Package 'scalreg'

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Type Package

Title Scaled Sparse Linear Regression

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Description Algorithms for fitting scaled sparse linear regression and estimating precision matrices.

License GPL-2

NeedsCompilation no

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R topics documented:

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scalreg-package   *Scaled sparse linear regression*

Description

This package fits scaled sparse linear regression with l_1 penalty. The algorithm jointly estimates the regression coefficients and the noise level in linear regression problem. In addition, the package estimates inverse covariance matrices (precision matrices) via a scale-invariant method.

Details

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Version:	1.0
Date:	2013-12-16
License:	GPL-2

Author(s)

Tingni Sun <tingni@wharton.upenn.edu>

References

Sun, T. and Zhang, C.-H. (2012) Scaled sparse linear regression. Biometrika, 99 (4), 879-898.

Sun, T. and Zhang, C.-H. (2013) Sparse matrix inversion with scaled Lasso. Journal of Machine Learning Research, 14, 3385-3418.

See Also

scalreg

Examples

```
## See examples in scalreg
```

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predict.scalreg	*Prediction based on a scalreg object*

Description

When the type of a scalreg object is "regression", this predict method applies.

Usage

```
## S3 method for class 'scalreg'
predict(object, newX = NULL,...)
```

Arguments

object	a fitted scalreg object.
newX	X values at which the fit is required. If newX is NULL, return the fitted value of the object.
...	Additonal arguments for generic methods

Value

y   the predicted values.

Author(s)

Tingni Sun

See Also

scalreg

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print.scalreg   *Printing the solution from a scalreg object*

Description

Print the solution from a scalreg object

Usage

```
## S3 method for class 'scalreg'
print(x,...)
```

Arguments

x   a scalreg object

...   Additonal arguments for generic methods

Author(s)

Tingni Sun

See Also

scalreg

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scalreg	*Scaled sparse linear regression*

Description

The algorithm gives the scaled Lasso solution with given penalty constants for a sparse linear regression. When the response vector is not set, the algorithm estimates the precision matrix of predictors.

Usage

```
scalreg(X, y, lam0 = NULL, LSE = FALSE)
```

Arguments

X	predictors, an n by p matrix with n > 1 and p > 1.
y	response, an n-vector with n > 1. If NULL, the algorithm computes the precision matrix of predictors.
lam0	penalty constant; c("univ","quantile") or other specified numerical value. If p < 10^6, default is "quantile"; otherwise, default is "univ".
LSE	If TRUE, compute least squares estimates after scaled Lasso selection. Default is FALSE.

Details

Scaled sparse linear regression jointly estimates the regression coefficients and noise level in a linear model, described in details in Sun and Zhang (2012). It alternates between estimating the noise level via the mean residual square and scaling the penalty in proportion to the estimated noise level. The theoretical performance of scaled Lasso with lam0="univ" was proven in Sun and Zhang (2012), while the quantile-based penalty level (lam0="quantile") was introduced and studied in Sun and Zhang (2013).

Precision matrix estimation was described in details in Sun and Zhang (2013). The algorithm first estimates each column of the matrix by scaled sparse linear regression and then adjusts the matrix estimator to be symmetric.

Value

A "scalreg" object is returned. If it is a linear regression solution, some significant components of the object are:

type	"regression".
hsigma	the estimated noise level.
coefficients	the estimated coefficients.
fitted.values	the fitted mean values.
residuals	the residuals, that is response minus fitted values.

lse	the object of least square estimation after the selection, which includes the similar values as "scalreg" (e.g. hsigma, coefficients, fitted.values, residual).

If it estimates a precition matrix, some significant components of the object are:

type	"precision matrix".
precision	the estimated precision matrix.
hsigma	the estimated noise level for the linear regression problem of each column.
lse	the object of least square estimation, containing values of precision and hsigma.

Author(s)

Tingni Sun <tingni@wharton.upenn.edu>

References

Sun, T. and Zhang, C.-H. (2012) Scaled sparse linear regression. Biometrika, 99 (4), 879-898.

Sun, T. and Zhang, C.-H. (2013) Sparse matrix inversion with scaled Lasso. Journal of Machine Learning Research, 14, 3385-3418.

Examples

```
data(sp500)
attach(sp500)
x = sp500.percent[,3: (dim(sp500.percent)[2])]
y = sp500.percent[,1]

object = scalreg(x,y)
##print(object)

object = scalreg(x,y,LSE=TRUE)
print(object$hsigma)
print(object$lse$hsigma)

detach(sp500)
```

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sp500	*sp500*

Description

The sp500 datafile contains a year's worth of close-of-day data for most of the Standard and Poors 500 stocks. The data is in reverse chronological order, with the top row being Dec 31st, 2008.

Usage

```
sp500
```

Format

This data file contains the following items:

sp500.2008 The raw close-of-day data. The first column is of the DJIA index, the second is the S&P 500 index, the rest are individual labeled stocks.

sp500.percent The daily percentage change.

References

This database was used in the R package "plus".

Examples

```
## See examples in scalreg
```

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