Package 'elasticIsing'

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Type Package

Title Ising Network Estimation using Elastic Net and k-Fold Cross-Validation

Version 0.2

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Description Description: Uses k-fold cross-validation and elastic-net regularization to estimate the Ising model on binary data. Produces 3D plots of the cost function as a function of the tuning parameter in addition to the optimal network structure.

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Imports magrittr, glmnet, reshape2, cvTools, qgraph, methods

Suggests IsingSampler, akima

URL github.com/SachaEpskamp/IsingSampler

NeedsCompilation no

Repository CRAN

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R topics documented:

costPlots *3D plots of cost functions*

Description

This function creates a PDF file with the 3D plots of cost functions given alpha and lambda. By default, accuracy is shown, which is defined as -cost.

Usage

```
costPlots(object, filename = "elasticIsing.pdf", width = 8,
    height = 5, theta = 25, phi = 30, ticktype = "simple",
    accuracy = TRUE)
```

Arguments

object	An elasticIsing object, resulting from elasticIsing
filename	Name of the PDF file to create
width	Width of the PDF file to creare
height	Height of the PDF file to create
theta	See persp
phi	See persp
ticktype	See persp
accuracy	See persp

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elasticIsing *Estimate Ising model using elastic-net and cross-validation.*

Description

Uses the glmnet package for elastic-net computation and the cvTools package for cross-validation error. Use optimalGraph to select the optimal graph.

Usage

```
elasticIsing(data, nLambda = 100, lambda.min.ratio = 0.01,
          alpha = seq(0, 1, length = 10), cost = c("mspe",
          "rmspe", "mape", "tmspe", "rtmspe"), K = 10,
          and = TRUE)
```

Arguments

data	A binary dataset
nLambda	Number of lambda tuning parameters
lambda.min.ratio	Lambda min ratio, see details.
alpha	Vector with values of alpha to test
cost	Cost functions from the cvTools package to use.
K	The number of splits in k-fold cross-validation.
and	Should an AND-rule be used? If TRUE, both A -> B and B <- A need to be non-zero to obtain the egde A – B. If FALSE, an OR-rule is used.

Details

For each alpha, the maximum lambda is obtained from glmnet. The minimum lambda for ALL levels of alpha is lambda.min.ratio * lambda.max obtained when alpha = 1.

Value

An elasticIsing object, with the following elements:

minimal	Values with minimal predictive cost
costs	Predictive cost
lambdaMatrix	Matrix indicating lambda values used. Columns correspond to the alpha values.
alpha	Alpha values used
data	Dataset used
and	AND-rule

Author(s)

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References

Jerome Friedman, Trevor Hastie, Robert Tibshirani (2010). Regularization Paths for Generalized Linear Models via Coordinate Descent. Journal of Statistical Software, 33(1), 1-22. URL http://www.jstatsoft.org/v33/i01/.

Andreas Alfons (2012). cvTools: Cross-validation tools for regression models. R package version 0.3.2. https://CRAN.R-project.org/package=cvTools

See Also

optimalGraph, costPlots

Examples

```
library("IsingSampler")

# Input:
P <- 5 # Number of nodes
nSample <- 250 # Number of samples

# Chain graph:
Graph <- matrix(0, P, P)
for (i in 1:P){
  Graph[i,i%%P+1] <- Graph[i%%P+1,i] <- 0.5
}

# Thresholds:
Thresh <- rep(0, P)

# Response options (0,1 or -1,1):
Resp <- c(0L,1L)

# Simulate with metropolis:
Data <- IsingSampler(nSample, Graph, Thresh)

## Not run:
# Estimate:
Res <- elasticIsing(Data)

# Optimal graph:
optimalGraph(Res)

# Plot result:
plot(Res)

# Cost plots:
costPlots(Res)

## End(Not run)
```

`optimalGraph` *Optimal graph selection*

Description

Selects the optimal graph from the results of `elasticIsing`

Usage

```
optimalGraph(object, cost)
```

Arguments

`object`	An `elasticIsing` object, resulting from `elasticIsing`
`cost`	Cost function to use (from the cvTools package). One of `'mspe'`, `'rmspe'`, `'mape'`, `'tmspe'`. or `'rtmspe'`

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