Package 'lassoshooting'

April 4, 2022

Version 0.1.5-1.1

Date 2012-04-26

Title L1 Regularized Regression (Lasso) Solver using the Cyclic Coordinate Descent Algorithm aka Lasso Shooting

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Depends R (>= 2.12.0)

Description L1 regularized regression (Lasso) solver using the Cyclic Coordinate Descent algorithm aka Lasso Shooting is fast. This implementation can choose which coefficients to penalize. It support coefficient-specific penalties and it can take X'X and X'y instead of X and y.

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Repository CRAN

Date/Publication 2022-04-04 09:25:56 UTC

NeedsCompilation yes

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`lassoshooting` *Lasso Shooting*

Description

Efficient estimates of sparse regression coefficients with a lasso (L1) penalty

Usage

```
lassoshooting(X=NULL, y=NULL, lambda, XtX=NULL, Xty=NULL, thr=1.0e-6,
              maxit=1e4, nopenalize=NULL, penaltyweight=NULL, trace=0, ...)
```

Arguments

X	Design matrix: N by p matrix of p explanatory variables
y	vector of 1 response variable for N observations
XtX	X'X, could be given together with X'y instead of X and y
Xty	X'y, could be given together with X'X instead of X and y
lambda	(Non-negative) regularization parameter for lasso. lambda=0 means no regularization.
thr	Threshold for convergence. Default value is 1e-4. Iterations stop when max absolute parameter change is less than thr
maxit	Maximum number of iterations of outer loop. Default 10,000
nopenalize	List of coefficients not to penalize starting at 0
penaltyweight	p weights, one per variable, will be multiplied by overall lambda penalty
trace	Level of detail for printing out information as iterations proceed. Default 0 – no information
...	Reserved for experimental options

Details

Estimates a sparse regression coefficient vector using a lasso (L1) penalty using the approach of cyclic coordinate descent. See references for details.

The solver does NOT include an intercept, add a column of ones to x if your data is not centered.

Value

A list with components

coefficients	Estimated regression coefficient vector
iterations	Number of iterations of outer loop used by algorithm
delta	Change in parameter value at convergence
infnorm	$\|\|X'y\|\|_\infty$

Author(s)

Tobias Abenius

References

Rebecka Jörnsten, Tobias Abenius, Teresia Kling, Linnéa Schmidt, Erik Johansson, Torbjörn Nordling, Bodil Nordlander, Chris Sander, Peter Gennemark, Keiko Funa, Björn Nilsson, Linda Lindahl, Sven Nelander. (2011) Network modeling of the transcriptional effects of copy number aberrations in glioblastoma. Molecular Systems Biology 7 (to appear)

Friedman J, Hastie T, et al. (2007) Pathwise coordinate optimization. Ann Appl Stat 1: 302–332

Fu WJ (1998) Penalized regressions: the bridge versus the lasso. J Comput Graph Statist 7: 397–416

Examples

```
  ## Not run:
set.seed(42)

b <- seq(3,3,length=10)
n<-100;
p<-10;
X <- matrix(rnorm(n*p),n,p)
noise <- as.matrix(rnorm(n,sd=0.1))
y <- X

require(lassoshooting)
# FIXME: write proper example using R built in dataset
#add intercept column to the design matrix
Xdesign <- cbind(1,X)
lambda <- 20
#don't penalize the intercept
bhat <- lassoshooting(X=Xdesign,y=y,lambda=lambda,nopenalize=0)

#above equals below
bhat1 <- lassoshooting(X=Xdesign,y=y,lambda=2*lambda,penaltyweight=c(0,seq(0.5,0.5,length=p-1)))

T1 <- all(abs(bhat1-bhat) < 1e-20)

c <- 10
bhat2 <- lassoshooting(X=Xdesign,y=y, lambda=lambda, penaltyweight=c(0,1,1,1,1,1,c,c,c,c,c))

T2 <- all(bhat2[2:6] > bhat2[7:11])
T1 && T2

## End(Not run)
```

`softthresh` *Soft Threshold*

Description

Soft threshold

Usage

```
softthresh(x, t)
```

Arguments

x	value
t	threshold

Details

Pass x through a soft threshold with parameter t.

Value

A numeric scalar

Examples

```
## Not run:
  t <- 0.4
  plot(sapply(seq(-2,2,by=0.1),function (x) softthresh(x, t)),type='l')

## End(Not run)
```

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