Package ‘linelist’

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Title Tagging and Validating Epidemiological Data

Version 1.1.3

Description Provides tools to help storing and handling case line list data. The 'linelist' class adds a tagging system to classical 'data.frame' objects to identify key epidemiological data such as dates of symptom onset, epidemiological case definition, age, gender or disease outcome. Once tagged, these variables can be seamlessly used in downstream analyses, making data pipelines more robust and reliable.

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has_tag ........................ A selector function to use in tidyverse functions

Description

A selector function to use in tidyverse functions

Usage

has_tag(tags)

Arguments

tags ........................ A character vector of tags listing the variables you want to operate on

Value

A numeric vector containing the position of the columns with the requested tags

Examples

if (require(outbreaks) & require(dplyr)) {

## dataset we'll create a linelist from
measles_hagelloch_1861

## create linelist
lost_tags_action

```r
x <- make_linelist(measles_hagelloch_1861,
  id = "case_ID",
  date_onset = "date_of_prodrome",
  age = "age",
  gender = "gender"
)

head(x)

x %>%
  select(has_tag(c("id", "age"))) %>%
  head()
```

---

**lost_tags_action**  
*Check and set behaviour for lost tags*

**Description**

This function determines the behaviour to adopt when tagged variables of a linelist are lost e.g. through subsetting. This is achieved using options defined for the linelist package.

**Usage**

```r
lost_tags_action(action = c("warning", "error", "none"), quiet = FALSE, x)

get_lost_tags_action()
```

**Arguments**

- `action`  
  a character indicating the behaviour to adopt when tagged variables have been lost: "error" (default) will issue an error; "warning" will issue a warning; "none" will do nothing

- `quiet`  
  a logical indicating if a message should be displayed; only used outside pipelines

- `x`  
  deprecated

**Details**

The errors or warnings generated by linelist in case of tagged variable loss has a custom class of `linelist_error` and `linelist_warning` respectively.

**Value**

returns NULL; the option itself is set in `options("linelist")`
Examples

# reset default - done automatically at package loading
lost_tags_action()

# check current value
get_lost_tags_action()

# change to issue errors when tags are lost
lost_tags_action("error")
get_lost_tags_action()

# change to ignore when tags are lost
lost_tags_action("none")
get_lost_tags_action()

# reset to default: warning
lost_tags_action()

make_linelist

Create a linelist from a data.frame

Description

This function converts a data.frame or a tibble into a linelist object, where different types of epidemiologically relevant data are tagged. This includes dates of different events (e.g. onset of symptoms, case reporting), information on the patient (e.g. age, gender, location) as well as other information such as the type of case (e.g. confirmed, probable) or the outcome of the disease. The output will seem to be the same data.frame, but linelist-aware packages will then be able to automatically use tagged fields for further data cleaning and analysis.

Usage

make_linelist(x, ..., allow_extra = FALSE)

Arguments

x a data.frame or a tibble containing case line list data, with cases in rows and variables in columns

... <dynamic-dots> A series of tags provided as tag_name = "column_name", where tag_name indicates any of the known variables listed in 'Details' and values indicate their name in x; see details for a list of known variable types and their expected content

allow_extra a logical indicating if additional data tags not currently recognized by linelist should be allowed; if FALSE, unknown tags will trigger an error
make_linelist

Details

Known variable types include:

- **id**: a unique case identifier as numeric or character
- **date_onset**: date of symptom onset (see below for date formats)
- **date_reporting**: date of case notification (see below for date formats)
- **date_admission**: date of hospital admission (see below for date formats)
- **date_discharge**: date of hospital discharge (see below for date formats)
- **date_outcome**: date of disease outcome (see below for date formats)
- **date_death**: date of death (see below for date formats)
- **gender**: a factor or character indicating the gender of the patient
- **age**: a numeric indicating the age of the patient, in years
- **location**: a factor or character indicating the location of the patient
- **occupation**: a factor or character indicating the professional activity of the patient
- **hcw**: a logical indicating if the patient is a health care worker
- **outcome**: a factor or character indicating the outcome of the disease (death or survival)

Dates can be provided in the following formats/types:

- **Date objects** (e.g., using `as.Date` on a character with a correct date format); this is the recommended format
- **POSIXct/POSIXlt objects** (when a finer scale than days is needed)
- **numeric values**, typically indicating the number of days since the first case

Value

The function returns a linelist object.

See Also

- An overview of the linelist package
- `tags_names()`: for a list of known tag names
- `tags_types()`: for the associated accepted types/classes
- `tags()`: for a list of tagged variables in a linelist
- `set_tags()`: for modifying tags
- `tags_df()`: for selecting variables by tags
Examples

```r
if (require(outbreaks)) {
  ## dataset we will convert to linelist
  head(measles_hagelloch_1861)
  
  ## create linelist
  x <- make_linelist(measles_hagelloch_1861,
                     id = "case_ID",
                     date_onset = "date_of_prodrome",
                     age = "age",
                     gender = "gender"
  )

  ## print result - just first few entries
  head(x)

  ## check tags
  tags(x)

  ## Tags can also be passed as a list with the splice operator (!!!)
  my_tags <- list(
    id = "case_ID",
    date_onset = "date_of_prodrome",
    age = "age",
    gender = "gender"
  )
  new_x <- make_linelist(measles_hagelloch_1861, !!!my_tags)

  ## The output is strictly equivalent to the previous one
  identical(x, new_x)
}
```

---

```r
names<-.linelist  Rename columns of a linelist
```

Description

This function can be used to rename the columns a linelist, adjusting tags as needed.

Usage

```r
## S3 replacement method for class 'linelist'
names(x) <- value
```
Arguments

x  a linelist object
value  a character vector to set the new names of the columns of x

Value

a linelist with new column names

Examples

if (require(outbreaks)) {
## dataset to create a linelist from
measles_hagelloch_1861

## create linelist
x <- make_linelist(measles_hagelloch_1861,
id = "case_ID",
date_onset = "date_of_prodrome",
age = "age",
gender = "gender"
)
head(x)

## change names
names(x)[1] <- "case_label"

## see results: tags have been updated
head(x)
tags(x)

# This also works with using `dplyr::rename()` because it uses names<-()
# under hood
if (require(dplyr)) {
  x <- x %>%
      rename(case_id= case_label)
  head(x)
tags(x)
}
}

print.linelist  Printing method for linelist objects

Description

This function prints linelist objects.
Usage

```r
## S3 method for class 'linelist'
print(x, ...)
```

Arguments

- `x`: a linelist object
- `...`: further arguments to be passed to `print`

Value

Invisibly returns the object.

Examples

```r
if (require(outbreaks)) {

  ## dataset we'll create a linelist from
  measles_hagelloch_1861

  ## create linelist
  x <- make_linelist(measles_hagelloch_1861,
    id = "case_ID",
    date_onset = "date_of_prodrome",
    age = "age",
    gender = "gender"
  )

  ## print object - using only the first few entries
  head(x)

  # version with a tibble
  if (require(tibble) && require(magrittr)) {
    measles_hagelloch_1861 %>%
      tibble() %>%
      make_linelist(
        id = "case_ID",
        date_onset = "date_of_prodrome",
        age = "age",
        gender = "gender"
      )
  }
}
```
Description

[Superseded]
This function was deprecated to ensure full compatibility with the default `dplyr::select()` methods. The tag selection feature is now possible via the `has_tag()` selection helper.

Usage

```r
## S3 method for class 'linelist'
select(.data, ..., tags)
```

Arguments

- `.data`: a `linelist` object
- `...`: the variables to select, using `dplyr` compatible syntax
- `tags`: [Deprecated] It is now recommended to leverage the `has_tag()` selection helper rather than this argument.

Value

The function returns a `linelist` with selected columns.

See Also

- `tags_df()` to return a `data.frame` of all tagged variables

---

| select_tags | Extract tagged variables of a linelist object |

Description

[Deprecated] This function was equivalent to running successively `tags_df()` and `dplyr::select()` on a `linelist` object. To encourage users to understand what is going on and in order to follow the software engineering good practice of providing just one way to do a given task, this function is now deprecated.

Usage

```r
select_tags(x, ...)
```

Arguments

- `x`: a `linelist` object
- `...`: the tagged variables to select, using `dplyr::select()` compatible terminology; see `tags_names()` for default values
set_tags

Description

This function changes the tags of a linelist object, using the same syntax as the constructor make_linelist(). If some of the default tags are missing, they will be added to the final object.

Usage

set_tags(x, ..., allow_extra = FALSE)
Arguments

x  a data.frame or a tibble containing case line list data, with cases in rows and variables in columns

... <dynamic-dots> A series of tags provided as tag_name = "column_name", where tag_name indicates any of the known variables listed in 'Details' and values indicate their name in x; see details for a list of known variable types and their expected content

allow_extra  a logical indicating if additional data tags not currently recognized by linelist should be allowed; if FALSE, unknown tags will trigger an error

Value

The function returns a linelist object.

See Also

make_linelist() to create a linelist object

Examples

if (require(outbreaks)) {
  ## create a linelist
  x <- make_linelist(measles_hagelloch_1861, date_onset = "date_of_rash")
  tags(x)

  ## add new tags and fix an existing one
  x <- set_tags(x,
                age = "age",
                gender = "gender",
                date_onset = "date_of_prodrome"
  )
  tags(x)

  ## add non-default tags using allow_extra
  x <- set_tags(x, severe = "complications", allow_extra = TRUE)
  tags(x)

  ## remove tags by setting them to NULL
  old_tags <- tags(x)
  x <- set_tags(x, age = NULL, gender = NULL)
  tags(x)

  ## setting tags providing a list (used to restore old tags here)
  x <- set_tags(x, !!!old_tags)
  tags(x)
}
Get the list of tags in a linelist

Description

This function returns the list of tags identifying specific variable types in a linelist.

Usage

tags(x, show_null = FALSE)

Arguments

- x: a linelist object
- show_null: a logical indicating if the complete list of tags, including NULL ones, should be returned; if FALSE, only tags with a non-NULL value are returned; defaults to FALSE

Details

Tags are stored as the tags attribute of the object.

Value

The function returns a named list where names indicate generic types of data, and values indicate which column they correspond to.

Examples

```r
if (require(outbreaks)) {
  ## make a linelist
  x <- make_linelist(measles_hagelloch_1861, date_onset = "date_of_prodrome")

  ## check non-null tags
  tags(x)

  ## get a list of all tags, including NULL ones
  tags(x, TRUE)
}
```
tags_defaults

Generate default tags for a linelist

Description

This function returns a named list providing the default tags for a linelist object (all default to NULL).

Usage

tags_defaults()

Value

A named list.

Examples

tags_defaults()

---

tags_df

Extract a data.frame of all tagged variables

Description

This function returns a data.frame of all the tagged variables stored in a linelist. Note that the output is no longer a linelist, but a regular data.frame.

Usage

tags_df(x)

Arguments

x a linelist object

Value

A data.frame of tagged variables.
if (require(outbreaks) && require(dplyr) && require(magrittr)) {

## create a tibble linelist
x <- measles_hagelloch_1861 %>%
  tibble() %>%
  make_linelist(
    id = "case_ID",
    date_onset = "date_of_prodrome",
    age = "age",
    gender = "gender"
  )

## get a data.frame of all tagged variables
tags_df(x)
}

---

**tags_names**

*Get the list of tag names used in linelist*

**Description**

This function returns the a character of all tag names used to designate specific variable types in a linelist.

**Usage**

`tags_names()`

**Value**

The function returns a character vector.

**See Also**

`tags_defaults()` for a list of default values of the tags

**Examples**

`tags_names()`
tags_types

List acceptable variable types for tags

Description

This function returns a named list providing the acceptable data types for the default tags. If no argument is provided, it returns default values. Otherwise, provided values will be used to define the defaults.

Usage

tags_types(..., allow_extra = FALSE)

Arguments

... <dynamic-dots> A series of tags provided as tag_name = "column_name", where tag_name indicates any of the known variables listed in 'Details' and values indicate their name in x; see details for a list of known variable types and their expected content

allow_extra a logical indicating if additional data tags not currently recognized by linelist should be allowed; if FALSE, unknown tags will trigger an error

Value

A named list.

See Also

• tags_defaults() for the default tags
• validate_types() uses tags_types() for validating tags
• validate_linelist() uses tags_types() for validating tags

Examples

# list default values
tags_types()

# change existing values
tags_types(date_onset = "Date") # impose a Date class

# add new types e.g. to allow genetic sequences using ape's format
tags_types(sequence = "DNAbin", allow_extra = TRUE)
validate_linelist checks the content of a linelist object

Description

This function evaluates the validity of a linelist object by checking the object class, its tags, and the types of the tagged variables. It combines validations checks made by validate_types() and validate_tags(). See ‘Details’ section for more information on the checks performed.

Usage

validate_linelist(x, allow_extra = FALSE, ref_types = tags_types())

Arguments

x a linelist object
allow_extra a logical indicating if additional data tags not currently recognized by linelist should be allowed; if FALSE, unknown tags will trigger an error
ref_types a list providing allowed types for all tags, as returned by tags_types()

Details

The following checks are performed:

• x is a linelist object
• x has a well-formed tags attribute
• all default tags are present (even if NULL)
• all tagged variables correspond to existing columns
• all tagged variables have an acceptable class
• (optional) x has no extra tag beyond the default tags

Value

If checks pass, a linelist object; otherwise issues an error.

See Also

• tags_types() to change allowed types
• validate_types() to check if tagged variables have the right classes
• validate_tags() to perform a series of checks on the tags
validate_tags

Examples

```r
if (require(outbreaks) && require(dplyr) && require(magrittr)) {

## create a valid linelist
x <- measles_hagelloch_1861 %>%
tibble() %>%
make_linelist(
  id = "case_ID",
  date_onset = "date_of_prodrome",
  age = "age",
  gender = "gender"
)

## validation
validate_linelist(x)

## create an invalid linelist - onset date is a factor
x <- measles_hagelloch_1861 %>%
tibble() %>%
make_linelist(
  id = "case_ID",
  date_onset = "gender",
  age = "age"
)

## the below issues an error
## note: tryCatch is only used to avoid a genuine error in the example
tryCatch(validate_linelist(x), error = paste)
}
```

---

**validate_tags**

Checks the tags of a linelist object

**Description**

This function evaluates the validity of the tags of a linelist object by checking that: i) tags are present ii) tags is a list of character iii) that all default tags are present iv) tagged variables exist v) that no extra tag exists (if allow_extra is FALSE).

**Usage**

`validate_tags(x, allow_extra = FALSE)`
validate_types

Check tagged variables are the right class

Description

This function checks the class of each tagged variable in a linelist against pre-defined accepted classes in tags_types().

Arguments

- **x**: a linelist object
- **allow_extra**: a logical indicating if additional data tags not currently recognized by linelist should be allowed; if FALSE, unknown tags will trigger an error

Value

If checks pass, a linelist object; otherwise issues an error.

See Also

validate_types() to check if tagged variables have the right classes

Examples

```r
if (require(outbreaks) && require(dplyr) && require(magrittr)) {
  # create a valid linelist
  x <- measles_hagelloch_1861 %>%
    tibble() %>%
    make_linelist(
      id = "case_ID",
      date_onset = "date_of_prodrome",
      age = "age",
      gender = "gender"
    )
  x

  # validation
  validate_tags(x)

  # hack to create an invalid tags (missing defaults)
  attr(x, "tags") <- list(id = "case_ID")

  # the below issues an error
  # note: tryCatch is only used to avoid a genuine error in the example
  tryCatch(validate_tags(x), error = paste)
}
```
Usage

validate_types(x, ref_types = tags_types())

Arguments

x
  a linelist object

ref_types
  a list providing allowed types for all tags, as returned by tags_types()

Value

A named list.

See Also

- tags_types() to change allowed types
- validate_tags() to perform a series of checks on the tags
- validate_linelist() to combine validate_tags and validate_types

Examples

if (require(outbreaks) && require(dplyr) && require(magrittr)) {

  ## create an invalid linelist - gender is a numeric
  x <- measles_hagelloch_1861 %>%
    tibble() %>%
    make_linelist(
      id = "case_ID",
      gender = "infector"
    )

  x

  ## the below would issue an error
  ## note: tryCatch is only used to avoid a genuine error in the example
  tryCatch(validate_types(x), error = paste)

  ## to allow other types, e.g. gender to be integer, character or factor
  validate_types(x, tags_types(gender = c("integer", "character", "factor")))
}

[.linelist

Subsetting of linelist objects

Description

The [] and [[]] operators for linelist objects behaves like for regular data.frame or tibble, but check that tagged variables are not lost, and takes the appropriate action if this is the case (warning, error, or ignore, depending on the general option set via lost_tags_action()).
Usage

```r
## S3 method for class 'linelist'
x[i, j, drop = FALSE]
```

```r
## S3 replacement method for class 'linelist'
x[i, j] <- value
```

```r
## S3 replacement method for class 'linelist'
x[[i, j]] <- value
```

```r
## S3 replacement method for class 'linelist'
x$name <- value
```

Arguments

- **x**: a linelist object
- **i**: a vector of integer or logical to subset the rows of the linelist
- **j**: a vector of character, integer, or logical to subset the columns of the linelist
- **drop**: a logical indicating if, when a single column is selected, the data.frame class should be dropped to return a simple vector, in which case the linelist class is lost as well; defaults to FALSE
- **value**: the replacement to be used for the entries identified in x
- **name**: a literal character string or a name (possibly backtick quoted). For extraction, this is normally (see under ‘Environments’) partially matched to the names of the object.

Value

If no drop is happening, a linelist. Otherwise an atomic vector.

See Also

- `lost_tags_action()` to set the behaviour to adopt when tags are lost through subsetting; default is to issue a warning
- `get_lost_tags_action()` to check the current the behaviour

Examples

```r
if (require(outbreaks) && require(dplyr) && require(magrittr)) {
  ## create a linelist
  x <- measles_hagelloch_1861 %>%
  tibble() %>%
  make_linelist(
    id = "case_ID",
    date_onset = "date_of_prodrome",
    age = "age",
    gender = "gender"
  )
  ```
) %>%
mutate(result = if_else(is.na(date_of_death), "survived", "died")) %>%
set_tags(outcome = "result") %>%
rename(identifier = case_ID)

## dangerous removal of a tagged column setting it to NULL issues a warning
x[, 1] <- NULL
x

x[[2]] <- NULL
x

x$age <- NULL
x
}
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