

# 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.
- $+$  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
  
- ***TRANSACTIONS***: character
- ***NODES***: character
- ***PATTERNS***: character
- ***RULES***: character
  
- ***NODES\_OR\_PATTERNS***: character
- ***NODES\_PATTERNS\_OR\_RULES***: character
- ***NODES\_PATTERNS\_OR\_TRANSACTIONS***: 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 C
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

t	numeric
period	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

RI.period	RI.limit
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

RI.period	is.above.threshold.1	RI.limit	is.above.threshold.2	status
numeric	logical	numeric	logical	character

[[ "thresholds" ]]: matrix

	threshold.1	threshold.2
xi	numeric	numeric
RI	numeric	numeric

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

ID	pattern	year	length	frequency	weight	specificity	status
numeric	vector(character)	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" ]]:

1	vector(numeric)
2	vector(numeric)
...	...
P	vector(numeric)

[[ "lengths" ]]:

1	vector(numeric)
2	vector(numeric)
...	...
P	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 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\_mixed**: 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"]]: 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	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\_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**

+ **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**
- **check\_access\_for\_category**(**category**: character or numeric, **value**: character, **stop**: logical): logical
- **has\_item\_names**(): 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\_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)