Package 'qfabs'

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Type Package

Title qfabs

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Description High-dimensional quantile regression estimation with the regression coefficients difference shrinkage. The contrast penalty is to consider the similarity among the regression coefficients. The Lasso is used to yield a sparse estimator.

License GPL (>=2)

Imports mnormt

Repository github

Encoding UTF-8

LazyData true

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R topics documented:

`generator` *Generate samples for multiple datasets*

Description

This function generates data including response and covariates for multiple datasets. Data can be heavy-tailed. Morever, there may be a high-correlated pattern among covariates.

Usage

```
generator(n, p, beta, distr = "gaussian", rho = 0.5)
```

Arguments

n	The sample sizes in multiple datasets. An integer vector in R^M, where M is the number of datasets.
p	The number of covariates. The number of covariates in each dataset is the same.
beta	A $p \times M$ numeric matrix, which is the true coefficients for the M datasets.
distr	The error's distribution, including "gaussian", "t3", "cauchy" and "logistic".
rho	The strength of correlation among covariates.

Value

A list

- x - A $N \times p$ design matrix, where N is the total sample size in M datasets.
- y - A length N vector of the response for M datasets.

Examples

```
library("mnormt")
M = 2
n1 = n2 = 20
n = c(n1, n2)
p = 50
beta = matrix(0, p, M)
index1 = 1:10
index2 = 2:11
beta[index1, 1] = runif(10, 0.2, 1.0)
beta[index2, 2] = runif(10, 0.4, 1.4)
distr = "t3"
rho = 0.8
dat = generator(n, p, beta, distr, rho)
x = dat$x
y = dat$y
```

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mqfabs *A minorization-maximization forward and backward stagewise algorithm for high-dimensional integrative quantile regression.*

Usage

```
mqfabs(y, x, n, tau = 0.5, Lambda2 = NULL, nlambda2 = 50, epsilon = 0.01,
       delta = 1e-8, xi = 1e-10, max.iter = 5000)
```

Arguments

y	The response for M datasets, a numeric vector.
x	The design matrix for M datasets.
n	The sample sizes in multiple datasets. An integer vector in R^M, where M is the number of datasets.
tau	The quantile to be estimated, this is a number strictly between 0 and 1. Default value is 0.5.

Lambda2	The value of the contrast penalty parameter(s) that determine how much shrinkage in different regression coefficients is done. This should be either a scalar, or a vector. If not specified then a sequence will be automatically generated based on the data.
nlambda2	The number of lambda2s generated. This is ignored if lambda is set manually. Default is 50.
epsilon	The step size for updating coefficients. Default is 0.01.
delta	A constant in pertubed loss function. Default is 1e-8.
xi	The threshold for mqfabs. Default is 1e-10.
max.iter	The maximum number of outer-loop iterations allowed. Default is 5000.

Value

A list.

- beta - The optimal solution that minimizes EBIC.
- lambda1 - lambda1 sequence generated by mqfabs.
- Lambda2 - Lambda2 sequence.
- lambda2 - lambda2 returned that minimizes the EBIC across the Lambda2 sequence.
- iter - Iterations.
- EBIC - The EBIC for each solution.
- opt - Position of the optimal lambda1 based on EBIC for lambda2.

Examples

```
data(simulatedData_gaussian)
y = data_gaussian$y
x = data_gaussian$x
n = data_gaussian$n
fit <- mqfabs(y, x, n)

data(simulatedData_t3)
y = data_t3$y
x = data_t3$x
n = data_t3$n
fit <- mqfabs(y, x, n)

data(simulatedData_cauchy)
y = data_cauchy$y
x = data_cauchy$x
n = data_cauchy$n
fit <- mqfabs(y, x, n)

data(simulatedData_logistic)
y = data_logistic$y
x = data_logistic$x
n = data_logistic$n
fit <- mqfabs(y, x, n)
```

qfabs *A minorization-maximization forward and backward stagewise algorithm for high-dimensional quantile regression.*

Usage

```
qfabs(y, x, tau = 0.5, epsilon = 0.01, delta = 1e-8, xi = 1e-10, max.iter = 5000)
```

Arguments

y	The response, a numeric vector.
x	The design matrix.
tau	The quantile to be estimated, this is a number strictly between 0 and 1. Default value is 0.5.
epsilon	The step size for updating coefficients. Default is 0.01.
delta	A constant in pertubed loss function. Default is 1e-8.
xi	The threshold for qfabs. Default is 1e-10.
max.iter	The maximum number of outer-loop iterations allowed. Default is 5000.

Value

A list.

- beta - The optimal solution that minimizes EBIC.
- lambda - lambda sequence generated by qfabs.
- iter - Iterations.
- EBIC - The EBIC for each solution.
- opt - Position of the optimal lambda based on EBIC.

Examples

```
library("mnormt")
n = 200
p = 500
beta = matrix(rep(0, p), ncol = 1)
index = 1:5
beta[index, 1] = c(1.0,1.1,1.2,1.3,1.4)
distr = "t3"
rho = 0.8
dat = generator(n, p, beta, distr, rho)
x = dat$x
y = dat$y
tau = 0.2
fit <- qfabs(y, x, tau)
```

simulatedData *Simulated datasets from linear models.*

Description

Simulated data from linear models, including family 'gaussian' (simulatedData_gaussian), 't3' (simulatedData_t3), 'cauchy' (simulatedData_cauchy), and 'logistic' (simulatedData_logistic).

Usage

```
data(simulatedData_gaussian)
```

Examples

```
data(simulatedData_gaussian)
x = data_gaussian$x
y = data_gaussian$y
n = data_gaussian$n
```

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