

# Package ‘rsubgroup’

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**Type** Package

**Title** Subgroup Discovery and Analytics

**Version** 1.1

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**Description** A collection of efficient and effective tools and algorithms for subgroup discovery and analytics. The package integrates an R interface to the org.vikamine.kernel library of the VIKAMINE system <<http://www.vikamine.org>> implementing subgroup discovery, pattern mining and analytics in Java.

**Classification/ACM** G.4, H.2.8, I.5.1

**License** GPL (>= 3)

**Depends** R (>= 2.10), methods, rJava (>= 0.6.3), foreign (>= 0.8.40)

**SystemRequirements** Java (>= 8)

**Collate** 'AAAonLoad.R' 'randomSeed.R' 'classes.R' 'subgroup.R'

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as.target	<i>Constructs a target variable (for subgroup discovery)</i>
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### Description

Constructs a target variable, i.e., an object suitable to be passed to DiscoverSubgroups or CreateSDTask.

### Usage

```
as.target(attribute, value=NULL)
```

### Arguments

attribute	The attribute of the target variable.
value	For binary targets, the respective attribute value; the value is NULL for numeric targets.

### See Also

[DiscoverSubgroups](#).

### Examples

```
# creating a target variable
# binary:
as.target("class", "true")

#numeric:
as.target("numeric_class")
```

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CreateSDTask	<i>Creates a Subgroup Discovery Task</i>
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**Description**

Performs subgroup discovery according to the given task.

**Usage**

```
CreateSDTask(source, target, config = SDTaskConfig())
```

**Arguments**

source	a data.frame or the a character string giving the filename of an ARFF file to use. Providing a file name directly provides the data to the subgroup discovery algorithms on the Java side, which is more memory efficient than converting the data frame to the Java representation.
target	the target variable (constructed by <code>as.target</code> ) to consider for subgroup discovery.
config	an instance of <code>SDTaskConfig</code> providing various parameters for subgroup discovery.

**See Also**

[DiscoverSubgroups](#). [DiscoverSubgroupsByTask](#) [SDTaskConfig](#)

**Examples**

```
# creating a task
data(credit.data)

# task with binary target
task <- CreateSDTask(credit.data, as.target("class", "good"))

# task with numeric target
taskNum <- CreateSDTask(credit.data, as.target("credit_amount"))
```

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credit.data	<i>Statlog (German Credit Data) Data Set</i>
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**Description**

This dataset classifies people described by a set of attributes as good or bad credit risks.

**Usage**

```
data(credit.data)
```

**Format**

A vector containing 1000 observations.

**Source**

UCI Repository, [https://archive.ics.uci.edu/ml/datasets/Statlog+\(German+Credit+Data\)](https://archive.ics.uci.edu/ml/datasets/Statlog+(German+Credit+Data)).

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DiscoverSubgroups      *Performs Subgroup Discovery*

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**Description**

Performs subgroup discovery according to the given target and the configuration on the data.

**Usage**

```
DiscoverSubgroups(source, target, config= SDTaskConfig(), as.df=FALSE)
```

**Arguments**

source	a data.frame or the a character string giving the filename of an ARFF file to use. Providing a file name directly provides the data to the subgroup discovery algorithms on the Java side, which is more memory efficient than converting the data frame to the Java representation.
target	the target variable (constructed by <code>as.target</code> ) to consider for subgroup discovery.
config	an instance of <code>SDTaskConfig</code> providing various parameters for subgroup discovery.
as.df	TRUE, if the result patterns should be returned as a data.frame using <a href="#">ToDataFrame</a>

**See Also**

[DiscoverSubgroupsByTask](#). [as.target](#) [CreateSDTask](#) [SDTaskConfig](#)

**Examples**

```
# subgroup discovery on a data.frame, for binary target
data(credit.data)
result1 <- DiscoverSubgroups(
  credit.data, as.target("class", "good"), new("SDTaskConfig",
  attributes=c("checking_status", "credit_amount", "employment", "purpose")))
result2 <- DiscoverSubgroups(
  credit.data, as.target("class", "good"), new("SDTaskConfig",
  attributes=c("checking_status", "employment")))

ToDataFrame(result1)
ToDataFrame(result2)
```

```
# subgroup discovery for numeric target variable
result3 <- DiscoverSubgroups(
  credit.data, as.target("credit_amount"), new("SDTaskConfig",
  attributes=c("checking_status", "employment")))

ToDataFrame(result3)
```

---

**DiscoverSubgroupsByTask**

*Performs Subgroup Discovery for a given Task*

---

**Description**

Performs subgroup discovery according to the given task.

**Usage**

```
DiscoverSubgroupsByTask(task, as.df=FALSE)
```

**Arguments**

task	a subgroup discovery task constructed by <code>CreateSDTask</code> .
as.df	TRUE, if the result patterns should be returned as a data.frame using <a href="#">ToDataFrame</a>

**See Also**

[DiscoverSubgroups](#). [CreateSDTask](#)

**Examples**

```
# creating a task
data(credit.data)
task <- CreateSDTask(
  credit.data, as.target("class", "bad"), SDTaskConfig(
  attributes=c("checking_status", "employment")))
taskNum <- CreateSDTask(
  credit.data, as.target("credit_amount"), SDTaskConfig(
  attributes=c("checking_status", "employment")))

# running the tasks
DiscoverSubgroupsByTask(task)
DiscoverSubgroupsByTask(taskNum)
```

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`is.pattern.matching`     *Tests whether a pattern and a data list (row of a data frame) match*

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### Description

Tests whether a pattern and a data list (row of a data frame) match, e.g., for implementing classification methods.

### Usage

```
is.pattern.matching(pattern, data.list)
```

### Arguments

<code>pattern</code>	An instance of class <code>Pattern</code> , e.g., returned by <code>DiscoverSubgroups</code> .
<code>data.list</code>	A list having the attributes as 'keys', and the values as respective values of the list. This corresponds, for example, to a row of a data frame.

### See Also

[Pattern-class](#).

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`Pattern-class`     *Class "Pattern" — A Simple Subgroup Description Container*

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### Description

A Simple Container holding the results (subgroups, description and parameters) for the Subgroup and Pattern Mining Algorithms

### Objects from the Class

Objects are created by calls of the form `new("Pattern", ...)`.

### Slots

**description:** The subgroup description, as a character vector.

**selectors:** The subgroup description, given as a list of (simple) selection expressions, where the 'key' is the attribute and the 'value' is the value.

**quality:** The numeric value denoting the quality of the subgroup pattern as determined by the applied quality function.

**size:** The size of the subgroup.

**parameters** Additional quality parameters of the subgroup.

### See Also

[DiscoverSubgroups](#). [DiscoverSubgroupsByTask](#) [CreateSDTask](#)

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rsubgroup	<i>rsubgroup Package - Algorithms and Tools for Efficient Subgroup Discovery and Analytics</i>
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## Description

The rsubgroup package contains a set of efficient and effective tools and algorithms for subgroup discovery and analytics. The package integrates an R interface to the org.vikamine.kernel library of the VIKAMINE system (<http://www.vikamine.org>).

Note: rsubgroup uses rJava. To set the maximum available heap space for Java, the .jinit command of rJava needs to be called before loading rsubgroup, i.e.

```
library(rJava) .jinit(parameters="-Xmx2048M") # for two gigabytes heap space, for example library(rsubgroup)
```

Please note that this needs to happen before rJava is used in any way. After the JVM has been initialized (and started), setting the heap space has no effect any more. Therefore, it is recommended to execute the .jinit(...) command right after loading the rJava package.

## Details

Package:	rsubgroup
Type:	Package
Version:	0.7
Date:	2015-07-xx
License:	GPL (>= 3)
LazyLoad:	yes

## Author(s)

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## References

1. Martin Atzmueller and Frank Puppe. SD-Map - A Fast Algorithm for Exhaustive Subgroup Discovery. Knowledge Discovery in Databases: PKDD 2006, LNAI 4213, pp. 6-17, Springer Verlag, 2006.
2. Martin Atzmueller and Florian Lemmerich. Fast Subgroup Discovery for Continuous Target Concepts. In: Foundations of Intelligent Systems, LNCS 5722, pp. 35-44, Springer Verlag, 2009.
3. Florian Lemmerich and Mathias Rohlfs and Martin Atzmueller. Fast Discovery of Relevant Subgroup Patterns. In: Proc. 23rd FLAIRS Conference, AAAI Press, 2010.

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SDTaskConfig	<i>Creates a Subgroup Discovery Task Configuration</i>
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### Description

Creates a subgroup discovery task configuration, that is, an instance of SDTaskConfig.

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SDTaskConfig-class	<i>Class “SDTaskConfig” — A Set of Configuration Settings</i>
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### Description

A Set of Configuration Settings for the Subgroup and Pattern Mining Algorithms

### Objects from the Class

Objects are created by calls of the form `SDTaskConfig(...)`.

### Slots

**attributes:** The list of attributes to consider for mining. Either a vector of attribute names, or NULL (the default), which includes all attributes.

**discretize:** Boolean, indicating whether to (automatically) discretize numeric attributes (default `discretize=TRUE`). Depends on parameter `nbins`. Either creates distinct values, if their number in the dataset is  $\leq$  `nbins`, or applies equal-frequency discretization for the respective numeric attribute.

**method:** A mining method; one of Beam-Search `beam`, BSD `bsd`, SD-Map `sdmap`, SD-Map enabling internal disjunctions `sdmap-dis`. The default is `method = "sdmap"`.

**nbins:** Specifies the number of bins to be used when discretizing numeric attributes (see `discretize` above).

**qf:** A quality function; one of: Adjusted Residuals `ares`, Binomial Test `bin`, Chi-Square Test `chi2`, Gain `gain`, Lift `lift`, Piatetsky-Shapiro `ps`, Relative Gain `relgain`, Weighted Relative Accuracy `wracc`. The default is `qf = "ps"`.

**k:** The maximum number (top-k) of patterns to discover, i.e., the best k rules according to the selected quality function. The default is `k = 20`

**minqual:** The minimal quality (default `minqual = 0`).

**minsize:** The minimal size of a subgroup (as an integer) (minimal coverage of database records, default `minsize = 0`).

**mintp:** The minimal true positive (tp) threshold, an integer (minimal (absolute) number of true positives in a subgroup, relevant for binary target concepts only), defaults to `mintp = 0`.

**maxlen:** The maximal length of a description of a pattern, i.e., the maximal number of conjunctions. This impacts both understandability and efficiency. Simpler rules are easier to understand, and a small `maxlen` will restrict the search space (default `maxlen = 7`).



**nodefaults:** Ignore default values, i.e., do not include the respective first value (with index 0) of each attribute (default `nodefaults=FALSE`, i.e., include all values).

**reelfilter:** Controls, whether irrelevant patterns are filtered during pattern mining; negatively impacts performance (default `reelfilter = FALSE`).

**postfilter:** Controls, whether a post-processing filter is applied; one (or a vector) of: Minimum Improvement (Global) `min-improve-global`, checks the patterns against all possible generalizations, Minimum Improvement (Pattern Set) `min-improve-set`, checks the patterns against all their generalizations in the result set, Relevancy Filter `relevancy`, removes patterns that are strictly irrelevant, Significant Improvement (Global) `sig-improve-global`, removes patterns that do not significantly improve (default 0.01 level) w.r.t. all their possible generalizations, Significant Improvement (Set) `sig-improve-set`, removes patterns that do not significantly improve (default 0.01 level) w.r.t. all generalizations in the result set, Weighted Covering `weighted-covering`, performs weighted covering on the data in order to select a covering set of subgroups while reducing the overlap on the data. By default no postfilter is set, i.e., `postfilter = ""`.

**parfilter:** Provides the minimal improvement value for the postfilter (for `min-improve-*` filters), or the significance level (P) for `sig-improve-*` filters.

#### See Also

[DiscoverSubgroups](#). [DiscoverSubgroupsByTask](#) [CreateSDTask](#)

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ToDataFrame

*Transforms patterns into a data frame*

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#### Description

Transforms a list/vector of patterns into a data frame for inspection and analysis.

#### Usage

```
ToDataFrame(patterns, ndigits = 2)
```

#### Arguments

<code>patterns</code>	List/vector of patterns.
<code>ndigits</code>	Number of significant digits when printing floats (optional).

#### See Also

[DiscoverSubgroups](#).

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