Package ‘LRQMM’

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Type Package

Title Fitting Linear Quantile Regression Mixed Models with Relationship Matrix

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R topics documented:

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Herd life Data of Iranian Holstein Cows

Description

Cow data include 100 cows with id records, father's record, mother's record, number of HYS, age of first calving and Herd life.

Usage

data("Cow")

Format

A data frame with 100 observations on the following 6 variables.

REGNO  The number form animal record as vector or column matrix
FREG  The number form father’s animal record as vector or column matrix
MREG  The number form mother's animal record as vector or column matrix
HYS  a numeric vector levels of Herd, Year, Season
AGECAL  a numeric vector of age of first calving
HL  a numeric vector of Herd Life

Examples

data(Cow)
**Fitting Linear Quantile Regression Mixed Models With Relationship Matrix**

**Description**

Fit a quantile regression mixed model involved Relationship Matrix using a sparse implementation of the Frisch-Newton interior-point algorithm.

**Usage**

```r
lrqmm(id, sire, dam, X, Y, cova = NULL, alpha = 0, tau = 0.5, Factor = FALSE)
```

**Arguments**

- `id`: The number form animal record as column matrix
- `sire`: The number form father’s animal record as column matrix
- `dam`: The number form mother’s animal record as column matrix
- `X`: fixed effect(s) as column matrix
- `Y`: a response column matrix
- `cova`: covariate effect(s) column matrix
- `alpha`: a parameter for rate error’s variance to variance of random effects dependent on statistical model (Animal model, Sire model, etc.)
- `tau`: desired quantile
- `Factor`: type of fixed effect that "TRUE" as factor variable and "FALSE" as quantitative variable

**Details**

The function computes an estimate on the tau-th quantile effects of the linear mixed model. This is a sparse implementation of the Frisch-Newton algorithm for quantile regression described in Portnoy and Koenker (1997).

We used "GeneticsPed", "Matrix", "kinship2", "MCMCglmm", "rsvd", "SparseM" and "quantreg" packages in this function. Before using "lrqmm" function be sure from installation this packages.

"GeneticsPed" available in

<https://bioconductor.org/packages/release/bioc/src/contrib/GeneticsPed_1.46.0.tar.gz> or orders in


Other packages are available in CRAN.
Value

**Fixed effects** estimate for fixed effect(s) from linear quantile regression mixed model with its standard error

**cova effects** estimate for covariate effect(s) from linear quantile regression mixed model with its standard error

**Random effects** estimate for random effect(s) from linear quantile regression mixed model with its standard error

**residuals** estimate for model residuals from linear quantile regression mixed model

**Time_between_start_to_end**

execution time of linear quantile regression mixed model

**summary**

reporting quantile for effects estimation, mean absolute error for fitted model, variance of response variable, variance of pedigree’s random effect, variance of record’s random effect, number of observations, pedigree’s length, fix effect labels and random effect labels

Author(s)

Sayyed Reza Alavian

References


Examples

```r
#Start(not run)

data(Cow)
with(lrqmm(id=REGNO,sire=FREG,dam=MREG,X=HYS,Y=HL,cova=AGECAL,alpha=1,tau=0.5,Factor=TRUE),data=Cow)

#End(not run)
```
**Description**

Fit a quantile regression mixed model involved Relationship Matrix using a sparse implementation of the Frisch-Newton interior-point algorithm.

**Usage**

```r
lrqmm_m(id, sire, dam, X, Y, cova=NULL, alpha = 0, tau = 0.5, Factor = FALSE, maxTries = 3000, interval = 30)
```

**Arguments**

- **id** The number form animal record as column matrix
- **sire** The number form father’s animal record as column matrix
- **dam** The number form mother’s animal record as column matrix
- **X** fixed effect(s) as column matrix
- **Y** a response column matrix
- **cova** covariate effect(s) column matrix
- **alpha** a parameter for raite error’s varince to variance of random effects, dependent on statistical model (Animal model, Sire model, etc.)
- **tau** desired quantile
- **Factor** type of fixed effect that "TRUE" as factor variable and "FALSE" as quantitative variable
- **maxTries** The maximum number of times the connection is check for an answer from the MATLAB server before giving up. Default values is 3000 times.
- **interval** The interval in seconds between each poll for an answer. Default interval is 30 (second).

**Details**

The function computes an estimate on the tau-th quantile effects of the linear mixed model. This is a sparse implementation of the Frisch-Newton algorithm for quantile regression described in Portnoy and Koenker (1997).

We used "GeneticsPed", "Matrix", "kinship2", "MCMCglmm", "R.matlab", "SparseM" and "quantreg" packages in this function. before using "lrqmm" function be sure from installation this packages.


other packages are available in CRAN.
Value

**Fixed effects** estimate for fixed effect(s) from linear quantile regression mixed model with its standard error

**cova effects** estimate for covariate effect(s) from linear quantile regression mixed model with its standard error

**Random effects** estimate for random effect(s) from linear quantile regression mixed model with its standard error

**residuals** estimate for model residuals from linear quantile regression mixed model

**Time_between_start_to_end** execution time of linear quantile regression mixed model

**summary** reporting quantile for effects estimation, mean absolute error for fitted model, variance of response variable, variance of pedigree’s random effect, variance of record’s random effect, number of observations, pedigree’s length, fix effect levels and random effect levels

Note

When this function stops abnormally (due an error or warning in MATLAB), you should close the MATLAB software window and disconnect the software. By performing this function again, the connection will be established. When more times need to the connection check for an answer from the MATLAB server before giving up, "maxTries" can be increase. When more times need to increase seconds between each poll for an answer, "interval" can be increase.

Author(s)

Sayyed Reza Alavian and Hani Rezaee[ctb]

References


Examples

```#Start(not run)
#before running this code, be sure for Matlab installation in your system.
#
# >data(Cow)
# >with(lrqmm_m(id=REGNO,sire=FREG,dam=MREG,X=HYS,Y=HL,cova=AGECAL,alpha=1,tau=0.5, # Factor=TRUE),data=Cow)```
PINVmat

Generalized Inverse of A Big Matrix With MATLAB

Description
Calculated inverse of the generalized big matrix with MATLAB

Usage
PINVmat(x, maxTriess = 3000, intervall = 30)

Arguments
x a numeric matrix
maxTriess The maximum number of times the connection is check for an answer from the MATLAB server before giving up. Default values is 3000 times.
intervall The interval in seconds between each poll for an answer. Default interval is 30 (second).

Details
see pinv function in MATLAB.

Value
a inverse generalized matrix

Author(s)
Sayyed Reza Alavian

References

Examples
M <- rbind(
c(20, 10, 15, 0, 2),
c(10, 5, 8, 1, 0),
c(0, 1, 2, 6, 3))
# before running this code, be sure for Matlab installation in your system.
# >PINVmat(M)
Description
Calculated inverse of the generalized sparse matrix with sparsesvd function in sparcsvd package and ginv function in MASS package.

Usage

```r
spginv(x)
```

Arguments

- `x`: a sparse real matrix in Matrix package format

Details

see sparsesvd function in sparcsvd package and ginv function in MASS package.

Value

a inverse generalized sparse matrix

Author(s)

Sayyed Reza Alavian

References


Examples

```r
M <- rbind(
  c(20, 10, 15, 0, 2),
  c(10, 5, 8, 1, 0),
  c(0, 1, 2, 6, 3))
M <- Matrix::Matrix(M, sparse=TRUE)
spginv(M)
```
STDE

Description
This function was written in "summary.rq" in "quantreg" package but in below used and changed for lrqmm function.

Details
This function runs in "lrqmm_m" function.

Author(s)
Sayyed Reza Alavian

References

SVDmat

Calculates SVD of Matrix in MATLAB

Description
This function calculates SVD of Matrix in MATLAB and produces the "economy size" decomposition.

Usage
SVDmat(E,maxTriess = 3000,intervall = 30)

Arguments
E a numeric matrix
maxTriess The maximum number of times the connection is check for an answer from the MATLAB server before giving up. Default values is 3000 times.
intervall The interval in seconds between each poll for an answer. Default interval is 30 (second).

Details
This function use R working directory to build and read files. So there should be enough space. All function's files remove after finishing calculation. This function is commonly used in big data.
Value

d  a vector containing the positive singular values
u  a matrix with the corresponding left singular vectors
v  a matrix with the corresponding right singular vectors

Note

When this function stops abnormally (due an error or warning in MATLAB), you should close the MATLAB software window and disconnect the software. By performing this function again, the connection will be established. When more times need to the connection check for an answer from the MATLAB server before giving up, "maxTries" can be increase. When more times need to increase seconds between each poll for an answer, "interval" can be increase.

Author(s)

Sayyed Reza Alavian

References


Examples

\[
M <- \text{rbind(}
  \begin{array}{cccc}
  20 & 10 & 15 & 0 \\
  10 & 5 & 8 & 1 \\
  0 & 1 & 2 & 6 \\
  \end{array}
\text{,}
\begin{array}{c}
2 \\
0 \\
3
\end{array}
\text{)}
\]  

#before running this code, be sure for Matlab installation in your system. 
# >SVDmat(M)
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