Package 'Bestie'

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Type Package

Title Bayesian Estimation of Intervention Effects

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Description An implementation of intervention effect estimation for DAGs (directed acyclic graphs) learned from binary data. First, parameters are estimated or sampled for the DAG and then interventions on each node (variable) are propagated through the network (do-calculus). Both exact computation (up to around 20 variables) and Monte Carlo schemes (for larger networks) are implemented.

License GPL-3

Imports BiDAG (>= 1.3.0), Rcpp (>= 1.0.3)

LinkingTo Rcpp

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

NeedsCompilation yes

Repository CRAN

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R topics documented:

DAGintervention	*Exact estimation of intervention effects for a single DAG or a chain of sampled DAGs*

Description

DAGintervention takes a DAG or a sampled chain of DAGs (for example from the partitionMCMC function of the BiDAG package) and computes the intervention effect of each node on all others by exhaustively examining all possible binary states. This is exponentially complex in the number of variables which should therefore be limited to around 20 or fewer.

Usage

```
DAGintervention(incidences, dataParams, sample = TRUE)
```

Arguments

incidences	a single adjacency matrix of a list of adjacency matrices of sampled DAGs, with entry [i,j] equal to 1 when a directed edge exists from node i to node j
dataParams	the data and parameters used to learn the DAGs derived from the scoreparameters function of the BiDAG package
sample	logical indicating whether to sample the parameters of each node from the posterior (TRUE, default) or to take the expectation (FALSE)

Value

a single matrix or a list of matrices containing the full set of intervention effects for each input DAG. Entry [i,j] is the downstream effect on node j of intervening on node i (the difference observed at node j when setting node i to 1 and 0)

See Also

scoreparameters

Examples

```
scoreParam <- BiDAG::scoreparameters(8, "bde", BiDAG::Asia)
causalmat <- DAGintervention(BiDAG::Asiamat, scoreParam)
```

DAGinterventionMC	*Monte Carlo estimation of intervention effects for a DAG or chain of sampled DAGs*

Description

DAGinterventionMC takes a DAG or a sampled chain of DAGs (for example from the `partitionMCMC` function of the BiDAG package) and computes a Monte Carlo estimate of the intervention effect of each node on all others by simulating data from the DAG. By default each node is intervened upon and the downstream effects estimated by further sampling. A faster but less robust and accurate version is also offered which reweights a single simulated dataset.

Usage

```
DAGinterventionMC(
  incidences,
  dataParams,
  sampleSize,
  sample = TRUE,
  fixNode = TRUE,
  reducedVarianceSampling = TRUE
)
```

Arguments

incidences	a single adjacency matrix of a list of adjacency matrices of sampled DAGs, with entry [i,j] equal to 1 when a directed edge exists from node i to node j
dataParams	the data and parameters used to learn the DAGs derived from the `scoreparameters` function of the BiDAG package
sampleSize	the number of Monte Carlo samples to draw
sample	logical indicating whether to sample the parameters of each node from the posterior (TRUE, default) or to take the expectation (FALSE)
fixNode	logical indicating whether to intervene on each node (TRUE, default) and re-sample downstream nodes or to sample once and reweight the sample (FALSE)
reducedVarianceSampling	
	logical indicating whether to perform Bernoulli samping for each node (FALSE) or to sample from a distribution with the same mean and lower variance (TRUE, default)

Value

a single matrix or a list of matrices containing the full set of intervention effects for each input DAG. Entry [i,j] is the downstream effect on node j of intervening on node i (the difference observed at node j when setting node i to 1 and 0)

See Also

scoreparameters

Examples

```
scoreParam <- BiDAG::scoreparameters(8, "bde", BiDAG::Asia)
causalmatMC <- DAGinterventionMC(BiDAG::Asiamat, scoreParam, 1e4)
```

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