

# Types of attributes and methods of the class TransactionAnalyzer

## 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 transactions exist.
- $J$  denotes the number of itemsets.
- $+$  denotes public attributes and methods (i.e. exported attributes and methods).
- $-$  denotes private attributes and methods (i.e. non-exported attributes and methods).

## Class attributes

- ***STATUS\_PERSISTENT***: character
- ***STATUS\_DECLINING***: character
- ***STATUS\_EMERGENT***: character
- ***STATUS\_LATENT***: character
  
- ***TRANSACTIONS***: character
- ***NODES***: character
- ***PATTERNS***: character
- ***RULES***: character
  
- ***NODES\_OR\_PATTERNS***: character
- ***NODES\_PATTERNS\_OR\_RULES***: character
- ***NODES\_PATTERNS\_OR\_TRANSACTIONS***: character
- ***ANY\_ITEMSETS***: character
  
- ***NODE\_LINKS***: character
- ***PATTERN\_LINKS***: character

# Attributes

- + **transactions**: TransactionSet
- + **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	frequency
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

+ **nodes\_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	length	frequency	weight	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

+ **transaction.analyzer**(**transactions**: see attribute **transactions**, **items**: see data.frame below,  
**target**: character, **count**: numeric, **min\_length**: numeric,  
**max\_length**: numeric, **status\_limit**: numeric, **init**: logical, **verbose**: logical):  
TransactionAnalyzer

item	name	category 1	category 2	...	category <i>C</i>
character	character	factor	factor	...	factor

+ **reset**(**object**: TransactionAnalyzer, **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\_trx\_per\_year**(): see attribute **nodes\_per\_year**

– **list\_separate\_trx**(): 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	frequency
vector(character)	numeric

– **list\_patterns\_by\_trx**(): see attribute **nodes\_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)

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

<b>t</b>	numeric
<b>period</b>	numeric

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

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

<b>RI.period</b>	<b>RI.limit</b>
numeric	numeric

– **compute\_xi\_threshold**(**reporting\_indexes**: vector(numeric)): numeric

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

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

[["res"]]: data.frame

<b>RI.period</b>	<b>is.above.threshold.1</b>	<b>RI.limit</b>	<b>is.above.threshold.2</b>	<b>status</b>
numeric	logical	numeric	logical	character

[["thresholds"]]: matrix

	<b>threshold.1</b>	<b>threshold.2</b>
<b>xi</b>	numeric	numeric
<b>RI</b>	numeric	numeric

+ **spectrum\_chart**(**pc**: character or see attribute **patterns**, **identifiers**: character, **sort**: logical,  
**title**: character, **path**: character, **name**: character): data.frame

<b>ID</b>	<b>pattern</b>	<b>year</b>	<b>length</b>	<b>frequency</b>	<b>f.complex</b>	<b>f.simple</b>	<b>weight</b>	<b>specificity</b>	<b>status</b>
numeric	vector	numeric	numeric	numeric	numeric	numeric	numeric	numeric	character

– **plot\_spectrum\_chart**(**pc**: see attribute **patterns**,  
**frequencies**: see method **frequency\_by\_node\_complexity**, **title**: character)

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

[["frequencies"]]:

<b>1</b>	vector(numeric)
<b>2</b>	vector(numeric)
...	...
<b>P</b>	vector(numeric)

[["lengths"]]:

<b>1</b>	vector(numeric)
<b>2</b>	vector(numeric)
...	...
<b>P</b>	vector(numeric)

+ **frequency\_by\_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	frequency	degree
numeric	vector(character)	numeric	numeric	numeric

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

ID	pattern	year	length	frequency	weight	specificity	status	degree
numeric	vector(character)	numeric	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 <i>N</i> or <i>P</i>	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 <i>N</i> or <i>P</i>	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	frequency
numeric	vector(character)	numeric	numeric

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

ID	pattern	year	length	frequency	weight	specificity	status
numeric	vector(character)	numeric	numeric	numeric	numeric	numeric	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\_looseness**: numeric, **edge\_alpha**: numeric, **palette**: character or numeric, **palette\_direction**: numeric): ggplot2 graph

+ **extract\_rules**(**itemsets**: 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 **itemsets**)

antecedent		consequent	support	confidence	lift	itemset
factor	=>	factor	numeric	numeric	numeric	numeric

+ **rules\_chart**(**rules**: see method **extract\_rules**, **items**: see attribute **items**, **parameter**: 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\_looseness**: numeric, **edge\_alpha**: numeric, **palette**: character, **palette\_direction**: numeric): list

[["graph"]]: ggplot2 graph

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

- + **export(nporc:** see attribute **nodes** or **patterns** or return of function **extract\_rules, ...)**
  
- + **get\_trx\_from\_category(trx:** TransactionSet, **category:** character or numeric, **value:** character):  
TransactionSet
  
- + **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**
  
- + **get\_item\_names(items:** vector(character) or vector(numeric) according to the attribute **items**):  
vector(character)



+ **category\_values**(itemsets: list(vector(character)), as\_character: logical, unique: logical):

list(list(factor))

\$category1

itemset 1	factor
itemset 2	factor
...	...
itemset J	factor

\$category2

itemset 1	factor
itemset 2	factor
...	...
itemset J	factor

...

\$categoryC

itemset 1	factor
itemset 2	factor
...	...
itemset J	factor

or data.frame (according to the value of **as\_character**)

	category 1	category 2	...	category C
itemset 1	vector(character)	vector(character)	...	vector(character)
itemset 2	vector(character)	vector(character)	...	vector(character)
...	...	...	...	...
itemset J	vector(character)	vector(character)	...	vector(character)

- **check\_access\_for\_category**(category: character or numeric, value: character, stop: logical): logical
- **has\_item\_names**(): logical
- **get\_items**(items: vector(character) or vector(numeric) according to the attribute **items**):  
see attribute **items**
- **get\_items\_from\_category**(category: character or numeric, value: character,  
**force\_character**: logical): vector(character) or vector(numeric)
- **get\_tnp**(tnp: character or TransactionSet or see attribute **nodes** or **patterns**, entities: character):  
see attribute **transactions**, **nodes** or **patterns**
- **get\_tnp\_itemsets**(tnp: 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)