

# 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,  
**min\_frequency**: integer,  
**min\_length**: integer,  
**max\_length**: numeric,  
**status\_limit**: numeric)

- + **nodes**: data.frame

node	length	frequency
vector(character)	integer	integer

- + **nodes\_per\_year**: matrix

	year 1	year 2	...	year $Y$
node 1	integer	integer	...	integer
node 2	integer	integer	...	integer
...	...	...	...	...
node $N$	integer	integer	...	integer

- + **n\_links**: matrix

	node 1	node 2	...	node $N$
node 1	integer	integer	...	integer
node 2	integer	integer	...	integer
...	...	...	...	...
node $N$	integer	integer	...	integer

+ **node\_links**: data.frame

endpoint.1	endpoint.2	items	weight
integer	integer	character	integer

+ **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	support	frequency	weight	specificity	status
vector(character)	integer	integer	numeric	integer	integer	numeric	character

+ **patterns\_per\_year**: matrix

	year 1	year 2	...	year $Y$
pattern 1	integer	integer	...	integer
pattern 2	integer	integer	...	integer
...	...	...	...	...
pattern $P$	integer	integer	...	integer

+ **p\_links**: matrix

	pattern 1	pattern 2	...	pattern $P$
pattern 1	integer	integer	...	integer
pattern 2	integer	integer	...	integer
...	...	...	...	...
pattern $P$	integer	integer	...	integer

+ **pattern\_links**: data.frame

endpoint.1	endpoint.2	items	weight	year
integer	integer	character	integer	integer

## Constructor

+ **transaction.analyzer**(**transactions**: TransactionSet, **items**: see data.frame below,

**target**: character, **min\_frequency**: 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

# Methods

- + **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, min\_frequency: numeric, min\_length: numeric, max\_length: numeric, arules: logical):** itemsets (class object from arules package) or data.frame

pattern	support	frequency
vector(character)	numeric	integer

- **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(end: numeric, period: numeric):** vector(integer)
- | end     | period  |
|---------|---------|
| integer | integer |
- **compute\_reporting\_indexes(patterns: list(vector(character)), end: numeric, period: numeric):**  
vector(numeric)

- **compute\_reporting\_indexes\_limits**(**patterns**: list(vector(character)), **end**: numeric, **overall\_period**: numeric, **recent\_period**: numeric): matrix

RI.overall	RI.recent
numeric	numeric

- **compute\_xi\_threshold**(**reporting\_indexes**: vector(numeric)): integer
- **compute\_ri\_threshold**(**reporting\_indexes**: vector(numeric), **xi**: numeric): numeric
- + **dynamic\_status**(**patterns**: list(vector(character)), **end**: numeric, **overall\_period**: numeric, **recent\_period**: numeric): list

[[ "res" ]]: data.frame

RI.overall	is.above.threshold.1	RI.recent	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	support	frequency	f.complex	f.simple	weight	specificity	status
integer	vector	integer	integer	numeric	integer	integer	integer	integer	numeric	character

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

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

[[ "frequencies" ]]:

1	vector(integer)
2	vector(integer)
...	...
P	vector(integer)

[[ "lengths" ]]:

1	vector(integer)
2	vector(integer)
...	...
P	vector(integer)

- + **frequency\_by\_complexity**(**patterns**: list(vector(character))): matrix

complex	simple
integer	integer

+ **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
integer	vector(character)	integer	integer	integer

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

ID	pattern	year	length	support	frequency	weight	specificity	status	degree
integer	vector(character)	integer	integer	numeric	integer	integer	numeric	character	integer

[["edges"]]: data.frame

ID	endpoint.1	endpoint.2	items	weight
integer	integer	integer	character	integer

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

ID	endpoint.1	endpoint.2	items	weight	year
integer	integer	integer	character	integer	integer

[["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**): integer

+ **itemset\_chart**(**tnpc**: character or TransactionSet 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): TransactionSet or data.frame

ID	node	length	frequency
integer	vector(character)	integer	integer

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

ID	pattern	year	length	support	frequency	weight	specificity	status
integer	vector(character)	integer	integer	numeric	integer	integer	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,  
**co\_occ**: matrix(numeric), **proportions**: logical, **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,  
**more**: logical, ...): rules (class object from arules package) or data.frame

antecedent		consequent	support	confidence	lift	frequency
vector(character)	=>	character	numeric	numeric	numeric	integer

or (**antecedent** and **consequent** types depend on the value of **as\_sets**; presence of **itemset** depends on the value of **itemsets**)

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

and (depending on the value of **more**) additional columns preceding the one named **itemset**: see method **compute\_additional\_rule\_indicators**.

– **compute\_additional\_rule\_indicators**(**rules**: rules (class object from arules package),  
**transactions**: transactions (class from arules package)):  
matrix

specificity	accuracy	added.value
numeric	numeric	numeric

+ **rules\_chart**(rules: see method **extract\_rules**, items: see attribute **items**, parameter: list, display: character, threshold: numeric, direction: logical, 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, plot: logical): 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: character or TransactionSet, category: character or numeric, value: character, as\_indices: logical): TransactionSet or named vector(integer)

+ **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)
- + **get\_item\_colors**(**category**: character or numeric,  
**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		\$category2		...	\$categoryC	
itemset 1	factor	itemset 1	factor		itemset 1	factor
itemset 2	factor	itemset 2	factor		itemset 2	factor
...	...	...	...		...	...
itemset J	factor	itemset J	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):  
TransactionSet or see attribute **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)