Package ‘lassoshooting’

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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 XX and
X'y instead of X and y.
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R topics documented:

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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

... Reserve 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)

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References


Examples

```r
## 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))
T2 <- all(bhat2[2:6] > bhat2[7:11])
T1 && T2
## End(Not run)
```

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**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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