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 penalities and it can take X'X and X'y instead of X and y.
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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)

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softthresh

References


Examples

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

b <- seq(3,3,length=10)
nc<-10;
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=lambda,penaltyweight=c(0,seq(0.5,0.6,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,c,c,c,c))

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

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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