Package: sbmSDP (via r-universe)

October 26, 2026

Type Package

Title Semidefinite Programming for Fitting Block Models of Equal Block Sizes

Version 0.2

Date 2015-06-18

Author Arash A. Amini

Maintainer Arash A. Amini <amini.aa@gmail.com>

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

Repository https://cran.r-universe.dev

Date/Publication 2015-06-18 00:00:00 UTC

RemoteUrl https://github.com/cran/sbmSDP

RemoteRef HEAD

RemoteSha f59dfbce71ae1beb8982ea1dc68de87bf8c95169

Contents

sbmSDP-package 2
sdp1_admm 2

Index **4**

sbmSDP-package *Semidefinite Programming for Fitting Block Models of Equal Block Sizes*

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.)

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)

Arash A. Amini

Maintainer: Arash A. Amini <amini.aa@gmail.com>

References

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

sdp1_admm *SDP-1 algorithm*

Description

Fits a balanced stochastic block model to an adjacency matrix using SDP-1. The function implements a first-order ADMM solver for SDP-1.

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

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

Examples

```
# 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,q,p,q,q,q,p),nrow=3),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)
```

Index

∗ **community detection**
sbmSDP-package, 2
∗ **stochastic block model**
sbmSDP-package, 2
∗
sbmSDP-package, 2

sbmSDP *(*sbmSDP-package*)*, 2
sbmSDP-package, 2
sdp1_admm, 2