Package ‘GSparO’

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Title Group Sparse Optimization
Version 1.0
Description

Depends R (>= 3.3.1)
License GPL (>= 2)
Encoding UTF-8
LazyData true
Imports stats, ThreeWay, ggplot2
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NeedsCompilation no
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**demon**

The example for GSparO

**Description**

demon is a function that implements GSparO for an example of least squares regression with A and b being Gaussian ensembles. A figure plotting the true signal and estimation by GSparO is illustrated in Plots, and the errors of least squares regression and obtained solution are printed. Two packages ThreeWay and ggplot2 should be installed for implementing demon.

**Usage**

demon()

**Details**

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**Examples**

demon()

**GSparO**

Group sparse optimization

**Description**

Group sparse optimization (GSparO) for least squares regression by using the proximal gradient algorithm to solve the $L_2,1/2$ regularization model.

**Usage**

GSparO(A, b, Initial, group, MaxIter, sparsity)

**Arguments**

- **A**: decoding matrix (matrix of predictors)
- **b**: noised signal (response)
- **Initial**: an initial point of iteration, recommend to set as a column vector of zeros
- **group**: group information, a column vector consisting of the length of each group
- **MaxIter**: the maximum number of iterations (a stopping criterion), recommend to set as 200
- **sparsity**: a guess of the group sparsity level (the number of nonzero groups)
Details

GSparO is group sparse optimization for least squares regression described in [Hu et al(2017)], in which the proximal gradient algorithm is implemented to solve the $L_{2,1/2}$ regularization model. GSparO is an iterative algorithm consisting of a gradient step for the least squares regression and a proximal steps for the $L_{2,1/2}$ penalty, which is analytically formulated in this function. Also, GSparO can solve sparse variable selection problem in absence of group structure. In particular, setting group in GSparO be a vector of ones, GSparO is reduced to the iterative half thresholding algorithm introduced in [Xu et al (2012)]. Copyright by Dr. Yaohua Hu, College of Mathematics and Statistics, Shenzhen University. Email: mayhhu@szu.edu.cn

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References


Examples

```r
m <- 256
n <- 1024
sparsity <- 6
gLen <- 16
MaxIter <- 200
gNo <- 1024/gLen
group <- gLen*matrix(1,gNo,1)
A <- matrix(rnorm(m*n,0,1),m,n)
library(ThreeWay)
A <- orth(t(A))
A <- t(A)
gNo1 <- 1:gNo
ActInd <- sample(gNo1,gNo)
Bs <- matrix(0,n,1)
c <- matrix(rnorm(n,0,1),n,1)
for (i in 1:sparsity){
  Bs[(ActInd[i]-1)*gLen+1:(ActInd[i]*gLen)] <- matrix(1,gLen,1)
  c <- Bs%c
  sigma <- 1e-3
  b <- A%*%c + sigma*matrix(runif(m,min=0,max=1),m,1)
  Initial <- matrix(0,n,1)
  GSparO(A,b,Initial,group,MaxIter,sparsity)
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