Package 'HDGLM'

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Title Tests for High Dimensional Generalized Linear Models

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Description Test the significance of coefficients in high dimensional generalized linear models.

Depends R (>= 3.1.1)

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LazyData true

NeedsCompilation yes

Repository CRAN

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Contents

`DGP` *Data Generate Process*

Description

Generate the covariates and the response for generalized linear models in simulation.

Usage

```
DGP(n, p, alpha, norm = 0, no = NA, betanui = NULL, model = "gaussian")
```

Arguments

n	the sample size.
p	the dimension of the covariates.
alpha	the coefficients in moving average model
norm	the norm of coefficient vector under the alternative hypothesis (norm of β or $\beta^{(2)}$), the default is 0 (the null hypothesis).
no	the number of nonzero coefficients under the alternative hypothesis (do not account the number of nuisance parameter). The default is NA, which means the data are generated under the null hypothesis.
betanui	the vector which denotes the value of the nuisance coefficients. The default is NULL which means the global test.
model	a character string to describe the model. The default is "gaussian", which denotes the linear model. The other options are "poisson", "logistic" and "negative_binomial" models.

Value

An object of class "DGP" is a list containing the following components:

X	the design matrix with n rows and p columns, where n is the sample size and p is the dimension of the covariates.
Y	the response with length n

Note

The covariates $X[i] = (X[i1], X[i2], ..., X[ip])$ are generated by the moving average model

$$X[ij] = \alpha[1]Z[ij] + \alpha[2]Z[i(j+1)] + ... + \alpha[T]Z[i(j+T-1)],$$

where $Z[i] = (Z[i1], Z[i2], ..., Z[i(p+T-1)])$ were generated from the $p+T-1$ dimensional standard normal distribution

Author(s)

Bin Guo

References

Guo, B. and Chen, S. X. (2015). Tests for High Dimensional Generalized Linear Models.

See Also

HDGLM_test

Examples

```
alpha=runif(5,min=0,max=1)
## Example 1: Linear model
## H_0:  \beta_0=0
DGP_0=DGP(80,320,alpha)

## Example 2: Logistic model
## H_0:  \beta_0=0
DGP_0=DGP(80,320,alpha,model="logistic")

## Example 3:  Linear model with the first five coefficients to be nonzero,
## the square of the norm of the coefficients to be 0.2
DGP_0=DGP(80,320,alpha,sqrt(0.2),5)
```

HDGLM_test *Tests the Coefficients of High Dimensional Generalized Linear Models*

Description

Tests for whole or partial regression coefficient vectors for high dimensional generalized linear models.

Usage

```
HDGLM_test(Y, X, beta_0 = NULL, nuisance = NULL, model = "gaussian")
```

Arguments

Y	a vector of observations of length n, where n is the sample size.
X	a design matrix with n rows and p columns, where p is the dimension of the covariates.
beta_0	a vector with length p. It is the value of regression coefficient under the null hypothesis in global test. The default is $\beta_0 = 0$ and it can be non-zero in the global test. In the test with nuisance coefficients, we only deal with $\beta_0^{(2)} = 0$.
nuisance	an index indicating which coefficients are nuisance parameter. The default is "NULL" (the global test).
model	a character string to describe the model and link function. The default is "gaussian", which denotes the linear model using identity link. The other options are "poisson", "logistic" and "negative_binomial" models, where the poisson and negative binomial models using log link.

Value

An object of class "HDGLM_test" is a list containing the following components:

test_stat	the standardized test statistic
test_pvalue	pvalue of the test against the null hypothesis

Note

In global test, the function "HDGLM_test" can deal with the null hypothesis with non-zero coefficients (β_0). However, in test with nuisance coefficient, the function can only deal with the null hypothesis with zero coefficients ($\beta_0^{(2)}$) in this version.

Author(s)

Bin Guo

References

Guo, B. and Chen, S. X. (2015). Tests for High Dimensional Generalized Linear Models.

Examples

```
## Example: Linear model
## Global test: if the null hypothesis is true (beta_0=0)
alpha=runif(5,min=0,max=1)
## Generate the data
DGP_0=DGP(80,320,alpha)
result=HDGLM_test(DGP_0$Y,DGP_0$X)
## Pvalue
result$test_pvalue

## Global test: if the alternative hypothesis is true
## (the square of the norm of the first 5 nonzero coefficients to be 0.2)
## Generate the data
DGP_0=DGP(80,320,alpha,sqrt(0.2),5)
result=HDGLM_test(DGP_0$Y,DGP_0$X)
## Pvalue
result$test_pvalue

## Test with nuisance coefficients: if the null hypothesis is true (beta_0^{(2)}=0)
## The first 10 coefficients to be the nuisance coefficients
betanui=runif(10,min=0,max=1)
## Generate the data
DGP_0=DGP(80,320,alpha,0,no=NA,betanui)
result=HDGLM_test(DGP_0$Y,DGP_0$X,nuisance=c(1:10))
## Pvalue
result$test_pvalue

## Test with nuisance coefficients: if the alternative hypothesis is true
## (the square of the norm of the first 5 nonzero coefficients in beta_0^{(2)} to be 2)
## The first 10 coefficients to be the nuisance coefficients
betanui=runif(10,min=0,max=1)
## Generate the data
DGP_0=DGP(80,330,alpha,sqrt(2),no=5,betanui)
result=HDGLM_test(DGP_0$Y,DGP_0$X,nuisance=c(1:10))
## Pvalue
result$test_pvalue
```

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