Package ‘SGL’

February 19, 2015

Type Package

Title Fit a GLM (or cox model) with a combination of lasso and group lasso regularization

Version 1.1

Date 2010-10-12

Author Noah Simon, Jerome Friedman, Trevor Hastie, and Rob Tibshirani

Maintainer Noah Simon <nsimon@stanford.edu>

Description Fit a regularized generalized linear model via penalized maximum likelihood. The model is fit for a path of values of the penalty parameter. Fits linear, logistic and Cox models.

License GPL

LazyLoad yes

Repository CRAN

Date/Publication 2013-04-02 20:51:39

NeedsCompilation yes

R topics documented:

SGL-package ................................................................. 2
cvSGL ................................................................. 2
plot.cv.SGL .......................................................... 4
predictSGL ........................................................... 5
SGL ................................................................. 6

Index 9
SGL-package

Fit a GLM (or cox model) with a combination of lasso and group lasso regularization

Description

Fit a regularized generalized linear model via penalized maximum likelihood. The model is fit for a path of values of the penalty parameter. Fits linear, logistic and Cox models.

Details

Package: SGL
Type: Package
Version: 1.0
Date: 2012-3-12
License: GPL
LazyLoad: yes

Only 4 functions: SGL cvSGL predictSGL plot.cvSGL

Author(s)

Noah Simon, Jerome Friedman, Trevor Hastie, and Rob Tibshirani
Maintainer: Noah Simon <nsimon@stanford.edu>

References


cvSGL

Fit and cross-validate a GLM with a combination of lasso and group lasso regularization

Description

Fits and cross-validates a regularized generalized linear model via penalized maximum likelihood. The model is fit for a path of values of the penalty parameter, and a parameter value is chosen by cross-validation. Fits linear, logistic and Cox models.

Usage

cvSGL(data, index, type = "linear", maxit = 1000, thresh = 0.001, min.frac = 0.05, nlam = 20, gamma = 0, ...
Arguments

data For type="linear" should be a list with $x$ a input matrix of dimension n_obs by p_vars, and $y$ a length n response vector. For type="logit" should be a list with $x$, an input matrix, as before, and $y$ a length n binary response vector. For type="cox" should be a list with x as before, time, an n-vector corresponding to failure/censor times, and status, an n-vector indicating failure (1) or censoring (0).

index A p-vector indicating group membership of each covariate

type model type: one of ("linear","logit", "cox")

maxit Maximum number of iterations to convergence

thresh Convergence threshold for change in beta

minfrac The minimum value of the penalty parameter, as a fraction of the maximum value

nlam Number of lambda to use in the regularization path

gamma Fitting parameter used for tuning backtracking (between 0 and 1)

nfold Number of folds of the cross-validation loop

standardize Logical flag for variable standardization prior to fitting the model.

verbose Logical flag for whether or not step number will be output

step Fitting parameter used for initial backtracking step size (between 0 and 1)

reset Fitting parameter used for taking advantage of local strong convexity in nesterov momentum (number of iterations before momentum term is reset)

alpha The mixing parameter. alpha = 1 is the lasso penalty.

lambdas A user inputted sequence of lambda values for fitting. We recommend leaving this NULL and letting SGL self-select values

Details

The function runs SGL nfold+1 times: the initial run is to find the lambda sequence, subsequent runs are used to compute the cross-validated error rate and its standard deviation.

Value

An object with S3 class "cv.SGL"

lldiff An nlam vector of cross validated negative log likelihoods (squared error loss in the linear case, along the regularization path)

llsd An nlam vector of approximate standard deviations of lldiff

lambdas The actual list of lambda values used in the regularization path.

type Response type (linear/logic/cox)

fit A model fit object created by a call to SGL on the entire dataset

Author(s)

Noah Simon, Jerry Friedman, Trevor Hastie, and Rob Tibshirani

Maintainer: Noah Simon <nsimon@stanford.edu>
References

See Also
SGL

Examples
set.seed(1)
n = 50; p = 100; size.groups = 10
index <- ceiling(1:p / size.groups)
X = matrix(rnorm(n * p), ncol = p, nrow = n)
beta = (-2:2)
y = X[,1:5] %*% beta + 0.1*rnorm(n)
data = list(x = X, y = y)
cvFit = cvSGL(data, index, type = "linear")

plot.cv.SGL

plots the cross-validated error curve produced by cv.SGL

Description
Plots the cross-validated error curve, and confidence bounds for each lambda in our regularization path.

Usage
## S3 method for class 'cv.SGL'
plot(x, ...)

Arguments
x fitted "cv.SGL" object
...
additional arguments to be passed to plot

Details
A cross validated deviance plot is produced. More regularized models are to the right (less regularized to the left)

Author(s)
Noah Simon, Jerome Friedman, Trevor Hastie, and Rob Tibshirani
Maintainer: Noah Simon <nsimon@stanford.edu>
predictSGL

References

http://www-stat.stanford.edu/~nsimon/SGL.pdf

See Also

SGL and cv.SGL.

Examples

```r
n = 50; p = 100; size.groups = 10
index <- ceiling(1:p / size.groups)
X = matrix(rnorm(n * p), ncol = p, nrow = n)
beta = (-2:2)
y = X[,1:5] %*% beta + 0.1*rnorm(n)
data = list(x = X, y = y)
cvFit = cvSGL(data, index, type = "linear")
plot(cvFit)
```

```r
predictSGL(x, newX, lam)
```

Arguments

- **x**: fitted "SGL" object
- **newX**: covariate matrix for new observations whose responses we wish to predict
- **lam**: the index of the lambda value for the model with which we desire to predict

Details

Predicted outcomes are given

Author(s)

Noah Simon, Jerome Friedman, Trevor Hastie, and Rob Tibshirani
Maintainer: Noah Simon <nsimon@stanford.edu>

References

http://www-stat.stanford.edu/~nsimon/SGL.pdf
See Also

SGL and cvSGL.

Examples

```r
n = 50; p = 100; size.groups = 10
index <- ceiling(1:p / size.groups)
X = matrix(rnorm(n * p), ncol = p, nrow = n)
beta = (-2:2)
y = X[,1:5] %*% beta + 0.1*runif(n)
data = list(x = X, y = y)
Fit = sgl(data, index, type = "linear")
X.new = matrix(rnorm(n * p), ncol = p, nrow = n)
predictSGL(Fit, X.new, 5)
```

**SGL**

*Fit a GLM with a combination of lasso and group lasso regularization*

Description

Fit a regularized generalized linear model via penalized maximum likelihood. The model is fit for a path of values of the penalty parameter. Fits linear, logistic and Cox models.

Usage

```r
sgl(data, index, type = "linear", maxit = 1000, thresh = 0.001, min.frac = 0.1, nlam = 20, gamma = 0.8, standardize = TRUE, verbose = FALSE, step = 1, reset = 10, alpha = 0.9, lambdas = NULL)
```

Arguments

- `data`: For type="linear" should be a list with $x$ an input matrix of dimension n-obs by p-vars, and $y$ a length $n$ response vector. For type="logit" should be a list with $x$, an input matrix, as before, and $y$ a length $n$ binary response vector. For type="cox" should be a list with x as before, time, an n-vector corresponding to failure/censor times, and status, an n-vector indicating failure (1) or censoring (0).
- `index`: A p-vector indicating group membership of each covariate
- `type`: model type: one of ("linear", "logit", "cox")
- `maxit`: Maximum number of iterations to convergence
- `thresh`: Convergence threshold for change in beta
- `min.frac`: The minimum value of the penalty parameter, as a fraction of the maximum value
- `nlam`: Number of lambda to use in the regularization path
- `gamma`: Fitting parameter used for tuning backtracking (between 0 and 1)
- `standardize`: Logical flag for variable standardization prior to fitting the model.
- `verbose`: Logical flag for whether or not step number will be output
step  
Fitting parameter used for initial backtracking step size (between 0 and 1)

reset  
Fitting parameter used for taking advantage of local strong convexity in nesterov momentum (number of iterations before momentum term is reset)

alpha  
The mixing parameter. alpha = 1 is the lasso penalty. alpha = 0 is the group lasso penalty.

lambdas  
A user specified sequence of lambda values for fitting. We recommend leaving this NULL and letting SGL self-select values

Details

The sequence of models along the regularization path is fit by accelerated generalized gradient descent.

Value

An object with S3 class "SGL"

beta
A p by nlam matrix, giving the penalized MLEs for the nlam different models, where the index corresponds to the penalty parameter lambda

lambdas
The actual sequence of lambda values used (penalty parameter)

type
Response type (linear/logic/cox)

intercept
For some model types, an intercept is fit

X.transform
A list used in predict which gives the empirical mean and variance of the x matrix used to build the model

lambdas
A user specified sequence of lambda values for fitting. We recommend leaving this NULL and letting SGL self-select values

Author(s)

Noah Simon, Jerry Friedman, Trevor Hastie, and Rob Tibshirani
Maintainer: Noah Simon <nsimon@stanford.edu>

References


See Also

cv.SGL

Examples

n = 50; p = 100; size.groups = 10
index <- ceiling(1:p / size.groups)
X = matrix(rnorm(n * p), ncol = p, nrow = n)
beta = (-2:2)
y = X[,1:5] %*% beta + 0.1*rnorm(n)
data = list(x = X, y = y)
fit = SGL(data, index, type = "linear")
Index

*Topic **models**
  plot.cv.SGL, 4
  predictSGL, 5

*Topic **model**
  cvSGL, 2
  SGL, 6

*Topic **regression**
  cvSGL, 2
  plot.cv.SGL, 4
  predictSGL, 5
  SGL, 6

cvSGL, 2

plot.cv.SGL, 4
predictSGL, 5

SGL, 6
SGL-package, 2