**netReg-package**

**netReg** is a package for generalized linear regression that includes prior graphs in the models objective function.

**Details**

**netReg** uses *Armadillo, OpenBLAS, BLAS* and *LAPACK* for fast matrix computations and *Dlib* for constrained derivate-free optimization.

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**References**


Fu W. J. (1998), Penalized Regression: The Bridge Versus the Lasso. *Journal of Computational and Graphical Statistics*

Cheng W. and Wang W. (2014), Graph-regularized dual Lasso for robust eQTL mapping. *Bioinformatics*

Powell M.J.D. (2009), The BOBYQA algorithm for bound constrained optimization without derivatives. *http://www.damtp.cam.ac.uk/user/na/NA_papers/NA2009_06.pdf*

**cv.edgenet**

Find the optimal shrinkage parameters for edgenet

**Description**

Finds the optimal shrinkage parameters using cross-validation for edgenet. We use the BOBYQA algorithm to minimize the sum of squared residuals objective function.

**Usage**

```r
cv.edgenet(X, Y, G.X = NULL, G.Y = NULL, thresh = 1e-05, maxit = 1e+05, family = c("gaussian"), epsilon = 0.001, approx.maxit = 10000, nfolds = 10, ...)
```
cv.edgenet

Arguments

X input matrix, of dimension (n x p) where n is the number of observations and p is the number of covariables. Each row is an observation vector.

Y output matrix, of dimension (n x q) where n is the number of observations and q is the number of response variables. Each row is an observation vector.

G.X non-negativ affinity matrix for n, of dimensions (p x p) where p is the number of covariables X

G.Y non-negativ affinity matrix for n, of dimensions (q x q) where q is the number of covariables Y

thresh threshold for coordinate descent

maxit maximum number of iterations

family family of response, e.g. gaussian

epsilon the threshold criterion for BOBYQA to stop. Usually 1e-3 is a good choice.

approx.maxit the maximum number of iterations for BOBYQA (if choosen). Usually 1e4 is a good choice.

nfolds the number of folds to be used - default is 10 (minimum 3, maximum nrow(X)).

... additional parameters

Value

An object of class cv.edgenet

call the call that produced the object

lambda the estimated (p x q)-dimensional coefficient matrix B.hat

psigx the estimated (q x 1)-dimensional vector of intercepts

psigy the estimated (q x 1)-dimensional vector of intercepts

Author(s)

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References


Cheng W. and Wang W. (2014), Graph-regularized dual Lasso for robust eQTL mapping. Bioinformatics

edgenet

Fit a graph-regularized linear regression model using edge-based regularization.

Description

Fit a graph-regularized linear regression model using edge-penalization. The coefficients are computed using graph-prior knowledge in the form of one/two affinity matrices. Graph-regularization is an extension to previously introduced regularization techniques, such as the LASSO.

Usage

edgenet(X, Y, G.X = NULL, G.Y = NULL, lambda = 1, psigx = 1, psigy = 1, thresh = 1e-05, maxit = 1e+05, family = c("gaussian"), ...)

Arguments

X input matrix, of dimension (n x p) where n is the number of observations and p is the number of covariables. Each row is an observation vector.
Y output matrix, of dimension (n x q) where n is the number of observations and q is the number of response variables Each row is an observation vector.
G.X non-negativ affinity matrix for X, of dimensions (p x p) where p is the number of covariables X
G.Y non-negativ affinity matrix for Y, of dimensions (q x q) where q is the number of covariables Y
lambda shrinkage parameter for LASSO.
psigx shrinkage parameter for graph-regularization of G.X
psigy shrinkage parameter for graph-regularization of G.Y
thresh threshold for coordinate descent
maxit maximum number of iterations
family family of response, e.g. gaussian
... additional params

Examples

X <- matrix(rnorm(100*10), 100, 10)
b <- rnorm(10)
G.X <- matrix(rpois(10*10,1),10)
G.X <- t(G.X) + G.X
diag(G.X) <- 0

# fit a Gaussian model
Y <- X%*%b + rnorm(100)
cv.edge <- cv.edgenet(X=X, Y=Y, G.X=G.X, family="gaussian")
predict.gaussian.edgenet

Value

An object of class edgenet

- **coefficients** the estimated \((p \times q)\)-dimensional coefficient matrix \(\hat{B}\)
- **intercept** the estimated \((q \times 1)\)-dimensional vector of intercepts
- **call** the call that produced the object
- **family** the family of the response

Author(s)

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References

- Fu W. J. (1998), Penalized Regression: The Bridge Versus the Lasso. *Journal of Computational and Graphical Statistics*
- Cheng W. and Wang W. (2014), Graph-regularized dual Lasso for robust eQTL mapping. *Bioinformatics*

Examples

```r
X <- matrix(rnorm(100*10), 100, 10)
b <- rnorm(10)
G.X <- matrix(rpois(100,1), 10)
G.X <- t(G.X) + G.X
diag(G.X) <- 0

# fit a Gaussian model
Y <- X%*%b + rnorm(100)
fit <- edgenet(X=X, Y=Y, G.X=G.X, family="gaussian")
```

```
predict.gaussian.edgenet

Predict method for gaussian edgenet fits
```

Description

Predicts the estimated \(\hat{Y}\) values for a newdata design matrix \(X\) similar to the other predict methods, e.g. from glm and glmnet

Usage

```r
## S3 method for class 'gaussian.edgenet'
predict(object, newdata = NULL, ...)
```
Arguments

object a fitted object of class `gaussian.edgenet`
newdata a new \((m \times p)\)-dimensional design matrix with a variable number of observations \(m\), but a constant number of co-variables \(p\)

... further arguments

Value

A \((m \times q)\)-dimensional matrix

Examples

```r
## Not run:
X <- matrix(rnorm(100*10),100,10)
G.X <- matrix(rpois(10*10,1),10)
G.X <- t(G.X) + G.X
diag(G.X) <- 0
Y <- matrix(rnorm(100*10),100,10)
fit <- edgenet(X=X, Y=Y, G.X=G.X, family="gaussian")
pred <- predict(fit, X)
## End(Not run)
```
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