**Types of attributes and methods of the SpectralAnalyzer class**

Notation

* denotes the number of items.
* denotes the number of separate categories associated with the items.
* denotes the number of separate values in the category .
* denotes the number of nodes.
* denotes the number of patterns.
* denotes the number of years for which observations exist.
* denotes public attributes and methods (i.e. exported attributes and methods).
* denotes private attributes and methods (i.e. attributes and methods not exported).

Class attributes

***STATUS\_PERSISTENT***: character

***STATUS\_DECLINING***: character

***STATUS\_EMERGENT***: character

***STATUS\_LATENT***: character

***NODES***: character

***PATTERNS***: character

***RULES***: character

***NODES\_OR\_PATTERNS***: character

***NODES\_PATTERNS\_OR\_RULES***: character

***NODE\_LINKS***: character

***PATTERN\_LINKS***: character

Attributes

**observations**: list

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CODE** | vector(character) or vector(numeric) | **YEAR** | numeric | **…** | … |
| **CODE** | vector(character) or vector(numeric) | **YEAR** | numeric | **…** | … |
| **…** | … | **…** | … | **…** | … |
| **CODE** | vector(character) or vector(numeric) | **YEAR** | numeric | **…** | … |

**items**: named vector(character) or named vector(numeric)

**items\_categories**: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **category 1** | **category 2** | **…** | **category C** |
| **item 1** | factor | factor | … | factor |
| **item 2** | factor | factor | … | factor |
| **…** | … | … | … | … |
| **item I** | factor | factor | … | factor |

**categories\_colors**: list(named vector(character))

|  |  |  |  |
| --- | --- | --- | --- |
| $category1 | $category2 | … | $categoryC |
| |  |  | | --- | --- | | **value 1** | character | | **value 2** | character | | **…** | … | | **value** | character | | |  |  | | --- | --- | | **value 1** | character | | **value 2** | character | | **…** | … | | **value** | character | | … | |  |  | | --- | --- | | **value 1** | character | | **value 2** | character | | **…** | … | | **value** | character | |

**status\_colors**: vector(character)

**parameters**: list(**target**: character,

**count**: numeric,

**min\_length**: numeric,

**max\_length**: numeric,

**status\_limit**: numeric)

**nodes**: data.frame

|  |  |  |
| --- | --- | --- |
| **node** | **length** | **weight** |
| vector(character) | numeric | numeric |

**nodes\_per\_year**: matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **year 1** | **year 2** | **…** | **year Y** |
| **node 1** | numeric | numeric | … | numeric |
| **node 2** | numeric | numeric | … | numeric |
| **…** | … | … | … | … |
| **node N** | numeric | numeric | … | numeric |

**n\_links**: matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **node 1** | **node 2** | **…** | **node N** |
| **node 1** | numeric | numeric | … | numeric |
| **node 2** | numeric | numeric | … | numeric |
| **…** | … | … | … | … |
| **node N** | numeric | numeric | … | numeric |

**node\_links**: data.frame

|  |  |  |  |
| --- | --- | --- | --- |
| **endpoint.1** | **endpoint.2** | **items** | **weight** |
| numeric | numeric | character | numeric |

**obs\_patterns**: matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **pattern 1** | **pattern 2** | **…** | **pattern P** |
| **node 1** | logical | logical | … | logical |
| **node 2** | logical | logical | … | logical |
| **…** | … | … | … | … |
| **node N** | logical | logical | … | logical |

**patterns**: data.frame

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **pattern** | **year** | **frequency** | **weight** | **order** | **specificity** | **status** |
| vector(character) | numeric | numeric | numeric | numeric | numeric | character |

**patterns\_per\_year**: matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **year 1** | **year 2** | **…** | **year Y** |
| **pattern 1** | numeric | numeric | … | numeric |
| **pattern 2** | numeric | numeric | … | numeric |
| **…** | … | … | … | … |
| **pattern P** | numeric | numeric | … | numeric |

**p\_links**: matrix

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **pattern 1** | **pattern 2** | **…** | **pattern P** |
| **pattern 1** | numeric | numeric | … | numeric |
| **pattern 2** | numeric | numeric | … | numeric |
| **…** | … | … | … | … |
| **pattern P** | numeric | numeric | … | numeric |

**pattern\_links**: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **endpoint.1** | **endpoint.2** | **items** | **weight** | **year** |
| numeric | numeric | character | numeric | numeric |

Methods

**spectral.analyzer(observations**: see attribute **observations**, **items**: see data.frame below,

**target**: character, **count**: numeric, **min\_length**: numeric, **max\_length**: numeric,

**status\_limit**: numeric, **init**: logical, **verbose**: logical**)**: SpectralAnalyzer

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **item** | **name** | **category 1** | **category 2** | **…** | **category C** |
| character | character | factor | factor | … | factor |

**reset(object**: SpectralAnalyzer, **from**: numeric, **verbose**: logical**)**

**init(part**: character, **verbose**: logical**):** itemsets (class object from arulespackage) or NULL

**init\_nodes(verbose**: logical**)**

**init\_node\_links(verbose**: logical**)**

**init\_patterns(verbose**: logical**):** itemsets (class object from arulespackage) or NULL

**init\_pattern\_links(verbose**: logical**)**

**is\_init(part**: character**)**: logical or vector(logical)

**is\_init\_nodes()**: logical

**is\_init\_node\_links()**: logical

**is\_init\_patterns()**: logical

**is\_init\_pattern\_links()**: logical

**check\_init(part**: character or vector(character), **stop**: logical, **prefix**: character, **suffix**: character**)**:

logical or vector(logical)

**list\_obs\_per\_year()**: see attribute **nodes\_per\_year**

**list\_separate\_obs()**: see attribute **nodes**

**count\_links(entities**: character**)**: see attributes **n\_links** and **p\_links**

**search\_links(entities**: character**)**: see attributes **node\_links** and **pattern\_links**

**list\_separate\_patterns(target**: character, **count**: numeric, **min\_length**: numeric,

**max\_length**: numeric, **arules**: logical**)**: itemsets (class object from arules

package) or data.frame

|  |  |
| --- | --- |
| **pattern** | **weight** |
| vector(character) | numeric |

**list\_patterns\_by\_obs()**: see attribute **obs\_patterns**

**list\_patterns\_per\_year()**: see attribute **patterns\_per\_year**

**compute\_patterns\_characteristics()**: see attribute **patterns**

**compute\_specificity(patterns**: list(vector(character)), **frequencies**: vector(numeric),

**weights**: vector(numeric)**)**: vector(numeric)

**compute\_ksi\_threshold(reporting\_indexes**: vector(numeric)**)**: numeric

**compute\_ri\_threshold(reporting\_indexes**: vector(numeric), **ksi**: numeric**)**: numeric

**compute\_reporting\_indexes(patterns**: list(vector(character)), **t**: numeric, **period**: numeric**)**:

data.frame

|  |  |
| --- | --- |
| **pattern** | **Ri** |
| vector(character) | Numeric |

**check\_params\_for\_RI(t**: numeric, **period**: numeric**)**: list

|  |  |
| --- | --- |
| **t** | numeric |
| **period** | numeric |

**compute\_reporting\_indexes\_limits(patterns**: list(vector(character)), **first\_limit**: numeric,

**t**: numeric, **period**: numeric**)**: data.frame

|  |  |  |
| --- | --- | --- |
| **pattern** | **ri\_2** | **ri\_period** |
| vector(character) | numeric | numeric |

**define\_dynamic\_status(patterns**: list(vector(character)), **status\_limit**: numeric, **t**: numeric,

**period**: numeric**)**: data.frame

|  |  |
| --- | --- |
| **pattern** | **Status** |
| vector(character) | character |

**spectrum\_chart(pc**: character or see attribute **patterns**, **identifiers**: character, **sort**: logical,

**title**: character, **path**: character, **name**: character**)**: data.frame

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ID** | **Pattern** | **frequency** | **weight** | **order** | **specificity** | **status** |
| numeric | vector(character) | numeric | numeric | numeric | numeric | character |

**plot\_spectrum\_chart(pc**: see attribute **patterns**,

**weights**: see method **weight\_by\_node\_complexity**, **title**: character**)**

**pattern\_node\_characteristics(patterns**: list(vector(character))**)**: list

[["weights"]]:

|  |  |
| --- | --- |
| **1** | vector(numeric) |
| **2** | vector(numeric) |
| **…** | … |
| **P** | vector(numeric) |

[["lengths"]]:

|  |  |
| --- | --- |
| **1** | vector(numeric) |
| **2** | vector(numeric) |
| **…** | … |
| **P** | vector(numeric) |

**weight\_by\_node\_complexity(patterns**: list(vector(character))**)**: matrix

|  |  |
| --- | --- |
| **complex** | **simple** |
| numeric | numeric |

**spectrosome\_chart(nopc**: character or see attribute **nodes** or **patterns**, **identifiers**: character,

**nb\_graphs**: numeric, **min\_link\_weight**: numeric,

**vertex\_size**: character or numeric or vector(numeric),

**size\_range**: vector(numeric), **vertex\_col**: character or vector(character),

**clusters**: numeric, **highlight**: numeric, **use\_names**: logical, **n.cutoff**: numeric,

**c.cutoff**: numeric, **display\_mixt**: logical, **title**: character, **path**: character,

**name**: character, **…)**: list

[["vertices"]]: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **node** | **length** | **weight** | **degree** |
| numeric | vector(character) | numeric | numeric | numeric |

or (depends on the type of entities contained in **nopc**)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **pattern** | **frequency** | **weight** | **order** | **specificity** | **status** | **degree** |
| numeric | vector(character) | numeric | numeric | numeric | numeric | character | numeric |

[["edges"]]: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **endpoint.1** | **endpoint.2** | **items** | **weight** |
| numeric | numeric | numeric | character | numeric |

or (depends on the type of entities contained in **nopc**)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **endpoint.1** | **endpoint.2** | **items** | **weight** | **year** |
| numeric | numeric | numeric | character | numeric | numeric |

[["coords"]]: list(matrix)

|  |  |  |
| --- | --- | --- |
|  | **x** | **y** |
| **vertex 1** | numeric | numeric |
| **vertex 2** | numeric | numeric |
| **…** | … | … |
| **vertex P** | numeric | numeric |

**cluster\_text(graph**: see matrix below, **links**: see attributes **node\_links** and **pattern\_links**,

**display**: numeric, **highlight**: numeric, **use\_names**: logical, **cutoff**: numeric**)**

|  |  |  |
| --- | --- | --- |
|  | **x** | **y** |
| **vertex 1** | numeric | numeric |
| **vertex 2** | numeric | numeric |
| **…** | … | … |
| **vertex P** | numeric | numeric |

**cluster\_chart(nopc**: character or see attribute **nodes** or **patterns**, **item**: numeric,

**identifiers**: character, **use\_name**: logical, **n.cutoff**: numeric,

**vertex\_size**: character or numeric or vector(numeric),

**size\_range**: vector(numeric), **vertex\_col**: character or vector(character),

**c.cutoff**: numeric, **display\_mixt**: logical, **title**: character, **path**: character,

**name**: character, **…)**: list

[["vertices"]]: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **node** | **length** | **weight** | **degree** |
| numeric | vector(character) | numeric | numeric | numeric |

or (depends on the type of entities contained in **nopc**)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **ID** | **pattern** | **frequency** | **weight** | **order** | **specificity** | **status** | **degree** |
| numeric | vector(character) | numeric | numeric | numeric | numeric | character | numeric |

[["edges"]]: data.frame

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **ID** | **endpoint.1** | **endpoint.2** | **items** | **weight** |
| numeric | numeric | numeric | character | numeric |

or (depends on the type of entities contained in **nopc**)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **ID** | **endpoint.1** | **endpoint.2** | **items** | **weight** | **year** |
| numeric | numeric | numeric | character | numeric | numeric |

[["coords"]]: matrix

|  |  |  |
| --- | --- | --- |
|  | **x** | **y** |
| **vertex 1** | numeric | numeric |
| **vertex 2** | numeric | numeric |
| **…** | … | … |
| **vertex P** | numeric | numeric |

**network\_density(links:** see attribute **node\_links** or **pattern\_links)**: numeric

**degree(ID:** numeric**, links:** see attribute **node\_links** or **pattern\_links)**: numeric

**pattern\_chart(pc**: character or see attribute **patterns**, **identifiers**: character, **length\_one**: logical,

**jitter**: logical, **display\_status**: logical, **display\_text**: character, **use\_names**: logical,

**n.cutoff**: numeric, **category**: character or numeric, **c.cutoff**: numeric,

**sort\_by**: character, **title**: character, **path**: character, **name**: character**)**: data.frame

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ID** | **pattern** | **frequency** | **weight** | **order** | **specificity** | **status** |
| numeric | vector(character) | numeric | numeric | numeric | numeric | character |

**plot\_pattern\_chart(pc**: see attribute **patterns**, **items\_category:** see data.frame below,

**category:** character, **c.cutoff:** numeric, **use\_names**: logical, **n.cutoff**: numeric,

**jitter**: logical, **display\_status**: logical, **display\_text:** character, **title:** character**)**

|  |  |
| --- | --- |
| **item** | **category** |
| character | character |

**category\_tree\_chart(category**: character or numeric, **items**: see attribute **items**,

**use\_names**: logical, **n.cutoff**: numeric, **c.cutoff**: numeric,

**vertex\_size**: numeric, **vertex\_alpha**: numeric, **leaf\_size**: numeric,

**leaf\_alpha**: numeric, **leaf\_margin**: numeric, **label\_size**: numeric,

**label\_margin**: numeric**)**: ggplot2 graph

**co\_occurrence\_chart(items**: see attribute **items**, **category**: character or numeric,

**min\_occ**: numeric, **max\_occ**: numeric, **use\_names**: logical, **n.cutoff**: numeric,

**c.cutoff**: numeric, **sort\_by**: character, **vertex\_size**: numeric,

**vertex\_alpha**: numeric, **vertex\_margin**: numeric, **label\_size**: numeric,

**label\_margin**: numeric, **edge\_tension**: numeric, **edge\_alpha**: numeric,

**palette**: character or numeric, **palette\_direction**: numeric**)**: ggplot2 graph

**extract\_rules(from**: character or list, **pruning**: logical, **arules**: logical, **as\_sets**: logical, **…)**: rules (class object from arules package) or data.frame

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **antecedent** |  | **consequent** | **support** | **confidence** | **lift** | **count** |
| vector(character) | => | character | numeric | numeric | numeric | numeric |

or (**antecedent** and **consequent** types depend on the value of **as\_sets**. Presence of **count** or **itemset** depends on the value of **from**)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **antecedent** |  | **consequent** | **support** | **confidence** | **lift** | **itemset** |
| factor | => | factor | numeric | numeric | numeric | numeric |

**rules\_chart(rules**: see method **extract\_rules**, **items**: see attribute **items**, **parameters**: list,

**display**: character, **threshold**: numeric, **use\_names**: logical, **n.cutoff**: numeric,

**category**: character or numeric, **c.cutoff**: numeric, **sort\_by**: character,

**vertex\_size**: numeric, **vertex\_alpha**: numeric, **vertex\_margin**: numeric,

**label\_size**: numeric, **label\_margin**: numeric, **edge\_tension**: numeric,

**edge\_alpha**: numeric, **palette**: character, **palette\_direction**: numeric**)**: list

[["graph"]]: ggplot2 graph

[["rules"]]: see method **extract\_rules**

**save\_characteristics(characteristics**: character or see attribute **nodes** or **patterns** or return of

function **extract\_rules**, **…)**

**get\_nodes(****nc**: character or see attribute **nodes**, **element**: character or numeric,

**value**: numeric or vector(numeric) or character or vector(character),

**condition**: character**)**: see attribute **nodes**

**get\_nodes\_from\_items(nc**: character or see attribute **nodes**, **items**: vector(numeric),

**condition**: character**)**: see attribute **nodes**

**get\_nodes\_from\_characteristic(nc**: character or see attribute **nodes**, **characteristic**: character,

**value**: numeric, **condition**: character**)**: see attribute **nodes**

**get\_nodes\_from\_category(nc**: character or see attribute **nodes**, **category**: character or numeric,

**value**: character, **condition**: character**)**: see attribute **nodes**

**get\_patterns(pc**: character or see attribute **patterns**, **element**: character or numeric,

**value**: numeric or vector(numeric) or character or vector(character),

**condition**: character**)**: see attribute **patterns**

**get\_patterns\_from\_items(pc**: character or see attribute **patterns**, **items**: vector(numeric),

**condition**: character**)**: see attribute **patterns**

**get\_patterns\_from\_characteristic(pc**: character or see attribute **patterns**,

**characteristic**: character, **value**: numeric, **condition**: character**)**:

see attribute **patterns**

**get\_patterns\_from\_status(pc**: character or see attribute **patterns**, **value**: vector(character),

**condition**: character**)**: see attribute **patterns**

**get\_patterns\_from\_category(pc**: character or see attribute **patterns**,

**category**: character or numeric, **value**: character,

**condition**: character**)**: see attribute **patterns**

**get\_links(nopc**: character or see attribute **nodes** or **patterns)**: see attribute **node\_links** or

**pattern\_links**

**get\_isolates(nopc**: character or see attribute **nodes** or **patterns)**: see attribute **nodes** or **patterns**

**get\_non\_isolates(nopc**: character or see attribute **nodes** or **patterns)**: see attribute **nodes** or

**patterns**

**get\_complexes(nopc**: character or see attribute **nodes** or **patterns**,

**category**: character or numeric, **condition**: character, **min\_nb\_values**: numeric**)**:

see attribute **nodes** or **patterns**

**check\_access\_for\_category(category**: character or numeric, **value**: character, **stop**: logical**)**: logical

**get\_item\_names(items**: vector(character) or vector(numeric) according to the attribute **items)**:

vector(character)

**get\_items(items**: vector(character) or vector(numeric) according to the attribute **items)**:

see attribute **items**

**get\_nopc(nopc**: character or see attribute **nodes** or **patterns**, **entities**: character**)**: see attribute

**nodes** or **patterns**

**get\_nop(nop**: character or list(vector(character)), **entities**: character**)**: list(vector(character))

**which\_entities(npr**: see attribute **nodes** or **patterns** or return of function **extract\_rules**,

**entities**: character**)**: character

**which\_associated\_links(name**: character**)**: character

**which\_name(name**: character or vector(character)**)**: character or vector(character)