

Package ‘QUIC’

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Type Package

Title Regularized sparse inverse covariance matrix estimation

Version 1.1

Description Use Newton's method and coordinate descent to solve the regularized inverse covariance matrix estimation problem. Please refer to: Sparse Inverse Covariance Matrix Estimation Using Quadratic Approximation, Cho-Jui Hsieh, Matyas A. Sustik, Inderjit S. Dhillon, Pradeep Ravikumar, Advances in Neural Information Processing Systems 24, 2011, p. 2330--2338.

Depends R (>= 2.10)

License GPL-3

URL <http://www.r-project.org>,
<http://www.cs.utexas.edu/users/sustik/QUIC>

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R topics documented:

QUIC	2
S	3
Index	4

 QUIC

QUadratic Inverse Covariance estimation

Description

Estimates a sparse inverse covariance matrix using a combination of Newton's method and coordinate descent.

Usage

```
QUIC(S, rho, path = NULL, tol = 1e-04, msg = 1, maxIter = 1000, X.init =
NULL, W.init = NULL)
```

Arguments

S	Covariance matrix. A $p \times p$ symmetric matrix.
rho	Regularization parameter. It can be a $p \times p$ matrix, a vector or scalar.
path	If specified, then rho is scaled with the elements of path and the corresponding inverse covariance matrix estimation is carried out for each value.
tol	Specifies the convergence tolerance.
msg	Controls how verbose messages should be printed during execution. Valid value range: 0–4.
maxIter	Specifies the maximum number of Newton iterations.
X.init	The initial estimate for the regularized inverse covariance matrix.
W.init	The inverse of initial estimate for the regularized inverse covariance matrix.

Value

X	Regularized inverse covariance matrix; an array of matrices when path is used.
W	Inverse of the matrix X.
regloglik	The optimal value for the regularized logarithmic likelihood, an array when path is used.
opt	The optimal value of the minimization problem, an array when path is used.
iter	The number of Newton iterations executed, an array when path is used.

Author(s)

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References

Sparse Inverse Covariance Matrix Estimation Using Quadratic Approximation. Cho-Jui Hsieh, Matyas A. Sustik, Inderjit S. Dhillon, Pradeep Ravikumar, *Advances in Neural Information Processing Systems*, vol. 24, 2011, p. 2330–2338.

<http://www.cs.utexas.edu/users/sustik/papers/invcov.pdf>

S

ER dataset

Description

Empirical covariance matrix derived from the ER dataset. The original dimension 7027 was reduced to 692 by thresholding.

Source

<http://www.math.nus.edu.sg/~mattohkc/Covsel-0.zip>

References

Lu Li, Kim-Chuan Toh: An inexact interior point method for L1 regularized sparse covariance selection. *Math. Prog. Comp.* (2010) 2:291-315

Index

- *Topic **Newton**
QUIC, 2
 - *Topic **coordinate descent**
QUIC, 2
 - *Topic **covariance**
QUIC, 2
 - *Topic **datasets**
S, 3
 - *Topic **graphical model**
QUIC, 2
 - *Topic **lasso**
QUIC, 2
 - *Topic **regularization**
QUIC, 2
- QUIC, 2
- S, 3