

Package ‘arulesNBMiner’

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Title Mining NB-Frequent Itemsets and NB-Precise Rules

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Description NBMiner is an implementation of the model-based mining algorithm for mining NB-frequent itemsets presented in “Michael Hahsler. A model-based frequency constraint for mining associations from transaction data. Data Mining and Knowledge Discovery, 13(2):137-166, September 2006.” In addition an extension for NB-precise rules is implemented.

Depends R (>= 2.6.0), arules (>= 0.6-6), rJava (>= 0.6-3)

Imports methods

SystemRequirements Java (>= 5.0)

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Agrawal

Synthetic Example Dataset Agrawal

Description

This dataset is generated by the method described by Agrawal and Srikant (1994) using the reimplementation in **arules** which also retains the patterns used in the generation process.

Usage

```
data(Agrawal)
```

Format

The format is: transactions Agrawal.db itemsets Agrawal.pat

Details

Agrawal.db contains the dataset (1000 items/20000 transactions) and Agrawal.pat contains the patterns that were used to create the dataset.

References

Rakesh Agrawal and Ramakrishnan Srikant (1994). Fast algorithms for mining association rules in large databases. In Jorge B. Bocca, Matthias Jarke, and Carlo Zaniolo, editors, *Proceedings of the 20th International Conference on Very Large Data Bases, VLDB*, pages 487-499, Santiago, Chile.

Examples

```
data(Agrawal)

summary(Agrawal.pat)
summary(Agrawal.db)

## the data sets was generated with the following code
## Not run:
Agrawal.pat <- random.patterns(1000, nPats = 2000, method = "agrawal",
  lPats = 2, corr = 0.5, cmean = 0.5, cvar = 0.1, iWeight = NULL,
  verbose = FALSE)
Agrawal.db <- random.transactions(1000, 20000, method="agrawal",
  patterns = Agrawal.pat)

## End(Not run)
```

Description

Calls the Java implementation of the depth first search algorithm described in the paper in the references section to mine NB-frequent itemsets of NB-precise rules.

Usage

```
NBMiner(data, parameter, control = NULL)
```

Arguments

data	object of class transactions.
parameter	a list of parameters (automatically converted into an object of class NBMinerParameter). Reasonable parameters can be obtained using NBMinerParameters (see details section).
control	a list of control options (automatically converted into an object of class NBMinerControl). Currently only "verbose" and "debug" (both logical) are available.

Details

The parameters can be estimated from the data using NBMinerParameters.

Value

An object of class itemsets or rules (depending on the rules entry in parameter). The estimated precision is stored in the quality slot.

References

Michael Hahsler. A model-based frequency constraint for mining associations from transaction data. *Data Mining and Knowledge Discovery*, 13(2):137-166, September 2006.

See Also

[NBMinerParameters](#), [transactions-class](#), [itemsets-class](#), [rules-class](#)

Examples

```
data("Agrawal")

## mine
param <- NBMinerParameters(Agrawal.db, pi=0.99, theta=0.5, maxlen=5,
  minlen=1, trim = 0, verb = TRUE, plot=TRUE)
itemsets_NB <- NBMiner(Agrawal.db, parameter = param,
  control = list(verb = TRUE, debug=FALSE))
```

```

inspect(head(itemsets_NB))

## remove patterns of length 1 (noise)
i_NB <- itemsets_NB[size(itemsets_NB)>1]
patterns <- Agrawal.pat[size(Agrawal.pat)>1]

## how many found itemsets are subsets of the patterns used in the db?
table(rowSums(is.subset(i_NB,patterns))>0)

## compare with the same number of the most frequent itemsets
itemsets_supp <- eclat(Agrawal.db, parameter=list(supp=0.001))
i_supp <- itemsets_supp[size(itemsets_supp) >1]
i_supp <- head(sort(i_supp, by = "support"), length(i_NB))
table(rowSums(is.subset(i_supp,patterns))>0)

## mine NB-precise rules
param <- NBMinerParameters(Agrawal.db, pi=0.99, theta=0.5, maxlen=5,
  rules=TRUE, minlen=1, trim = 0)
rules_NB <- NBMiner(Agrawal.db, parameter = param,
  control = list(verb = TRUE, debug=FALSE))

inspect(head(rules_NB))

```

NBMinerParameters

Estimate Global Model Parameters from Data

Description

Estimate the global negative binomial data model used by the NBMiner and create an appropriate parameter object.

Usage

```

NBMinerParameters(data, trim = 0.01, pi = 0.99, theta = 0.5,
  minlen = 1, maxlen = 5, rules = FALSE,
  plot = FALSE, verbose = FALSE, getdata = FALSE)

```

Arguments

<code>data</code>	the data as a object of class transactions.
<code>trim</code>	fraction of incidences to trim off the tail of the frequency distribution of the data.
<code>pi</code>	precision threshold π .
<code>theta</code>	pruning parameter θ .
<code>minlen</code>	minimum number of items in found itemsets (default: 1).
<code>maxlen</code>	maximal number of items in found itemsets (default: 5).
<code>rules</code>	mine NB-precise rules instead of NB-frequent itemsets?

plot	plot the model?
verbose	use verbose output for the estimation procedure.
getdata	get also the observed and estimated counts.

Details

Uses the EM algorithm to estimate the global NB model for the data. The EM algorithm is used since the zero class (items which do not occur in the dataset) is not included in the data. The result are the two NB parameters k and a , where a is rescaled by dividing it by the number of incidences in the data (this is needed by the NBMiner). Also the real number of items n is a result of the estimation.

theta and pi are just taken and added to the resulting parameter object.

Value

an object of class NBMinerParameter for NBMiner.

References

Michael Hahsler. A model-based frequency constraint for mining associations from transaction data. *Data Mining and Knowledge Discovery*,13(2):137-166, September 2006.

See Also

[NBMiner](#), [transactions-class](#)

Examples

```
data("Epub")

param <- NBMinerParameters(Epub, trim = 0.001, plot = TRUE, verbose = TRUE)
param
```

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