

# Types of attributes and methods of the class SpectralAnalyzer

## Notation

- $I$  denotes the number of items.
- $C$  denotes the number of separate categories associated with the items.
- $V_c$  denotes the number of separate values in the category  $c$ .
- $N$  denotes the number of nodes.
- $P$  denotes the number of patterns.
- $Y$  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**: ObservationSet
- + **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

value 1	character
value 2	character
...	...
value $V_1$	character

\$category2

value 1	character
value 2	character
...	...
value $V_2$	character

...

\$categoryC

value 1	character
value 2	character
...	...
value $V_C$	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	length	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 arules package) or NULL

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

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

– **init\_patterns**(**verbose**: logical): itemsets (class object from arules package) 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)**: vector(numeric)
- **check\_params\_for\_RI(t: numeric, period: numeric)**: list

t	numeric
period	numeric

- **compute\_reporting\_indexes\_limits(patterns: list(vector(character)), t: numeric, period: numeric, short\_limit: numeric)**: matrix

RI.period	RI.limit
numeric	numeric

- **define\_dynamic\_status(patterns: list(vector(character)), t: numeric, period: numeric, short\_limit: numeric)**: vector(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	length	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	length	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	length	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

+ **itemset\_chart**(**nopc**: character or see attribute **nodes** or **patterns**, **identifiers**: character, **length\_one**: logical, **jitter**: logical, **under**: character, **over**: 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	node	length	weight
numeric	vector(character)	numeric	numeric

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

ID	pattern	frequency	weight	length	specificity	status
numeric	vector(character)	numeric	numeric	numeric	numeric	character

– **plot\_itemset\_chart**(**nopc**: see attribute **nodes** or **patterns**, **items\_category**: see data.frame below, **category**: character, **c.cutoff**: numeric, **use\_names**: logical, **n.cutoff**: numeric, **jitter**: logical, **under**: character, **over**: 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)