Package ‘IrishDirectorates’

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Title A Dynamic Bipartite Latent Space Model to Analyse Irish Companies' Boards from 2003 to 2013

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Description Provides the dataset and an implementation of the method illustrated in Friel, N., Rastelli, R., Wyse, J. and Raftery, A.E. (2016) <DOI:10.1073/pnas.1606295113>.

License GPL-3

Imports Rcpp (>= 0.12.19)

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Author Riccardo Rastelli [aut, cre]

Maintainer Riccardo Rastelli <riccardoras@gmail.com>

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IrishDirectorates-package

*A Dynamic Bipartite Latent Space Model to Analyse Irish Companies’ Boards from 2003 to 2013*

**Description**

Provides the dataset and an implementation of the method illustrated in Friel, N., Rastelli, R., Wyse, J. and Raftery, A.E. (2016) <DOI:10.1073/pnas.1606295113>.

**Author(s)**

Riccardo Rastelli Maintainer: Riccardo Rastelli <riccardoras@gmail.com>

**References**


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**dblpm_mcmc**

**Description**

Runs the Metropolis-within-Gibbs sampler on the given Dynamic Bipartite Latent Position Model (dblpm network).

**Usage**

`dblpm_mcmc(network, niter, burnin, thin, x_var, w_var, gamma_var, beta_var, verbose = T)`

**Arguments**

- `network`: A list identifying a dblpm network.
- `niter`: Number of iterations after thinning and burnin.
- `burnin`: Number of iterations to be discarded before starting the count for `niter`. The burnin iterations are not thinned.
- `thin`: After burnin, keep one sampled observation every `thin` and discard the rest.
- `x_var`: Proposal variance for the positions of sender nodes.
- `w_var`: Proposal variance for the positions of receiver nodes.
- `gamma_var`: Proposal variance for the intercept gamma.
- `beta_var`: Proposal variance for the intercept beta.
- `verbose`: true or false indicating whether a lengthy output should be printed out.
Value

computing_time  Number of seconds required for the sampling process.
samples  Sampled values for each of the model parameters.
tail  dblpm network sampled in the last iteration.

Examples

data(IrishDirectoratesFit)
IrishDirectoratesFit <- dblpm_mcmc(network = IrishDirectoratesFit$tail,
niter = 3, burnin = 6, thin = 3,
x_var = 4.75, w_var = 0.25, gamma_var = 1.825, beta_var = 0.2175,
verbose = TRUE)
# to replicate the results of the paper: niter = 10000, burnin = 500000, thin = 50

dblpm_posterior

Description

Evaluates the posterior value for a given Dynamic Bipartite Latent Position Model (dblpm network).

Usage

dblpm_posterior(network)

Arguments

network  A list identifying a dblpm network.

Value

computing_time  Number of seconds required for the evaluation.
likelihood_value  Likelihood value for the given network.
posterior_value  Posterior value for the given network.

Examples

data(IrishDirectoratesFit)
res <- dblpm_posterior(network = IrishDirectoratesFit$tail)
Board Composition For Companies Quoted On The Irish Stock Exchange From 2003 To 2013

Description

Board composition for companies quoted on Irish Stock Exchange from 2003 to 2013. Board compositions are only observed at the end of each year.

Usage

data("IrishDirectoratesData")

Format

IrishDirectoratesData is a list containing:

- edgelist the edgelist for a bipartite dynamic network. Each row of this dataframe corresponds to an undirected edge in the network. For each row, the first entry identifies the time frame where the edge occurs, the second entry represents the director, whereas the third identifies the company. The presence of an edge at a certain time frame between a director and a company means that the director was part of the company’s board at the end of the corresponding year.
- years lookup table for the time frame labels.
- directors_names lookup table for directors’ names.
- companies_names lookup table for companies’ names.

Details

The adjacency cube can be constructed from the edgelist. Please see example for sample code.

Source

Irish Stock Exchange (http://www.ise.ie/).

References


Examples

data(IrishDirectoratesData)
attach(IrishDirectoratesData)

N <- length(directors_names)
M <- length(companies_names)
tframes <- length(years)

# construct the binary adjacency cube
adj <- array(0,c(N,M,tframes))
for (l in 1:nrow(edgelist)) adj[edgelist[l,2],edgelist[l,3],edgelist[l,1]] = 1

dimnames(adj) = list(directors_names, companies_names, years)

# calculate the degrees of directors and boards
out_degrees <- apply(adj,c(1,3),sum)
in_degrees <- apply(adj,c(2,3),sum)

# create a binary matrix with ones corresponding to interlocked directors
interlocked_directors <- ifelse(out_degrees > 1, 1, 0)

# create a binary matrix with ones corresponding to interlocking companies
interlocking_companies <- matrix(0,M,tframes)
for (t in 1:tframes) for (i in 1:N) for (j in 1:M) if (adj[i,j,t] == 1) {
  if (interlocked_directors[i,t] > 0) interlocking_companies[j,t] = 1
}

# extract labels of interlocking companies
selected_companies <- which(rowSums(interlocking_companies) > 0)

# extract labels of remaining active directors
new_out_degrees <- apply(adj[,selected_companies,], c(1,3), sum)
selected_directors <- which(rowSums(new_out_degrees) > 0)

# create the new adjacency cube for the reduced data, as shown in the referenced paper
adj_reduced <- adj[selected_directors, selected_companies, ]
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