma0)
grad = result$grad_L_gamma
Hessian = result$hess_L_gamma
```
**NR_gamma**  

*Newton-Raphson method for estimation of gamma*

---

**Description**

This function estimates gamma with Newton-Raphson method.

**Usage**

```r
NR_gamma(Y, X, beta0, gamma0, n_iter)
```

**Arguments**

- `Y`: Observation matrix
- `X`: Design matrix
- `beta0`: Initial beta vector
- `gamma0`: Initial gamma vector
- `n_iter`: Number of iterations of the algorithm. Default=100

**Value**

- `gamma`: Estimated gamma vector

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**References**


**Examples**

```r
n=50  
p=30  
X = matrix(NA,(p+1),n)  
f = 1/0.7  
for(t in 1:n){X[,t]<-c(1,cos(2*pi*(1:(p/2))*t*f/n),sin(2*pi*(1:(p/2))*t*f/n))}  
gamma0 = c(0)  
data(Y)  
glm_pois<-glm(Y~t(X)[,2:(p+1)],family = poisson)  
beta0<-as.numeric(glm_pois$coefficients)  
gamma_est = NR_gamma(Y, X, beta0, gamma0, n_iter=100)
```
variable_selection

Description

This function performs variable selection, estimates a new vector beta and a new vector gamma

Usage

variable_selection(Y, X, gamma0, k_max = 2, n_iter = 100, method = "min", nb_rep_ss = 1000, threshold = 0.8, parallel = FALSE, nb.cores = 1)

Arguments

Y Observation matrix
X Design matrix
gamma0 Initial gamma vector
k_max Number of iteration to repeat the whole algorithm
n_iter Number of iteration for Newton-Raphson algorithm
method Stability selection method: "fast", "min" or "cv". In "min" the smallest lambda is chosen, in "cv" cross-validation lambda is chosen for stability selection. "fast" is a faster stability selection approach. The default is "min"
nb_rep_ss Number of replications in stability selection step. The default is 1000
threshold Threshold for stability selection. The default is 0.9
parallel Whether to parallelize stability selection step or not. The default is FALSE
nb.cores Number of cores for parallelization. The default is 1

Value

estim_active Estimated active coefficients
beta_est Vector of estimated beta values
gamma_est Vector of estimated gamma values

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References

Examples

n=50
p=30
X = matrix(NA,(p+1),n)
f = 1/0.7
for(t in 1:n){X[,t]<-c(1,cos(2*pi*(1:(p/2))*t*f/n),sin(2*pi*(1:(p/2))*t*f/n))}
gamma0 = c(0)
data(Y)
result = variable_selection(Y, X, gamma0, k_max=2, n_iter=100, method="min",
nb_rep_ss=1000, threshold=0.7, parallel=FALSE, nb.cores=1)
beta_est = result$beta_est
Estim_active = result$estim_active
gamma_est = result$gamma_est

Observation matrix Y

Description
An example of observation matrix

Usage
data("Y")

Format
The format is: num [1:50] 11 8 3 3 3 4 4 4 3 1 ...

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