Package 'alphanorm'

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Type Package

Title alpha-norm regularization

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Description alpha-norm regulariztaion linear model

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Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

Depends graphics, stats

VignetteBuilder knitr

R topics documented:

`alphanorm` *fit a sparse model with alpha-norm regularization*

Description

Fit a alph-norm model with proximal algorithm and coordinate descent

Usage

```
alphanorm(x, y, lambda = exp(-10:10), q = 0.5, intercept = TRUE,
  tol = 1e-07, T = 500, nlambda = NULL, trace = FALSE)
```

Arguments

x	the design matrix
y	the response vector
lambda	a vector of lambda values, default as exp(-10:10)
q	a numerical value for q, 0<q<=1, with default 0.5
intercept	whether the intercept term should be included, TRUE to be included(default), FALSE not to
tol	tolerence of convergence condition
T	number of maximum iterations for each coefficient
nlambda	number of lambda wanted
trace	print the process

Details

The sequence of models implied by lambda is solved via coordinate descent. The objective function is: RSS+ lambda*penalty . Here the penalty is the l_q norm of coefficients, which is sum(|beta_i|^q), 0<q<=1, when q=1, it is actually same as lasso

Value

An object of S3 class "alphanorm"

x	input design matrix
y	input of response vector
Lambda	input of lambda
q	input value of q
Coefficient	matrix coefficients
Intercept	non-penalized intercept(if intercept=TRUE), otherwise, NULL
df	number of nonzero coefficients for each value of lambda

References

Feng, Guanhao.,Polson, Nicolas G., Wang, Yuexi.and Xu, Jiang.(2017) Sparse regularization in marketing and Economics, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3022856

See Also

predict.alphanorm, coef.alphanorm, cv.alphanorm, and plot.alphanorm methods

Examples

```
x<-matrix(rnorm(100*100),100,100)
# Only the first 10 are true predictors
y<-x[,1:10]%*%rep(1,10)

# Build a alpha-norm model
alphanorm.obj<-alphanorm(x,y,intercept=FALSE)
# Get coefficients
coef(alphanorm.obj)
# Get fitted values
```

```
predict(alphanorm.obj)
# Cross-validation to choose q and lambda
cv.alphanorm(x,y,intercept=FALSE)
# Plot coefficient profile according to log-lambda
plot(alphanorm.obj)
```

`coef.alphanorm` *Output the coefficients of "alphanorm" object*

Description

Output the coefficients of "alphanorm" object

Usage

```
## S3 method for class 'alphanorm'
coef(alphanorm.obj)
```

Arguments

`alphanorm.obj`	a fitted "alphanorm" object

Value

coefficients of "alphanorm" object

See Also

`alphanorm`

`cv.alphanorm` *Cross-validation for alpha-norm*

Description

Does k-fold cross-validation for alpha-norm, and return the best lambda and q

Usage

```
cv.alphanorm(x, y, lambda_Tune = exp(-10:10), q_Tune = c(0.1, 0.5, 0.9),
  intercept = TRUE, nfolds = 5, tol = 1e-07, T = 500)
```

Arguments

`x`	design matrix
`y`	response vector
`lambda_Tune`	user-supplied lambda sequence
`q_Tune`	user-supplied q sequence
`intercept`	whether intercept should be in the model, default to be TRUE
`nfolds`	number of folds , default to be 5
`tol`	tolerence of convergence condition
`T`	number of maximum iterations for each coefficient

Value

An object of S3 class "cv.alphanorm"

`lambda`	the values of lambda used in the fits
`q`	the values of q used in the fits
`cvm`	The mean cross-validation error, a matrix of length(q)*length(lambda)
`lambda.min`	value of lambda that gives minimum cvm
`q.min`	value of q that gives minimum cvm

See Also

`alphanorm`

`plot.alphanorm` *plot coefficient for a "alphanorm"*

Description

Produce a coefficient profile plot of the coefficient paths for a fitted "alphanorm" object

Usage

```
## S3 method for class 'alphanorm'
plot(alphanorm.obj, xvar = c("lambda"), legend = FALSE)
```

Arguments

`alphanorm.obj`	fitted "alphanorm" model
`xvar`	what is on the X-axis. "norm" plots against the L_q-norm of the coefficients, "lambda" against the log-lambda sequence
`legend`	whether legend should be plotted

See Also

`alphanorm`

Examples

```
x=matrix(rnorm(100*20),100,20)
y=rnorm(100)
obj1=alphanorm(x,y)
plot(obj1)
plot(obj1,xvar="norm")
```

`predict.alphanorm` *Predict method for alpha-norm fits*

Description

Similar to other predict methods, this function predicts fitted values from a fitted alphanorm model

Usage

```
## S3 method for class 'alphanorm'
predict(alphanorm.obj, newx = NULL)
```

Arguments

`alphanorm.obj`	a fitted alpha-norm model, returned by alphanorm()
`newx`	matrix of new values of x, if NULL, use the x in alphanorm.obj

Value

matrix of fitted values from alpha-norm model

See Also

alphanorm,and cv.alphanorm methods

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