Package 'GraphKit'

February 21, 2017

Type Package

Title Estimating Structural Invariants of Graphical Models

Version 0.4

Date 2017-2-20

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Description Efficient methods for constructing confidence intervals of monotone graph invariants, as well as testing for monotone graph properties. Many packages are available to estimate precision matrices, this package serves as a tool to extract structural properties from their induced graphs. By iteratively bootstrapping on only the relevant edge set, we are able to obtain the optimal interval size.

License GPL (>= 2)

Depends R (>= 2.10)

Imports Rcpp (>= 0.12.8)

LinkingTo Rcpp, RcppArmadillo

RoxygenNote 6.0.1

NeedsCompilation yes

Repository CRAN

Date/Publication 2017-02-21 12:12:54

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cov.hat *A sample covariance matrix from the same distribution as t.hat and Xs*

Description

The population precrision matrix has 20 connected components in the induced graph

Usage

```
cov.hat
```

Format

A 200x200 data frame

GraphKit *GraphKit*

Description

Efficient methods for constructing confidence intervals of monotone graph invariants, as well as testing for monotone graph properties. Many packages are available to estimate precision matrices, this package serves as a tool to extract structural properties from their induced graphs. By iteratively bootstrapping on only the relevant edge set, we are able to obtain the optimal interval size.

Author(s)

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graph_invar *Graph Invar*

Description

Computes the confidence interval for a numeric invariant on an estimated conditional independence graph.

Usage

```
graph_invar(x, sigmaHat, thetaHat, invar = c("connectivity", "longest_chain",
  "max_degree", "largest_clique", "chromatic_number", "num_singletons",
  "girth"), numB = 1000, alpha = 0.05)
```

Arguments

x	A sample of data
sigmaHat	A sample covariance matrix for x
thetaHat	A sample precision matrix estimated from sigmaHat
invar	The monotone graph invariant to examine
numB	The number of bootstrap samples to take Default: 1000
alpha	The significance level for the confidence interval Default: 0.05

Value

A confidence intveral for the value of invar with sig. level alpha

Examples

```
## Not run:
data(Xs,cov.hat,t.hat)
graph_invar(x=Xs,sigmaHat=cov.hat,thetaHat=t.hat,invar="conn")

## End(Not run)
```

---

graph_prop *Graph Prop*

Description

Computes the value of boolean property on an estimated conditional independence graph.

Usage

```
graph_prop(x, sigmaHat, thetaHat, prop = c("connectivity", "longest_chain",
  "max_degree", "largest_clique", "chromatic_number", "num_singletons", "girth",
  "matching", "planarity", "bipartite", "acyclic"), k = 1, numB = 1000,
  alpha = 0.05)
```

Arguments

x	A sample of data
sigmaHat	A sample covariance matrix for x
thetaHat	A sample precision matrix estimated from sigmaHat
prop	The monotone graph property to examine
k	The value to threshold numeric tests at
numB	The number of bootstrap samples to take Default: 1000
alpha	The significance level for the property test Default: 0.05

Value

The value of prop with sig. level alpha

Examples

```
## Not run:
data(Xs,cov.hat,t.hat)
graph_prop(x=Xs,sigmaHat=cov.hat,thetaHat=t.hat,prop="conn",k=20)

## End(Not run)
```

---

t.hat *A sample precision matrix from the same distribution as Xs and cov.hat*

Description

The population precrision matrix has 20 connected components in the induced graph

Usage

```
t.hat
```

Format

a 200x200 data frame

Xs *A random sample generated from a multivariate Guassian Distribution*

Description

The population precrision matrix has 20 connected components in the induced graph

Usage

```
Xs
```

Format

A Large 500x200 Matrix

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