# Package: BaseSet (via r-universe)

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**Title** Working with Sets the Tidy Way

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**Description** Implements a class and methods to work with sets, doing intersection, union, complementary sets, power sets, cartesian product and other set operations in a ``tidy" way. These set operations are available for both classical sets and fuzzy sets. Import sets from several formats or from other several data structures.

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---

`activate` *Determine the context of subsequent manipulations.*

---

## Description

Functions to help to perform some action to just some type of data: elements, sets or relations. `activate`: To table the focus of future manipulations: elements, sets or relations. `active`: To check the focus on the `TidySet`. `deactivate`: To remove the focus on a specific `TidySet`-

## Usage

```
activate(.data, what)

active(.data)

deactivate(.data)
```

## Arguments

| | |
|---|---|
| .data | A TidySet object. |
| what | Either "elements", "sets" or "relations" |

## Value

A TidySet object.

## See Also

Other methods: TidySet-class, add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
a <- tidySet(relations)
elements(a) <- cbind(elements(a),
    type = c(rep("Gene", 4), rep("lncRNA", 2))
)
# Filter in the whole TidySet
filter(a, elements == "a")
filter(a, elements == "a", type == "Gene")
# Equivalent to filter_elements
filter_element(a, type == "Gene")
a <- activate(a, "elements")
active(a)
filter(a, type == "Gene")
a <- deactivate(a)
active(a)
filter(a, type == "Gene")
```

add_column *Add column*

## Description

Add column to a slot of the TidySet object.

## Usage

```
add_column(object, slot, columns)

## S4 method for signature 'TidySet,character'
add_column(object, slot, columns)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| slot | A TidySet slot. |
| columns | The columns to add. |

## Value

A TidySet object.

## Methods (by class)

- add_column(object = TidySet, slot = character): Add a column to any slot

## See Also

rename_set()

Other column: remove_column()

Other methods: TidySet-class, activate(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
```

```
TS <- tidySet(relations)
add_column(TS, "relations", data.frame(well = c(
    "GOOD", "BAD", "WORSE",
    "UGLY", "FOE", "HEY"
)))
```

---

`add_elements` *Add elements to a TidySet*

---

## Description

Functions to add elements. If the elements are new they are added, otherwise they are omitted.

## Usage

```
add_elements(object, elements, ...)
```

## Arguments

| | |
|---|---|
| `object` | A `TidySet` object |
| `elements` | A character vector of the elements. |
| `...` | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A `TidySet` object with the new elements.

## Note

`add_element` doesn't set up any other information about the elements. Remember to add/modify them if needed with `mutate` or `mutate_element`

## See Also

Other add_*: `add_relations()`, `add_sets()`

## Examples

```
x <- list("a" = letters[1:5], "b" = LETTERS[3:7])
a <- tidySet(x)
b <- add_elements(a, "fg")
elements(b)
```

add_relation *Add relations*

## Description

Given a TidySet adds new relations between elements and sets.

## Usage

```
add_relation(object, relations, ...)

## S4 method for signature 'TidySet,data.frame'
add_relation(object, relations)
```

## Arguments

| | |
|---|---|
| object | A TidySet object |
| relations | A data.frame object |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A TidySet object.

## Methods (by class)

- add_relation(object = TidySet, relations = data.frame): Adds relations

## See Also

Other methods: TidySet-class, activate(), add_column(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
relations <- data.frame(
```

```
    sets = c(rep("A2", 5), "B2"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6),
    new = runif(6)
)
add_relation(TS, relations)
```

---

`add_relations` *Add relations to a TidySet*

---

## Description

Adds new relations to existing or new sets and elements. If the sets or elements do not exist they are added.

## Usage

```
add_relations(object, elements, sets, fuzzy, ...)
```

## Arguments

| | |
|---|---|
| `object` | A `TidySet` object |
| `elements` | A character vector of the elements. |
| `sets` | A character vector of sets to be added. |
| `fuzzy` | The strength of the membership. |
| `...` | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A `TidySet` object with the new relations.

## Note

`add_relations` doesn't set up any other information about the relationship. Remember to add/modify them if needed with `mutate` or `mutate_relation`

## See Also

`add_relation()` to add relations with new sets or/and new elements.

Other add_*: `add_elements()`, `add_sets()`

### Examples

```
x <- list("a" = letters[1:5], "b" = LETTERS[3:7])
a <- tidySet(x)
add_relations(a, elements = c("a", "b", "g"), sets = "d")
add_relations(a, elements = c("a", "b"), sets = c("d", "g"))
add_relations(a, elements = c("a", "b"), sets = c("d", "g"), fuzzy = 0.5)
add_relations(a,
    elements = c("a", "b"), sets = c("d", "g"),
    fuzzy = c(0.5, 0.7)
)
```

---

## add_sets *Add sets to a TidySet*

---

### Description

Functions to add sets. If the sets are new they are added, otherwise they are omitted.

### Usage

```
add_sets(object, sets, ...)
```

### Arguments

| | |
|---|---|
| object | A TidySet object |
| sets | A character vector of sets to be added. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

### Value

A TidySet object with the new sets.

### Note

add_sets doesn't set up any other information about the sets. Remember to add/modify them if needed with mutate or mutate_set

### See Also

Other add_*: add_elements(), add_relations()

### Examples

```
x <- list("a" = letters[1:5], "b" = LETTERS[3:7])
a <- tidySet(x)
b <- add_sets(a, "fg")
sets(b)
```

adjacency *Adjacency*

## Description

Are two elements connected ?

## Usage

```
## S3 method for class 'TidySet'
adjacency(object)

adjacency_element(object)

adjacency_set(object)

## S3 method for class 'TidySet'
adjacency(object)
```

## Arguments

| | |
|---|---|
| object | A TidySet object |

## Value

A square matrix, 1 if two nodes are connected, 0 otherwise.

## See Also

incidence()

## Examples

```
x <- list("SET1" = letters[1:5], "SET2" = LETTERS[3:7])
a <- tidySet(x)
adjacency_element(a)
adjacency_set(a)
```

arrange.TidySet *Arrange the order of a TidySet*

## Description

Use arrange to extract the columns of a TidySet object. You can use activate with filter or use the specific function. The S3 method filters using all the information on the TidySet.

## Usage

```
## S3 method for class 'TidySet'
arrange(.data, ...)

arrange_set(.data, ...)

arrange_element(.data, ...)

arrange_relation(.data, ...)
```

## Arguments

| | |
|---|---|
| .data | The TidySet object |
| ... | Comma separated list of variables names or expressions integer column position to be used to reorder the TidySet. |

## Value

A TidySet object

## See Also

dplyr::arrange() and activate()

Other methods: TidySet-class, activate(), add_column(), add_relation(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B", rep("A2", 5), "B2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
```

```
a <- tidySet(relations)
a <- mutate_element(a,
    type = c(rep("Gene", 4), rep("lncRNA", 2))
)

b <- arrange(a, desc(type))
elements(b)
b <- arrange_element(a, elements)
elements(b)
# Arrange sets
arrange_set(a, sets)
```

---

`as.data.frame.TidySet` *Transforms a TidySet to a data.frame*

---

## Description

Flattens the three slots to a single big table

## Usage

```
## S3 method for class 'TidySet'
as.data.frame(x, ...)
```

## Arguments

| | |
|---|---|
| `x` | The `TidySet` object. |
| `...` | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A `data.frame` table.

---

`as.list.TidySet` *Convert to list*

---

## Description

Converts a TidySet to a list.

## Usage

```
## S3 method for class 'TidySet'
as.list(x, ...)
```

### Arguments

| | |
|---|---|
| x | A TidySet object to be coerced to a list. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

### Value

A list.

### Examples

```
r <- data.frame(sets = c("A", "A", "A", "B", "C"),
             elements = c(letters[1:3], letters[2:3]),
             fuzzy = runif(5),
             info = rep_len(c("important", "very important"), 5))
TS <- tidySet(r)
TS
as.list(TS)
```

---

## c,TidySet-method *Combine Values into a Vector or List*

---

### Description

This method combines TidySets. It only works if the first element is a TidySet.

### Usage

```
## S4 method for signature 'TidySet'
c(x, ...)
```

### Arguments

| | |
|---|---|
| x | A TidySet object. |
| ... | Objects to be concatenated. All NULL entries are dropped. |

### Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[6]))
TS2 <- c(TS, data.frame(sets = "C", elements = "gg"))
```

## cardinality *Cardinality or membership of sets*

### Description

Calculates the membership of sets according to the logic defined in FUN.

### Usage

```
cardinality(object, sets = NULL, ...)

## S4 method for signature 'TidySet'
cardinality(object, sets, FUN = "sum", ...)
```

### Arguments

| | |
|---|---|
| object | A TidySet object. |
| sets | Character vector with the name of the sets. |
| ... | Other arguments passed to FUN. |
| FUN | Function that returns a single numeric value given a vector of fuzzy values. |

### Methods (by class)

- cardinality(TidySet): Cardinality of sets

### See Also

size()

### Examples

```
rel <- list(A = letters[1:3], B = letters[1:2])
TS <- tidySet(rel)
cardinality(TS, "A")
```

## cartesian *Create the cartesian product of two sets*

### Description

Given two sets creates new sets with one element of each set

## Usage

```
cartesian(object, set1, set2, name = NULL, ...)

## S3 method for class 'TidySet'
cartesian(
  object,
  set1,
  set2,
  name = NULL,
  keep = TRUE,
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep,
  ...
)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| set1, set2 | The name of the sets to be used for the cartesian product |
| name | The name of the new set. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |
| keep | A logical value if you want to keep. |
| keep_relations | A logical value if you wan to keep old relations. |
| keep_elements | A logical value if you wan to keep old elements. |
| keep_sets | A logical value if you wan to keep old sets. |

## Value

A TidySet object with the new set

## See Also

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)]
```

```
)
TS <- tidySet(relations)
cartesian(TS, "a", "b")
```

---

`complement` *Complement TidySet*

---

## Description

Use complement to find elements or sets the TidySet object. You can use activate with complement or use the specific function. You must specify if you want the complements of sets or elements.

## Usage

```
complement(.data, ...)
```

## Arguments

| | |
|---|---|
| `.data` | The TidySet object |
| `...` | Other arguments passed to either `complement_set()` or `complement_element()`. |

## Value

A TidySet object

## See Also

`activate()`

Other complements: `complement_element()`, `complement_set()`, `subtract()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
rel <- data.frame(
    sets = c("A", "A", "B", "B", "C", "C"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(rel)
TS |>
    activate("elements") |>
    complement("a")
```

```
TS |>
    activate("elements") |>
    complement("a", "C_a", keep = FALSE)
TS |>
    activate("set") |>
    complement("A")
TS |>
    activate("set") |>
    complement("A", keep = FALSE)
TS |>
    activate("set") |>
    complement("A", FUN = function(x){abs(x - 0.2)}, keep = FALSE)
```

---

`complement_element` *Complement of elements*

---

## Description

Return the objects without the elements listed

## Usage

```
complement_element(object, elements, ...)

## S4 method for signature 'TidySet,characterORfactor'
complement_element(
  object,
  elements,
  name = NULL,
  FUN = NULL,
  keep = TRUE,
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep
)
```

## Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `elements` | The set to look for the complement. |
| `...` | Placeholder for other arguments that could be passed to the method. Currently not used. |
| `name` | Name of the new set. By default it adds a "C". |
| `FUN` | A function to be applied when performing the union. The standard union is the "max" function, but you can provide any other function that given a numeric vector returns a single number. |
| `keep` | Logical value to keep all the other sets. |

| | |
|---|---|
| keep_relations | A logical value if you wan to keep old relations. |
| keep_elements | A logical value if you wan to keep old elements. |
| keep_sets | A logical value if you wan to keep old sets. |

## Value

A TidySet object.

## Methods (by class)

- complement_element(object = TidySet, elements = characterORfactor): Complement of the elements.

## See Also

Other complements: complement(), complement_set(), subtract()

Other methods that create new sets: complement_set(), intersection(), subtract(), union()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c("A", "A", "B", "B", "C", "C"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
complement_element(TS, "a", "C_a")
complement_element(TS, "a", "C_a", keep = FALSE)
```

---

# complement_set *Complement of a set*

---

## Description

Return the complement for a set

## Usage

```
complement_set(object, sets, ...)

## S4 method for signature 'TidySet,characterORfactor'
complement_set(
  object,
  sets,
  name = NULL,
  FUN = NULL,
  keep = TRUE,
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep
)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| sets | The name of the set to look for the complement. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |
| name | Name of the new set. By default it adds a "C". |
| FUN | A function to be applied when performing the union. The standard union is the "max" function, but you can provide any other function that given a numeric vector returns a single number. |
| keep | Logical value to keep all the other sets. |
| keep_relations | A logical value if you wan to keep old relations. |
| keep_elements | A logical value if you wan to keep old elements. |
| keep_sets | A logical value if you wan to keep old sets. |

## Value

A TidySet object.

## Methods (by class)

- complement_set(object = TidySet, sets = characterORfactor): Complement of the sets.

## See Also

filter()

Other complements: complement(), complement_element(), subtract()

Other methods that create new sets: complement_element(), intersection(), subtract(), union()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), element_size(), elements(), filter.TidySet(),

group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c("A", "A", "B", "B", "C", "C"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
complement_set(TS, "A")
```

---

# dimnames.TidySet *Dimnames of a TidySet*

---

## Description

Retrieve the column names of the slots of a TidySet.

## Usage

```
## S3 method for class 'TidySet'
dimnames(x)
```

## Arguments

| | |
|---|---|
| x | A TidySet object. |

## Value

A list with the names of the columns of the sets, elements and relations.

## See Also

names()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
dimnames(TS)
```

## droplevels.TidySet *Drop unused elements and sets*

### Description

Drop elements and sets without any relation.

### Usage

```
## S3 method for class 'TidySet'
droplevels(x, elements = TRUE, sets = TRUE, relations = TRUE, ...)
```

### Arguments

| | |
|---|---|
| x | A TidySet object. |
| elements | Logical value: Should elements be dropped? |
| sets | Logical value: Should sets be dropped? |
| relations | Logical value: Should sets be dropped? |
| ... | Other arguments, currently ignored. |

### Value

A TidySet object.

### Examples

```
rel <- list(A = letters[1:3], B = character())
TS <- tidySet(rel)
TS
sets(TS)
TS2 <- droplevels(TS)
TS2
sets(TS2)
```

## element_size *Calculates the size of the elements*

### Description

Assuming that the fuzzy values are probabilities, calculates the probability of being of different sizes for a given set.

## Usage

```
element_size(object, elements = NULL)

## S4 method for signature 'TidySet'
element_size(object, elements = NULL)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| elements | The element from which the length is calculated. |

## Value

A list with the size of the elements or the probability of having that size.

## Methods (by class)

- element_size(TidySet): Calculates the number of sets an element appears with length_set()

## See Also

cardinality

Other sizes: set_size()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B", "C"),
    elements = c(letters[seq_len(6)], letters[6]),
    fuzzy = runif(7)
)
a <- tidySet(relations)
element_size(a)
```

elements *Elements of the TidySet*

## Description

Given TidySet retrieve the elements or substitute them.

## Usage

```
elements(object)

elements(object) <- value

## S4 method for signature 'TidySet'
elements(object)

## S4 replacement method for signature 'TidySet'
elements(object) <- value

replace_elements(object, value)

## S4 method for signature 'TidySet,missing'
nElements(object)

## S4 method for signature 'TidySet,logical'
nElements(object, all)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| value | Modification of the elements. |
| all | A logical value to count all elements or just those present. |

## Value

A data.frame with information about the elements

## Methods (by class)

- elements(TidySet): Retrieve the elements
- elements(TidySet) <- value: Modify the elements
- nElements(object = TidySet, all = missing): Return the number of elements
- nElements(object = TidySet, all = logical): Return the number of elements

## See Also

nElements()

Other slots: relations(), sets()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[2:10]))
elements(TS)
elements(TS) <- data.frame(elements = letters[10:1])
TS2 <- replace_elements(TS, data.frame(elements = letters[1:11]))
nElements(TS)
nElements(TS2)
```

---

# extract-TidySet *Extract*

---

## Description

Operators acting on TidySet to extract or replace parts. They are designed to resemble the basic operators.

## Usage

```
## S4 method for signature 'TidySet'
x$name

## S4 replacement method for signature 'TidySet'
x$name <- value

## S4 method for signature 'TidySet'
x[i, j, k, ..., drop = TRUE]

## S4 replacement method for signature 'TidySet'
x[i, j, k, ...] <- value

## S4 method for signature 'TidySet'
x[[i, j, ..., exact = TRUE]]

## S4 replacement method for signature 'TidySet'
x[[i]] <- value
```

## Arguments

| | |
|---|---|
| x | A TidySet object. |
| name | The data about the TidySet object to extract. |
| value | The value to overwrite |
| i | Which rows do you want to keep? By default all. |
| j | Which slot do you want to extract? One of "sets", "elements" or "relations". |
| k | Which columns do you want to extract. By default all. |
| ... | Other arguments currently ignored. |
| drop | Remove remaining elements, sets and relations? Passed to all arguments of droplevels(). |
| exact | A logical value. FALSE if fuzzy matching is wanted. Add values to the TidySet. Allows to control to which slot is it added. |

## Value

Always returns a valid TidySet.

## Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[6]))
TS[, "sets", "origin"] <- sample(c("random", "non-random"), 2, replace = TRUE)
TS[, "sets", "type"] <- c("Fantastic", "Wonderful")
# This produces a warning
# TS$description <- c("What", "can", "I", "say", "now", "?")
# Better to be explicit:
TS[, "relations", "description"] <- c("What", "can", "I", "say", "now", "?")
relations(TS)
TS[, "elements", "description"] <- rev(c("What", "can", "I", "say", "now", "?"))
elements(TS)
# Which will be deleted?
# TS$description <- NULL
TS$type
TS$origin <- c("BCN", "BDN")
# Different subsets
TS[1, "elements"]
TS[1, "sets"]
# Always print
TS
TS[, "sets", c("type", "origin")] # Same
TS[, "sets", "origin"] # Drop column type
is(TS[, "sets", "origin"])
TS[, "sets"]
TS[["A"]]
TS[["B"]]
TS[["C"]] # Any other set is the empty set
```

`filter.TidySet` *Filter TidySet*

## Description

Use filter to subset the TidySet object. You can use activate with filter or use the specific function. The S3 method filters using all the information on the TidySet.

## Usage

```
## S3 method for class 'TidySet'
filter(.data, ...)

filter_set(.data, ...)

filter_element(.data, ...)

filter_relation(.data, ...)
```

## Arguments

| | |
|---|---|
| `.data` | The TidySet object. |
| `...` | The logical predicates in terms of the variables of the sets. |

## Value

A TidySet object.

## See Also

`dplyr::filter()` and `activate()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12),
    type = c(rep("Gene", 4), rep("lncRNA", 2))
)
```

```
TS <- tidySet(relations)
TS <- move_to(TS, from = "relations", to = "elements", column = "type")
filter(TS, elements == "a")
# Equivalent to filter_relation
filter(TS, elements == "a", sets == "a")
filter_relation(TS, elements == "a", sets == "a")
# Filter element
filter_element(TS, type == "Gene")
# Filter sets and by property of elements simultaneously
filter(TS, sets == "b", type == "lncRNA")
# Filter sets
filter_set(TS, sets == "b")
```

---

`getGAF` *Read a GAF file*

---

## Description

Read a GO Annotation File (GAF) formatted file

## Usage

```
getGAF(x)
```

## Arguments

| | |
|---|---|
| x | A file in GAF format. |

## Value

A TidySet object.

## References

The format is defined here.

## See Also

Other IO functions: `getGMT()`, `getOBO()`

## Examples

```
gafFile <- system.file(
    package = "BaseSet", "extdata",
    "go_human_rna_valid_subset.gaf"
)
gs <- getGAF(gafFile)
head(gs)
```

getGMT *Import GMT (Gene Matrix Transposed) files*

## Description

The GMT (Gene Matrix Transposed) file format is a tab delimited file format that describes groups of genes. In this format, each row represents a group. Each group is described by a name, a description, and the genes in it.

## Usage

```
getGMT(con, sep = "\t", ...)
```

## Arguments

| | |
|---|---|
| con | File name of the GMT file. |
| sep | GMT file field separator, by default tabs. |
| ... | Other arguments passed to readLines. |

## Value

A TidySet object.

## References

The file format is defined by the Broad Institute here

## See Also

Other IO functions: getGAF(), getOBO()

## Examples

```
gmtFile <- system.file(
    package = "BaseSet", "extdata",
    "hallmark.gene.symbol.gmt"
)
gs <- getGMT(gmtFile)
nRelations(gs)
nElements(gs)
nSets(gs)
```

## getOBO *Read an OBO file*

### Description

Read an Open Biological and Biomedical Ontologies (OBO) formatted file

### Usage

```
getOBO(x)
```

### Arguments

| | |
|---|---|
| x | Path to a file in OBO format. |

### Value

A TidySet object.

### References

The format is described here

### See Also

Other IO functions: `getGAF()`, `getGMT()`

### Examples

```
oboFile <- system.file(
    package = "BaseSet", "extdata",
    "go-basic_subset.obo"
)
gs <- getOBO(oboFile)
head(gs)
```

## group *Create a new set from existing elements*

### Description

It allows to create a new set given some condition. If no element meet the condition an empty set is created.

## Usage

```
group(object, name, ...)

## S3 method for class 'TidySet'
group(object, name, ...)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| name | The name of the new set. |
| ... | A logical condition to subset some elements. |

## Value

A TidySet object with the new set.

## See Also

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
x <- list("A" = c("a" = 0.1, "b" = 0.5), "B" = c("a" = 0.2, "b" = 1))
TS <- tidySet(x)
TS1 <- group(TS, "C", fuzzy < 0.5)
TS1
sets(TS1)
TS2 <- group(TS, "D", fuzzy < 0)
sets(TS2)
r <- data.frame(
    sets = c(rep("A", 5), "B", rep("A2", 5), "B2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12),
    type = c(rep("Gene", 2), rep("Protein", 2), rep("lncRNA", 2))
)
TS3 <- tidySet(r)
group(TS3, "D", sets %in% c("A", "A2"))
```

group_by.TidySet *group_by TidySet*

## Description

Use group_by to group the TidySet object. You can use activate with group_by or with the whole data.

## Usage

```
## S3 method for class 'TidySet'
group_by(.data, ...)
```

## Arguments

| | |
|---|---|
| .data | The TidySet object |
| ... | The logical predicates in terms of the variables of the sets |

## Value

A grouped data.frame (See The dplyr help page)

## See Also

dplyr::group_by() and activate()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
a <- tidySet(relations)
elements(a) <- cbind(elements(a),
    type = c(rep("Gene", 4), rep("lncRNA", 2))
)
group_by(a, elements)
```

incidence *Incidence*

## Description

Check which elements are in which sets.

## Usage

```
incidence(object)

## S4 method for signature 'TidySet'
incidence(object)
```

## Arguments

| | |
|---|---|
| object | Object to be coerced or tested. |

## Value

A matrix with elements in rows and sets in columns where the values indicate the relationship between the element and the set.

## Methods (by class)

- incidence(TidySet): Incidence of the TidySet

## See Also

adjacency(), tidySet()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
x <- list("a" = letters[1:5], "b" = LETTERS[3:7])
a <- tidySet(x)
incidence(a)
```

## independent *Independence of the sets*

### Description

Checks if the elements of the sets are present in more than one set.

### Usage

```
independent(object, sets)
```

### Arguments

| | |
|---|---|
| object | A TidySet object. |
| sets | A character vector with the names of the sets to analyze. |

### Value

A logical value indicating if the sets are independent (TRUE) or not.

### Examples

```
x <- list("A" = letters[1:5], "B" = letters[3:7], "C" = letters[6:10])
TS <- tidySet(x)
independent(TS)
independent(TS, c("A", "B"))
independent(TS, c("A", "C"))
independent(TS, c("B", "C"))
```

## intersection *Intersection of two or more sets*

### Description

Given a TidySet creates a new set with the elements on the both of them following the logic defined on FUN.

### Usage

```
intersection(object, sets, ...)

## S4 method for signature 'TidySet,character'
intersection(
  object,
  sets,
  name = NULL,
```

```
  FUN = "min",
  keep = FALSE,
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep,
  ...
)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| sets | The character of sets to be intersect. |
| ... | Other named arguments passed to FUN. |
| name | The name of the new set. By defaults joins the sets with an ∪. |
| FUN | A function to be applied when performing the union. The standard intersection is the "min" function, but you can provide any other function that given a numeric vector returns a single number. |
| keep | A logical value if you want to keep originals sets. |
| keep_relations | A logical value if you wan to keep old relations. |
| keep_elements | A logical value if you wan to keep old elements. |
| keep_sets | A logical value if you wan to keep old sets. |

## Details

#' The default uses the `min` function following the standard fuzzy definition, but it can be changed.

## Value

A `TidySet` object.

## Methods (by class)

- `intersection(object = TidySet, sets = character)`: Applies the standard intersection

## See Also

Other methods that create new sets: `complement_element()`, `complement_set()`, `subtract()`, `union()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
rel <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = c("a", "b", "c", "d", "f", "f")
)
TS <- tidySet(rel)
intersection(TS, c("A", "B")) # Default Name
intersection(TS, c("A", "B"), "C") # Set the name
# Fuzzy set
rel <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = c("a", "b", "c", "d", "f", "f"),
    fuzzy = runif(6)
)
TS2 <- tidySet(rel)
intersection(TS2, c("A", "B"), "C")
intersection(TS2, c("A", "B"), "C", FUN = function(x){max(sqrt(x))})
```

---

# is.fuzzy *Check if a TidySet is fuzzy.*

---

## Description

Check if there are fuzzy sets. A fuzzy set is a set where the relationship between elements is given by a probability (or uncertainty).

## Usage

```
is.fuzzy(object)

## S4 method for signature 'TidySet'
is.fuzzy(object)
```

## Arguments

| | |
|---|---|
| object | Object to be coerced or tested. |

## Value

A logical value.

## Methods (by class)

- `is.fuzzy(TidySet)`: Check if it is fuzzy

## See Also

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[2:10]))
is.fuzzy(TS)
```

---

# is_nested *Are some sets as elements of other sets?*

---

## Description

Check if some elements are also sets of others. This is also known as hierarchical sets.

## Usage

```
is_nested(object)

## S3 method for class 'TidySet'
is_nested(object)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |

## Value

A logical value: TRUE if there are some sets included as elements of others.

## See Also

adjacency

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- list(A = letters[1:3], B = c(letters[4:5]))
TS <- tidySet(relations)
is_nested(TS)
TS2 <- add_relation(TS, data.frame(elements = "A", sets = "B"))
# Note that A is both a set and an element of B
TS2
is_nested(TS2)
```

---

`length.TidySet` *Length of the TidySet*

---

## Description

Returns the number of sets in the object.

## Usage

```
## S3 method for class 'TidySet'
length(x)
```

## Arguments

| | |
|---|---|
| `x` | A TidySet object.<br>No replacement function is available, either delete sets or add them. |

## Value

A numeric value.

## See Also

`dim()`, `ncol()` and `nrow()`. Also look at `lengths()` for the number of relations of sets.

## Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[6]))
length(TS)
```

## length_set *Calculates the probability*

### Description

Given several probabilities it looks for how probable is to have a vector of each length

### Usage

```
length_set(probability)
```

### Arguments

| | |
|---|---|
| probability | A numeric vector of probabilities. |

### Value

A vector with the probability of each set.

### See Also

length_probability() to calculate the probability of a specific length.

### Examples

```
length_set(c(0.5, 0.1, 0.3, 0.5, 0.25, 0.23))
```

## lengths,TidySet-method *Lengths of the TidySet*

### Description

Returns the number of relations of each set in the object.

### Usage

```
## S4 method for signature 'TidySet'
lengths(x, use.names = TRUE)
```

### Arguments

| | |
|---|---|
| x | A TidySet object. |
| use.names | A logical value whether to inherit names or not. |

## Value

A vector with the number of different relations for each set.

## See Also

`length()`, Use `set_size()` if you are using fuzzy sets.

## Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[6]))
lengths(TS)
```

---

`move_to` *Move columns between slots*

---

## Description

Moves information from one slot to other slots. For instance from the sets to the relations.

## Usage

```
move_to(object, from, to, columns)

## S4 method for signature
## 'TidySet,characterORfactor,characterORfactor,character'
move_to(object, from, to, columns)
```

## Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `from` | The name of the slot where the content is. |
| `to` | The name of the slot to move the content. |
| `columns` | The name of the columns that should be moved. |

## Value

A TidySet object where the content is moved from one slot to other.

## Methods (by class)

- `move_to( object = TidySet, from = characterORfactor, to = characterORfactor, columns = character )`: Move columns

## See Also

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
x <- list("A" = c("a" = 0.1, "b" = 0.5), "B" = c("a" = 0.2, "b" = 1))
TS <- tidySet(x)
TS <- mutate_element(TS, b = runif(2))
TS2 <- move_to(TS, from = "elements", to = "relations", "b")
# Note that apparently we haven't changed anything:
TS2
```

---

`multiply_probabilities` *Probability of a vector of probabilities*

---

## Description

Calculates the probability that all probabilities happened simultaneously. `independent_probabilities()` just multiply the probabilities of the index passed.

## Usage

```
multiply_probabilities(p, i)

independent_probabilities(p, i)
```

## Arguments

| | |
|---|---|
| p | Numeric vector of probabilities. |
| i | Numeric integer index of the complementary probability. |

## Value

A numeric value of the probability.

## See Also

length_probability()

## Examples

```
multiply_probabilities(c(0.5, 0.1, 0.3, 0.5, 0.25, 0.23), c(1, 3))
independent_probabilities(c(0.5, 0.1, 0.3, 0.5, 0.25, 0.23), c(1, 3))
```

---

`mutate.TidySet` *Mutate*

---

## Description

Use mutate to alter the TidySet object. You can use activate with mutate or use the specific function. The S3 method filters using all the information on the TidySet.

## Usage

```
## S3 method for class 'TidySet'
mutate(.data, ...)

mutate_set(.data, ...)

mutate_element(.data, ...)

mutate_relation(.data, ...)
```

## Arguments

| | |
|---|---|
| `.data` | The TidySet object. |
| `...` | The logical predicates in terms of the variables of the sets. |

## Value

A TidySet object

## See Also

`dplyr::mutate()` and `activate()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
a <- tidySet(relations)
a <- mutate_element(a, Type = c(rep("Gene", 4), rep("lncRNA", 2)))
a
b <- mutate_relation(a, Type = sample(c("PPI", "PF", "MP"), 12,
    replace = TRUE
))
```

---

# name_elements *Name elements*

---

## Description

Retrieve the name of the elements.

## Usage

```
name_elements(object, all, ...)

## S4 method for signature 'TidySet,logical'
name_elements(object, all = TRUE)

## S4 method for signature 'TidySet,missing'
name_elements(object, all)

## S4 replacement method for signature 'TidySet,logical,characterORfactor'
name_elements(object, all) <- value

## S4 replacement method for signature 'TidySet,missing,characterORfactor'
name_elements(object) <- value
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| all | A logical value if all elements should be reported or only those present. |
| ... | Other arguments passed to methods. |
| value | A character with the new names for the elements. |

## Value

A TidySet object.

### Methods (by class)

- `name_elements(object = TidySet, all = logical)`: Name elements
- `name_elements(object = TidySet, all = missing)`: Name elements
- `name_elements(object = TidySet, all = logical) <- value`: Rename elements
- `name_elements(object = TidySet, all = missing) <- value`: Rename elements

### See Also

Other names: `name_elements<-()`, `name_sets()`, `name_sets<-()`, `rename_elements()`, `rename_set()`

### Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
name_elements(TS)
```

---

## `name_elements<-` *Rename elements*

---

### Description

Rename elements.

### Usage

```
name_elements(object, all, ...) <- value
```

### Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `all` | A logical value whether to return all elements or just those present. |
| `...` | Other arguments passed to methods. |
| `value` | A character with the new names for the elements. |

### Value

A `TidySet` object.

## See Also

rename_elements()

Other names: name_elements(), name_sets(), name_sets<-(), rename_elements(), rename_set()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
TS
name_elements(TS) <- letters[1:6]
```

---

# name_sets *Name sets*

---

## Description

Retrieve the name of the sets.

## Usage

```
name_sets(object, all, ...)

## S4 method for signature 'TidySet,logical'
name_sets(object, all = TRUE)

## S4 method for signature 'TidySet,missing'
name_sets(object, all)

## S4 replacement method for signature 'TidySet,logical,characterORfactor'
name_sets(object, all) <- value

## S4 replacement method for signature 'TidySet,missing,characterORfactor'
name_sets(object, all) <- value
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| all | A logical value if all sets should be reported or only those present. |
| ... | Other arguments passed to methods. |
| value | A character with the new names for the sets. |

## Value

A TidySet object.

## Methods (by class)

- name_sets(object = TidySet, all = logical): Name sets
- name_sets(object = TidySet, all = missing): Name sets
- name_sets(object = TidySet, all = logical) <- value: Rename sets
- name_sets(object = TidySet, all = missing) <- value: Rename sets

## See Also

Other names: name_elements(), name_elements<-(), name_sets<-(), rename_elements(), rename_set()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
name_sets(TS)
```

name_sets<- *Rename sets*

## Description

Rename sets.

## Usage

```
name_sets(object, all, ...) <- value
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| all | A logical value whether it should return all sets present. |
| ... | Other arguments passed to methods. |
| value | A character with the new names for the sets. |

## Value

A TidySet object.

## See Also

rename_set()

Other names: name_elements(), name_elements<-(), name_sets(), rename_elements(), rename_set()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
TS
name_sets(TS) <- LETTERS[1:2]
```

## names.TidySet *Names of a TidySet*

### Description

Retrieve the column names of a slots of a TidySet.

### Usage

```
## S3 method for class 'TidySet'
names(x)
```

### Arguments

| | |
|---|---|
| x | A TidySet object. |

### Value

A vector with the names of the present columns of the sets, elements and relations. If a slot is active it only returns the names of that slot.

### See Also

dimnames()

### Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
names(TS)
names(activate(TS, "sets"))
```

## naming *Name an operation*

### Description

Helps setting up the name of an operation.

## Usage

```
naming(
  start = NULL,
  sets1,
  middle = NULL,
  sets2 = NULL,
  collapse_symbol = "union"
)
```

## Arguments

| | |
|---|---|
| start, middle | Character used as a start symbol or to divide sets1 and sets2. |
| sets1, sets2 | Character of sets |
| collapse_symbol | Name of the symbol that joins the sets on sets1 and sets2. |

## Value

A character vector combining the sets

## See Also

set_symbols()

## Examples

```
naming(sets1 = c("a", "b"))
naming(sets1 = "a", middle = "union", sets2 = "b")
naming(sets1 = "a", middle = "intersection", sets2 = c("b", "c"))
naming(sets1 = "a", middle = "intersection", sets2 = c("b", "c"))
naming(
    start = "complement", sets1 = "a", middle = "intersection",
    sets2 = c("b", "c"), collapse_symbol = "intersection"
)
```

---

# nElements *Number of elements*

---

## Description

Check the number of elements of the TidySet.

## Usage

```
nElements(object, all)
```

### Arguments

| | |
|---|---|
| object | Object to be coerced or tested. |
| all | Logical value to count all elements. |

### Value

A numeric value with the number of elements.

### See Also

Other count functions: nRelations(), nSets()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

### Examples

```
TS <- tidySet(list(A = letters[1:2], B = letters[5:7]))
nElements(TS)
```

---

## nRelations *Number of relations*

---

### Description

Check the number of relations of the TidySet.

### Usage

```
nRelations(object)
```

### Arguments

| | |
|---|---|
| object | Object to be coerced or tested. |

### Value

A numeric value with the number of the relations.

## See Also

Other count functions: nElements(), nSets()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
TS <- tidySet(list(A = letters[1:2], B = letters[5:7]))
nRelations(TS)
```

---

# nSets *Number of sets*

---

## Description

Check the number of sets of the TidySet

## Usage

```
nSets(object, all)
```

## Arguments

| | |
|---|---|
| object | Object to be coerced or tested. |
| all | Logical value to count all sets. |

## Value

The number of sets present.

## See Also

Other count functions: nElements(), nRelations()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

### Examples

```
TS <- tidySet(list(A = letters[1:2], B = letters[5:7]))
nSets(TS)
```

---

power_set *Create the power set*

---

### Description

Create the power set of the object: All the combinations of the elements of the sets.

### Usage

```
power_set(object, set, name, ...)
```

### Arguments

| | |
|---|---|
| object | A TidySet object. |
| set | The name of the set to be used for the power set, if not provided all are used. |
| name | The root name of the new set, if not provided the standard notation "P()" is used. |
| ... | Other arguments passed down if possible. |

### Value

A TidySet object with the new set.

### See Also

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

### Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)]
)
TS <- tidySet(relations)
power_set(TS, "a", name = "power_set")
```

`pull.TidySet` *Pull from a TidySet*

## Description

Use pull to extract the columns of a TidySet object. You can use activate with filter or use the specific function. The S3 method filters using all the information on the TidySet.

## Usage

```
## S3 method for class 'TidySet'
pull(.data, var = -1, name = NULL, ...)

pull_set(.data, var = -1, name = NULL, ...)

pull_element(.data, var = -1, name = NULL, ...)

pull_relation(.data, var = -1, name = NULL, ...)
```

## Arguments

| | |
|---|---|
| `.data` | The TidySet object |
| `var` | The literal variable name, a positive integer or a negative integer column position. |
| `name` | Column used to name the output. |
| `...` | Currently not used. |

## Value

A TidySet object

## See Also

`dplyr::pull()` and `activate()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
a <- tidySet(relations)
a <- mutate_element(a, type = c(rep("Gene", 4), rep("lncRNA", 2)))
pull(a, type)
# Equivalent to pull_relation
b <- activate(a, "relations")
pull_relation(b, elements)
pull_element(b, elements)
# Filter element
pull_element(a, type)
# Filter sets
pull_set(a, sets)
```

---

# relations *Relations of the TidySet*

---

## Description

Given TidySet retrieve the relations or substitute them. `TidySet()` object

## Usage

```
relations(object)

relations(object) <- value

## S4 method for signature 'TidySet'
relations(object)

replace_relations(object, value)

## S4 replacement method for signature 'TidySet'
relations(object) <- value

## S4 method for signature 'TidySet'
nRelations(object)
```

## Arguments

| | |
|---|---|
| `object` | Object to be coerced or tested. |
| `value` | Modification of the relations. |

### Value

A `data.frame` with information about the relations between elements and sets.

### Methods (by class)

- `relations(TidySet)`: Retrieve the relations
- `relations(TidySet) <- value`: Modify the relations
- `nRelations(TidySet)`: Return the number of unique relations

### See Also

`nRelations()`

Other slots: `elements()`, `sets()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

### Examples

```
TS <- tidySet(list(A = letters[1:2], B = letters[5:7]))
relations(TS)
```

---

## `remove_column` *Remove column*

---

### Description

Removes column from a slot of the TidySet object.

### Usage

```
remove_column(object, slot, column_names)

## S4 method for signature 'TidySet,character,character'
remove_column(object, slot, column_names)
```

### Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `slot` | A TidySet slot. |
| `column_names` | The name of the columns. |

### Value

A TidySet object.

### Methods (by class)

- remove_column(object = TidySet, slot = character, column_names = character): Remove columns to any slot

### See Also

rename_set()

Other column: add_column()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

### Examples

```
x <- data.frame(sets = c(rep("A", 5), rep("B", 5)),
                elements = c(letters[1:5], letters[3:7]),
                extra = sample(c("YES", "NO"), 10, replace = TRUE))
TS <- tidySet(x)
TS
remove_column(TS, "relations", "extra")
```

---

## remove_element *Remove elements*

---

### Description

Given a TidySet remove elements and the related relations and if required also the sets.

### Usage

```
remove_element(object, elements, ...)

## S4 method for signature 'TidySet,characterORfactor'
remove_element(object, elements)
```

### Arguments

| | |
|---|---|
| object | A TidySet object. |
| elements | The elements to be removed. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A TidySet object.

## Methods (by class)

- remove_element(object = TidySet, elements = characterORfactor): Removes everything related to an element

## See Also

Other remove functions: remove_relation(), remove_set()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
remove_element(TS, "c")
```

---

# remove_relation *Remove a relation*

---

## Description

Given a TidySet removes relations between elements and sets

## Usage

```
remove_relation(object, elements, sets, ...)

## S4 method for signature 'TidySet,characterORfactor,characterORfactor'
remove_relation(object, elements, sets)
```

### Arguments

| | |
|---|---|
| object | A TidySet object |
| elements | The elements of the sets. |
| sets | The name of the new set. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

### Value

A TidySet object.

### Methods (by class)

- remove_relation( object = TidySet, elements = characterORfactor, sets = characterORfactor ): Removes a relation between elements and sets.

### See Also

Other remove functions: remove_element(), remove_set()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

### Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
remove_relation(TS, "A", "a")
```

---

## remove_set *Remove sets*

---

### Description

Given a TidySet remove sets and the related relations and if required also the elements

## Usage

```
remove_set(object, sets, ...)

## S4 method for signature 'TidySet,characterORfactor'
remove_set(object, sets)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| sets | The sets to be removed. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |

## Value

A TidySet object.

## Methods (by class)

- remove_set(object = TidySet, sets = characterORfactor): Removes everything related to a set

## See Also

Other remove functions: remove_element(), remove_relation()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c("A", "A", "B", "B", "C", "C"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
remove_set(TS, "B")
```

`rename_elements` *Rename elements*

## Description

Change the default names of sets and elements.

## Usage

```
rename_elements(object, old, new)

## S4 method for signature 'TidySet'
rename_elements(object, old, new)
```

## Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `old` | A character vector of to be renamed. |
| `new` | A character vector of with new names. |

## Value

A `TidySet` object.

## Methods (by class)

- `rename_elements(TidySet)`: Rename elements

## See Also

`name_elements()`

Other renames: `rename_set()`

Other names: `name_elements()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `rename_set()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
x <- list("A" = letters[1:5], "B" = letters[3:7])
TS <- tidySet(x)
name_elements(TS)
TS2 <- rename_elements(TS, "a", "first")
name_elements(TS2)
```

rename_set *Rename sets*

## Description

Change the default names of sets and elements.

## Usage

```
rename_set(object, old, new)

## S4 method for signature 'TidySet'
rename_set(object, old, new)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| old | A character vector of to be renamed. |
| new | A character vector of with new names. |

## Value

A TidySet object.

## Methods (by class)

- rename_set(TidySet): Rename sets

## See Also

name_sets()

Other renames: rename_elements()

Other names: name_elements(), name_elements<-(), name_sets(), name_sets<-(), rename_elements()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), select.TidySet(), set_size(), sets(), subtract(), union()

## Examples

```
x <- list("A" = letters[1:5], "B" = letters[3:7])
TS <- tidySet(x)
name_sets(TS)
TS2 <- rename_set(TS, "A", "C")
name_sets(TS2)
```

`select.TidySet` *select from a TidySet*

## Description

Use select to extract the columns of a TidySet object. You can use activate with filter or use the specific function. The S3 method filters using all the information on the TidySet.

## Usage

```
## S3 method for class 'TidySet'
select(.data, ...)

select_set(.data, ...)

select_element(.data, ...)

select_relation(.data, ...)
```

## Arguments

| | |
|---|---|
| `.data` | The TidySet object |
| `...` | The name of the columns you want to keep, remove or rename. |

## Value

A TidySet object

## See Also

`dplyr::select()` and `activate()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
relations <- data.frame(
    sets = c(rep("a", 5), "b", rep("a2", 5), "b2"),
    elements = rep(letters[seq_len(6)], 2),
    fuzzy = runif(12)
)
a <- tidySet(relations)
```

```
a <- mutate_element(a,
    type = c(rep("Gene", 4), rep("lncRNA", 2))
)
a <- mutate_set(a, Group = c("UFM", "UAB", "UPF", "MIT"))
b <- select(a, -type)
elements(b)
b <- select_element(a, elements)
elements(b)
# Select sets
select_set(a, sets)
```

---

`set_size` *Calculates the size of a set*

---

## Description

Assuming that the fuzzy values are probabilities, calculates the probability of being of different sizes for a given set.

## Usage

```
set_size(object, sets = NULL)

## S4 method for signature 'TidySet'
set_size(object, sets = NULL)
```

## Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `sets` | The sets from which the length is calculated. |

## Value

A list with the size of the set or the probability of having that size.

## Methods (by class)

- `set_size(TidySet)`: Calculates the size of a set using `length_set()`

## See Also

cardinality

Other sizes: `element_size()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`,

remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), sets(), subtract(), union()

## Examples

```
relations <- data.frame(
    sets = c(rep("A", 5), "B", "C"),
    elements = c(letters[seq_len(6)], letters[6]),
    fuzzy = runif(7)
)
a <- tidySet(relations)
set_size(a)
```

---

# set_symbols *A subset of symbols related to sets*

---

## Description

Name and symbol of operations related to sets, including intersection and union among others:

## Usage

```
set_symbols
```

## References

https://www.fileformat.info/info/unicode/category/Sm/list.htm

## Examples

```
set_symbols
```

---

# sets *Sets of the TidySet*

---

## Description

Given TidySet retrieve the sets or substitute them.

## Usage

```
sets(object)

sets(object) <- value

## S4 method for signature 'TidySet'
sets(object)

## S4 replacement method for signature 'TidySet'
sets(object) <- value

replace_sets(object, value)

## S4 method for signature 'TidySet,missing'
nSets(object)

## S4 method for signature 'TidySet,logical'
nSets(object, all)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| value | Modification of the sets. |
| all | A logical value whether it should return all sets or only those present. |

## Value

A data.frame with information from the sets.

## Methods (by class)

- sets(TidySet): Retrieve the sets information
- sets(TidySet) <- value: Modify the sets information
- nSets(object = TidySet, all = missing): Return the number of sets
- nSets(object = TidySet, all = logical): Return the number of sets

## See Also

nSets()

Other slots: elements(), relations()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), subtract(), union()

### Examples

```
TS <- tidySet(list(A = letters[1:5], B = letters[2:10]))
sets(TS)
sets(TS) <- data.frame(sets = c("B", "A"))
TS2 <- replace_sets(TS, data.frame(sets = c("A", "B", "C")))
sets(TS2)
nSets(TS)
nSets(TS2)
```

---

## show,TidySet-method *Method to show the TidySet object*

---

### Description

Prints the resulting table of a TidySet object. Does not shown elements or sets without any relationship (empty sets). To see them use `sets()` or `elements()`.

### Usage

```
## S4 method for signature 'TidySet'
show(object)
```

### Arguments

| | |
|---|---|
| `object` | A TidySet |

### Value

A table with the information of the relationships.

---

## size *Size*

---

### Description

Calculate the size of the elements or sets, using the fuzzy values as probabilities. First it must have active either sets or elements.

### Usage

```
size(object, ...)
```

### Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `...` | Character vector with the name of elements or sets you want to calculate the size of. |

## Value

The size of the elements or sets. If there is no active slot or it is the relations slot returns the TidySet object with a warning.

## See Also

A related concept `cardinality()`. It is calculated using `length_set()`.

## Examples

```
rel <- data.frame(
    sets = c(rep("A", 5), "B", "C"),
    elements = c(letters[seq_len(6)], letters[6])
)
TS <- tidySet(rel)
TS <- activate(TS, "elements")
size(TS)
TS <- activate(TS, "sets")
size(TS)
# With fuzzy sets
relations <- data.frame(
    sets = c(rep("A", 5), "B", "C"),
    elements = c(letters[seq_len(6)], letters[6]),
    fuzzy = runif(7)
)
TS <- tidySet(relations)
TS <- activate(TS, "elements")
size(TS)
TS <- activate(TS, "sets")
size(TS)
```

---

# subtract *Subtract*

---

## Description

Elements in a set not present in the other set. Equivalent to `base::setdiff()`.

## Usage

```
subtract(object, set_in, not_in, ...)

## S4 method for signature 'TidySet,characterORfactor,characterORfactor'
subtract(
  object,
  set_in,
  not_in,
  name = NULL,
  keep = TRUE,
```

```
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep
)
```

## Arguments

| | |
|---|---|
| object | A TidySet object. |
| set_in | Name of the sets where the elements should be present. |
| not_in | Name of the sets where the elements should not be present. |
| ... | Placeholder for other arguments that could be passed to the method. Currently not used. |
| name | Name of the new set. By default it adds a "C". |
| keep | Logical value to keep all the other sets. |
| keep_relations | A logical value if you wan to keep old relations. |
| keep_elements | A logical value if you wan to keep old elements. |
| keep_sets | A logical value if you wan to keep old sets. |

## Value

A TidySet object.

## Methods (by class)

- subtract( object = TidySet, set_in = characterORfactor, not_in = characterORfactor ): Elements present in sets but not in other sets

## See Also

base::setdiff()

Other complements: complement(), complement_element(), complement_set()

Other methods that create new sets: complement_element(), complement_set(), intersection(), union()

Other methods: TidySet-class, activate(), add_column(), add_relation(), arrange.TidySet(), cartesian(), complement(), complement_element(), complement_set(), element_size(), elements(), filter.TidySet(), group(), group_by.TidySet(), incidence(), intersection(), is.fuzzy(), is_nested(), move_to(), mutate.TidySet(), nElements(), nRelations(), nSets(), name_elements<-(), name_sets(), name_sets<-(), power_set(), pull.TidySet(), relations(), remove_column(), remove_element(), remove_relation(), remove_set(), rename_elements(), rename_set(), select.TidySet(), set_size(), sets(), union()

## Examples

```
relations <- data.frame(
    sets = c("A", "A", "B", "B", "C", "C"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
TS <- tidySet(relations)
subtract(TS, "A", "B")
subtract(TS, "A", "B", keep = FALSE)
```

---

# TidySet-class *A tidy class to represent a set*

---

## Description

A set is a group of unique elements it can be either a fuzzy set, where the relationship is between 0 or 1 or nominal.

## Details

When printed if an element or a set do not have any relationship is not shown. They can be created from lists, matrices or data.frames. Check `tidySet()` constructor for more information.

## Slots

`relations` A data.frame with elements and the sets were they belong.

`elements` A data.frame of unique elements and related information.

`sets` A data.frame of unique sets and related information.

## See Also

tidySet

Other methods: `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`, `union()`

## Examples

```
x <- list("A" = letters[1:5], "B" = LETTERS[3:7])
a <- tidySet(x)
a
x <- list("A" = letters[1:5], "B" = character())
b <- tidySet(x)
b
name_sets(b)
```

tidySet.GeneSetCollection *Create a TidySet object*

## Description

These functions help to create a `TidySet` object from `data.frame`, `list`, `matrix`, and `GO3AnnDbBimap`. They can create both fuzzy and standard sets.

## Usage

```
## S3 method for class 'GeneSetCollection'
tidySet(relations)

## S3 method for class 'GeneColorSet'
tidySet(relations)

## S3 method for class 'GeneSet'
tidySet(relations)

tidySet(relations)

## S3 method for class 'data.frame'
tidySet(relations)

## S3 method for class 'list'
tidySet(relations)

## S3 method for class 'matrix'
tidySet(relations)

## S3 method for class 'Go3AnnDbBimap'
tidySet(relations)

## S3 method for class 'TidySet'
tidySet(relations)
```

## Arguments

| | |
|---|---|
| `relations` | An object to be coerced to a TidySet. |

## Details

Elements or sets without any relation are not shown when printed.

## Value

A TidySet object.

### Methods (by class)

- `tidySet(GeneSetCollection)`: Converts to a tidySet given a GeneSetCollection
- `tidySet(GeneColorSet)`: Converts to a tidySet given a GeneColorSet
- `tidySet(GeneSet)`: Converts to a tidySet given a GeneSet
- `tidySet(data.frame)`: Given the relations in a data.frame
- `tidySet(list)`: Convert to a TidySet from a list.
- `tidySet(matrix)`: Convert an incidence matrix into a TidySet
- `tidySet(Go3AnnDbBimap)`: Convert Go3AnnDbBimap into a TidySet object.
- `tidySet(TidySet)`: Convert TidySet into a TidySet object.

### See Also

TidySet

### Examples

```
# Needs GSEABase package from Bioconductor
if (requireNamespace("GSEABase", quietly = TRUE)) {
    library("GSEABase")
    gs <- GeneSet()
    gs
    tidySet(gs)
    fl <- system.file("extdata", "Broad.xml", package="GSEABase")
    gs2 <- getBroadSets(fl) # actually, a list of two gene sets
    TS <- tidySet(gs2)
    dim(TS)
    sets(TS)
}
relations <- data.frame(
    sets = c(rep("a", 5), "b"),
    elements = letters[seq_len(6)]
)
tidySet(relations)
relations2 <- data.frame(
    sets = c(rep("A", 5), "B"),
    elements = letters[seq_len(6)],
    fuzzy = runif(6)
)
tidySet(relations2)
# A
x <- list("A" = letters[1:5], "B" = LETTERS[3:7])
tidySet(x)
# A fuzzy set taken encoded as a list
A <- runif(5)
names(A) <- letters[1:5]
B <- runif(5)
names(B) <- letters[3:7]
relations <- list(A, B)
tidySet(relations)
```

```
# Will error
# x <- list("A" = letters[1:5], "B" = LETTERS[3:7], "c" = runif(5))
# a <- tidySet(x) # Only characters or factors are allowed as elements.
M <- matrix(c(1, 0.5, 1, 0), ncol = 2,
            dimnames = list(c("A", "B"), c("a", "b")))
tidySet(M)
```

---

`union` *Join sets*

---

## Description

Given a TidySet merges several sets into the new one using the logic defined on FUN.

## Usage

```
union(object, ...)

## S3 method for class 'TidySet'
union(
  object,
  sets,
  name = NULL,
  FUN = "max",
  keep = FALSE,
  keep_relations = keep,
  keep_elements = keep,
  keep_sets = keep,
  ...
)
```

## Arguments

| | |
|---|---|
| `object` | A TidySet object. |
| `...` | Other named arguments passed to `FUN`. |
| `sets` | The name of the sets to be used. |
| `name` | The name of the new set. By defaults joins the sets with an ∩. |
| `FUN` | A function to be applied when performing the union. The standard union is the "max" function, but you can provide any other function that given a numeric vector returns a single number. |
| `keep` | A logical value if you want to keep. |
| `keep_relations` | A logical value if you wan to keep old relations. |
| `keep_elements` | A logical value if you wan to keep old elements. |
| `keep_sets` | A logical value if you wan to keep old sets. |

## Details

The default uses the `max` function following the standard fuzzy definition, but it can be changed. See examples below.

## Value

A `TidySet` object.

## See Also

`union_probability()`

Other methods that create new sets: `complement_element()`, `complement_set()`, `intersection()`, `subtract()`

Other methods: `TidySet-class`, `activate()`, `add_column()`, `add_relation()`, `arrange.TidySet()`, `cartesian()`, `complement()`, `complement_element()`, `complement_set()`, `element_size()`, `elements()`, `filter.TidySet()`, `group()`, `group_by.TidySet()`, `incidence()`, `intersection()`, `is.fuzzy()`, `is_nested()`, `move_to()`, `mutate.TidySet()`, `nElements()`, `nRelations()`, `nSets()`, `name_elements<-()`, `name_sets()`, `name_sets<-()`, `power_set()`, `pull.TidySet()`, `relations()`, `remove_column()`, `remove_element()`, `remove_relation()`, `remove_set()`, `rename_elements()`, `rename_set()`, `select.TidySet()`, `set_size()`, `sets()`, `subtract()`

## Examples

```
# Classical set
rel <- data.frame(
    sets = c(rep("A", 5), "B", "B"),
    elements = c(letters[seq_len(6)], "a")
)
TS <- tidySet(rel)
union(TS, c("B", "A"))
# Fuzzy set
rel <- data.frame(
    sets = c(rep("A", 5), "B", "B"),
    elements = c(letters[seq_len(6)], "a"),
    fuzzy = runif(7)
)
TS2 <- tidySet(rel)
# Standard default logic
union(TS2, c("B", "A"), "C")
# Probability logic
union(TS2, c("B", "A"), "C", FUN = union_probability)
```

---

# union_closed *Union closed sets*

---

## Description

Tests if a given object is union-closed.

### Usage

```
union_closed(object, ...)

## S3 method for class 'TidySet'
union_closed(object, sets = NULL, ...)
```

### Arguments

| | |
|---|---|
| object | A TidySet object. |
| ... | Other named arguments passed to FUN. |
| sets | The name of the sets to be used. |

### Value

A logical value: TRUE if the combinations of sets produce already existing sets, FALSE otherwise.

### Examples

```
l <- list(A = "1",
     B = c("1", "2"),
     C = c("2", "3", "4"),
     D = c("1", "2", "3", "4")
)
TS <- tidySet(l)
union_closed(TS)
union_closed(TS, sets = c("A", "B", "C"))
union_closed(TS, sets = c("A", "B", "C", "D"))
```

---

## union_probability *Calculates the probability of a single length*

---

### Description

Creates all the possibilities and then add them up. union_probability Assumes independence between the probabilities to calculate the final size.

### Usage

```
union_probability(p)

length_probability(p, size)
```

### Arguments

| | |
|---|---|
| p | Numeric vector of probabilities. |
| size | Integer value of the size of the selected values. |

## Value

A numeric value of the probability of the given size.

## See Also

multiply_probabilities() and length_set()

## Examples

```
length_probability(c(0.5, 0.75), 2)
length_probability(c(0.5, 0.75, 0.66), 1)
length_probability(c(0.5, 0.1, 0.3, 0.5, 0.25, 0.23), 2)
union_probability(c(0.5, 0.1, 0.3))
```

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