Package ‘sbmSDP’

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Type Package

Title Semidefinite Programming for Fitting Block Models of Equal Block Sizes

Version 0.2

Date 2015-06-18

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Description An ADMM implementation of SDP-1, a semidefinite programming relaxation of the maximum likelihood estimator for fitting a block model. SDP-1 has a tendency to produce equal-sized blocks and is ideal for producing a form of network histogram approximating a nonparametric graphon model. Alternatively, it can be used for community detection. (This is experimental code, proceed with caution.)

License GPL-3

Imports Rcpp (>= 0.11.6)

LinkingTo Rcpp, RcppArmadillo

NeedsCompilation yes

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Description

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Details

Package: sbmSDP
Type: Package
Version: 0.2
Date: 2015-06-18
License: GPL-3

An ADMM implementation of SDP-1 algorithm for fitting stochastic block models (SBMs). The main function is sdp1_admm.

Author(s)

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References

On Semidefinite relaxations of the block model by A.A. Amini and E. Levina.

Usage

sdp1_admm(As, K, opts)
**Arguments**

- **As** a binary adjacency matrix.
- **K** number of communities (or blocks).
- **opts** a list containing options. Pass the empty list, that is, "list()", to use the default values. (See examples.)

**Value**

A list containing the following items:

- **X** the estimated cluster matrix.
- **delta** a vector of norm differences between consecutive cluster matrices at each step of the ADMM iteration.
- **T_term** number of actual iterations performed.

**Author(s)**

Arash A. Amini

**References**

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**Examples**

```r
# Create a simple blkmodel with K=3 communities each of size m=20
blkmodel <- list(m=20, K=3, p=.9, q=.4)
blkmodel <- within(blkmodel, {
  n <- m*K
  M <- kronecker(matrix(c(p, q, q, p, q, q, q, p), nrow=S), matrix(1, m, m))
  As <- 1*(matrix(runif(n^2), nrow=n) < M)
})

# Call sdp1_admm with options:
# rho the ADMM parameter,
# T maximum number of iteration
# tol tolerance for norm(X_{t+1} - X_t)
# report_interval how many iteration between reporting progress
sdp.fit <- with(blkmodel,
  sdp1_admm(as.matrix(As), K, list(rho=.1, T=10000, tol=1e-5, report_interval=100)))

# plot the adjacency matrix and the estimated cluster matrix
par(mfrow=c(1,2))
image(blkmodel$As)
image(sdp.fit$X)
```
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