Package ‘ruler’

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R topics documented:

ruler-package ......................................................... 2
act_after_exposure ................................................... 3
any_breaker ............................................................. 4
ruler-package

Description

ruler offers a set of tools for creating tidy data validation reports using dplyr grammar of data manipulation. It is designed to be flexible and extendable in terms of creating rules and using their output.

Details

The common workflow is:

- Define dplyr-style packs of rules for basic data units (data, group, column, row, cell) to obey.
- Expose some data to those rules. The result is the same data with possibly created exposure attribute. Exposure contains information about applied packs and tidy data validation report.
- Use data and exposure to perform some actions: assert about rule breakers, impute data, remove outliers and so on.

To learn more about ruler browse vignettes with `browseVignettes(package = "ruler")`. The preferred order is:

1. Design process and exposure format.
2. Rule packs.
3. Validation

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See Also

Useful links:

- https://echasnovski.github.io/ruler/
- https://github.com/echasnovski/ruler
- Report bugs at https://github.com/echasnovski/ruler/issues

act_after_exposure

Description

A wrapper for consistent application of some actions based on the data after exposure.

Usage

act_after_exposure(.tbl, .trigger, .actor)

Arguments

.tbl: Result of exposure, i.e. data frame with exposure attribute.

.trigger: Function which takes .tbl as argument and returns TRUE if some action needs to be performed.

.actor: Function which takes .tbl as argument and performs the action.

Details

Basically act_after_exposure() is doing the following:

- Check that .tbl has a proper exposure attribute.
- Compute whether to perform intended action by computing .trigger(.tbl).
- If trigger results in TRUE then .actor(.tbl) is returned. In other case .tbl is returned.

It is a good idea that .actor should be doing one of two things:

- Making side effects. For example throwing an error (if condition in .trigger is met), printing some information and so on. In this case it should return .tbl to be used properly inside a pipe.
- Changing .tbl based on exposure information. In this case it should return the imputed version of .tbl.

See Also

any_breaker for trigger which returns TRUE in case any rule breaker is found in exposure.

assert_any_breaker for usage of act_after_exposure() in building data validation pipelines.
assert_any_breaker

Examples

```r
exposure_printer <- function(.tbl) {
  print(get_exposure(.tbl))
  .tbl
}
mtcars_exposed <- mtcars %>%
  expose(data_packs(. %>% dplyr::summarise(nrow_low = nrow(.) > 50))) %>%
  act_after_exposure(any_breaker, exposure_printer)
```

---

**any_breaker**

*Is there any breaker in exposure?*

---

**Description**

Function designed to be used as trigger in `act_after_exposure()`. Returns TRUE if exposure attribute of `.tbl` has any information about data units not obeying the rules, i.e. rule breakers.

**Usage**

```r
any_breaker(.tbl)
```

**Arguments**

- `.tbl` Result of `exposure`, i.e. data frame with `exposure` attribute.

**See Also**

`assert_any_breaker` for implicit usage of `any_breaker()`.

**Examples**

```r
mtcars %>%
  expose(data_packs(. %>% dplyr::summarise(nrow_low = nrow(.) > 50))) %>%
  any_breaker()
```

---

**assert_any_breaker**

*Assert presence of rule breaker*

---

**Description**

Function to assert if `exposure` resulted in detecting some rule breakers.

**Usage**

```r
assert_any_breaker(.tbl, .type = "error", .silent = FALSE, ...)
```
bind_exposures

Arguments

- `.tbl` Result of `exposure`, i.e. data frame with `exposure` attribute.
- `.type` The type of assertion. Can be only one of "error", "warning" or "message".
- `.silent` If `TRUE` no printing of rule breaker information is done.
- `...` Arguments for printing rule breaker information.

Details

In case breaker presence this function does the following:

- In case `.silent` is `FALSE` print rows from exposure report corresponding to rule breakers.
- Make assertion of the chosen `.type` about breaker presence in exposure.
- Return `.tbl` (for using inside a `pipe`).

If there are no breakers only `.tbl` is returned.

See Also

- `any_breaker` for checking of breaker presence in exposure result.
- `act_after_exposure` for making general actions based in exposure result.

Examples

```r
## Not run:
mtcars %>%
expose(data_packs(. %>% dplyr::summarise(nrow_low = nrow(.) > 50))) %>%
assert_any_breaker()
## End(Not run)
```

bind_exposures

Bind exposures

Description

Function to bind several exposures into one.

Usage

`bind_exposures(..., .validate_output = TRUE)`

Arguments

- `...` Exposures to bind.
- `.validate_output` Whether to validate with `is_exposure()` if the output is exposure.
Details

Note that the output might not have names in list-column `fun` in `packs info`, which depends on version of `dplyr` package.

Examples

```r
my_data_packs <- data_packs(
  data_dims = . %>% dplyr::summarise(nrow_low = nrow(.) < 10),
  data_sum = . %>% dplyr::summarise(sum = sum(.) < 1000)
)

ref_exposure <- mtcars %>%
expose(my_data_packs) %>%
get_exposure()

exposure_1 <- mtcars %>%
expose(my_data_packs[1]) %>%
get_exposure()

exposure_2 <- mtcars %>%
expose(my_data_packs[2]) %>%
get_exposure()

exposure_binded <- bind_exposures(exposure_1, exposure_2)

exposure_pipe <- mtcars %>%
expose(my_data_packs[1]) %>%
expose(my_data_packs[2]) %>%
get_exposure()

identical(exposure_binded, ref_exposure)

identical(exposure_pipe, ref_exposure)
```

---

**cell-pack**

Cell rule pack

**Description**

Cell rule pack is a rule pack which defines a set of rules for cells, i.e. functions which convert cells of interest to logical values. It should return a data frame with the following properties:

- Number of rows equals to **number of rows for checked cells**.
- Column names should be treated as concatenation of `column name of check cell` + `separator` + `rule name`
- Values indicate whether the **cell** follows the rule.
Details

This format is inspired by scoped variants of \texttt{transmute()}.

The most common way to define cell pack is by creating a functional sequence containing one of:

- \texttt{transmute_all(.funs = rules(...)).}
- \texttt{transmute_if(.predicate,.funs = rules(...)).}
- \texttt{transmute_at(.vars,.funs = rules(...)).}

\textbf{Note} that (as of \texttt{dplyr} version 0.7.4) when only one column is transmuted, names of the output don’t have a necessary structure. The ‘column name of check cell’ is missing which results (after \texttt{exposure}) into empty string in \texttt{var} column of \texttt{validation report}. The current way of dealing with this is to name the input column (see examples).

Using rules()

Using \texttt{rules()} to create list of functions for scoped \texttt{dplyr} ”mutating” verbs (such as \texttt{summarise_all()} and \texttt{transmute_all()}) is recommended because:

- It is a convenient way to ensure consistent naming of rules without manual name.
- It adds a common prefix to all rule names. This helps in defining separator as prefix surrounded by any number of non-alphanumeric values.

Note about rearranging rows

\textbf{Note} that during exposure packs are applied to keyed object with \texttt{id key}. So they can rearrange rows as long as it is done with \texttt{functions supported by keyholder}. Rows will be tracked and recognized as in the original data frame of interest.

See Also

- \texttt{Data pack, group pack, column pack, row pack}.

Examples

```r
cell_outlier_rules <- . %>% \texttt{dplyr::transmute_at(}
  \texttt{c("disp", "qsec"),}
  \texttt{rules(z_score = abs(. - mean(.)) / sd(.) > 1)}
\texttt{)}
\texttt{)
}

\texttt{cell_packs(outlier = cell_outlier_rules)}

# Dealing with one column edge case
improper_pack <- . %>% \texttt{dplyr::transmute_at(}
  \texttt{dplyr::vars(vs),}
  \texttt{rules(improper_is_neg = . < 0)}
\texttt{)}
\texttt{)
}

\texttt{proper_pack <- . %>% \texttt{dplyr::transmute_at(}
  \texttt{dplyr::vars(vs = vs),}
  \texttt{rules(proper_is_neg = . < 0)}
\texttt{)}
\texttt{)
```
mtcars[1:2, ] %>%
expose(cell_packs(improper_pack, proper_pack)) %>%
get_report()

column-pack  Column rule pack

Description

Column rule pack is a rule pack which defines a set of rules for columns as a whole, i.e. functions which convert columns of interest to logical values. It should return a data frame with the following properties:

- Number of rows equals to one.
- Column names should be treated as concatenation of 'check column name' + 'separator' + 'rule name'.
- Values indicate whether the column as a whole follows the rule.

Details

This format is inspired by dplyr’s scoped variants of summarise() applied to non-grouped data. The most common way to define column pack is by creating a functional sequence with no grouping and ending with one of:

- `summarise_all(.funs = rules(...))`.
- `summarise_if(.predicate,.funs = rules(...))`.
- `summarise_at(.vars,.funs = rules(...))`.

Note that (as of dplyr version 0.7.4) when only one column is summarised, names of the output don’t have a necessary structure. The 'check column name' is missing which results (after exposure) into empty string in var column of validation report. The current way of dealing with this is to name the input column (see examples).

Using rules()

Using `rules()` to create list of functions for scoped dplyr "mutating" verbs (such as `summarise_all()` and `transmute_all()`) is recommended because:

- It is a convenient way to ensure consistent naming of rules without manual name.
- It adds a common prefix to all rule names. This helps in defining separator as prefix surrounded by any number of non-alphanumeric values.

See Also

Data pack, group pack, row pack, cell pack.
Examples

```r
# Validating present columns
numeric_column_rules <- . %>% dplyr::summarise_if(  
  is.numeric,  
  rules(mean(.) > 5, sd(.) < 10)
)
character_column_rules <- . %>% dplyr::summarise_if(  
  is.character,  
  rules(. %in% letters[1:4])
)

col_packs(  
  num_col = numeric_column_rules,  
  chr_col = character_column_rules
)

# Dealing with one column edge case
improper_pack <- . %>% dplyr::summarise_at(  
  dplyr::vars(vs),  
  rules(improper_is_chr = is.character)
)

proper_pack <- . %>% dplyr::summarise_at(  
  dplyr::vars(vs = vs),  
  rules(proper_is_chr = is.character)
)

mtcars %>%  
  expose(col_packs(improper_pack, proper_pack)) %>%  
  get_report()
```

---

**data-pack**

**Data rule pack**

**Description**

Data rule pack is a rule pack which defines a set of rules for data as a whole, i.e. functions which convert data to logical values. It should return a data frame with the following properties:

- Number of rows equals to one.
- Column names should be treated as rule names.
- Values indicate whether the data as a whole follows the rule.

**Details**

This format is inspired by dplyr’s summarise() applied to non-grouped data.

The most common way to define data pack is by creating a functional sequence with no grouping and ending with summarise(…).
**See Also**

Group pack, Column pack, row pack, cell pack.

**Examples**

```r
data_dims_rules <- .%>%
dplyr::summarise(
  nrow_low = nrow(.) > 10,
  nrow_up = nrow(.) < 20,
  ncol_low = ncol(.) > 5,
  ncol_up = ncol(.) < 10
)
data_na_rules <- .%>%
dplyr::summarise(all_not_na = Negate(anyNA)(.))
data_packs(
data_nrow = data_dims_rules,
data_na = data_na_rules
)
```

**Description**

Function for applying rule packs to data.

**Usage**

```r
expose(.tbl, ..., .rule_sep = inside_punct("\_\_\.")
  , .remove_obeyers = TRUE, .guess = TRUE)
```

**Arguments**

- `.tbl`  
  Data frame of interest.
- `...`  
  Rule packs. They can be in pure form or inside a list (at any depth).
- `.rule_sep`  
  Regular expression used as separator between column and rule names in col packs and cell packs.
- `.remove_obeyers`  
  Whether to remove elements which obey rules from report.
- `.guess`  
  Whether to guess type of unsupported rule pack type (see Details).
Details

expose() applies all supplied rule packs to data, creates an exposure object based on results and stores it to attribute 'exposure'. It is guaranteed that .tbl is not modified in any other way in order to use expose() inside a pipe.

It is a good idea to name all rule packs: explicitly in ... (if they are supplied not inside list) or during creation with respective rule pack function. In case of missing name it is imputed based on possibly existing exposure attribute in .tbl and supplied rule packs. Imputation is similar to one in rules() but applied to every pack type separately.

Default value for .rule_sep is the regular expression characters ._ surrounded by non alphanumeric characters. It is picked to be used smoothly with dplyr’s scoped verbs and rules() instead of funs(). In most cases it shouldn’t be changed but if needed it should align with .prefix in rules().

Value

A .tbl with possibly added 'exposure' attribute containing the resulting exposure. If .tbl already contains 'exposure' attribute then the result is binded with it.

Guessing

To work properly in some edge cases one should specify pack types with appropriate function. However with .guess equals to TRUE expose will guess the pack type based on its output after applying to .tbl. It uses the following features:

- Presence of non- logical columns: if present then the guess is group pack. Grouping columns are guessed as all non-logical. This works incorrectly if some grouping column is logical: it will be guessed as result of applying the rule. Note that on most occasions this edge case will produce error about grouping columns define non-unique levels.

- Combination of whether number of rows equals 1 (n_rows_one) and presence of .rule_sep in all column names (all_contain_sep). Guesses are:
  - Data pack if n_rows_one == TRUE and all_contain_sep == FALSE.
  - Column pack if n_rows_one == TRUE and all_contain_sep == TRUE.
  - Row pack if n_rows_one == FALSE and all_contain_sep == FALSE. This works incorrectly if output has one row which is checked. In this case it will be guessed as data pack.
  - Cell pack if n_rows_one == FALSE and all_contain_sep == TRUE. This works incorrectly if output has one row in which cells are checked. In this case it will be guessed as column pack.

Examples

my_rule_pack <- . %>% dplyr::summarise(nrow_neg = nrow(.) < 0)
my_data_packs <- data_packs(my_data_pack_1 = my_rule_pack)

# These pipes give identical results
mtcars %>%
  expose(my_data_packs) %>%
  get_report()
mtcars %>%
expose(my_data_pack_1 = my_rule_pack) %>%
get_report()

# This throws an error because no pack type is specified for my_rule_pack
## Not run:
mtcars %>% expose(my_data_pack_1 = my_rule_pack, .guess = FALSE)

## End(Not run)

# Edge cases against using 'guess = TRUE' for robust code

group_rule_pack <- . %>%
dplyr::mutate(vs_one = vs == 1) %>%
dplyr::group_by(vs_one, am) %>%
dplyr::summarise(n_low = dplyr::n() > 10)
group_rule_pack_dummy <- . %>%
dplyr::mutate(vs_one = vs == 1) %>%
dplyr::group_by(mpg, vs_one, wt) %>%
dplyr::summarise(n_low = dplyr::n() > 10)
row_rule_pack <- . %>% dplyr::transmute(neg_row_sum = rowSums(.) < 0)
cell_rule_pack <- . %>% dplyr::transmute_all(rules(neg_value = . < 0))

# Only column 'am' is guessed as grouping which defines non-unique levels.
## Not run:
mtcars %>%
expose(group_rule_pack, .remove_obeyers = FALSE, .guess = TRUE) %>%
get_report()

## End(Not run)

# Values in 'var' should contain combination of three grouping columns but
# column 'vs_one' is guessed as rule. No error is thrown because the guessed
# grouping column define unique levels.
mtcars %>%
expose(group_rule_pack_dummy, .remove_obeyers = FALSE, .guess = TRUE) %>%
get_report()

# Results should have in column 'id' value 1 and not 0.
mtcars %>%
dplyr::slice(1) %>%
expose(row_rule_pack) %>%
get_report()

mtcars %>%
dplyr::slice(1) %>%
expose(cell_rule_pack) %>%
get_report()
Description

Exposure is a result of exposing data to rules. It is implemented with S3 class exposure which is a list of the following structure: packs_info - a packs_info object; report - tidy data validation report.

Usage

is_exposure(.x)

get_exposure(.object)

remove_exposure(.object)

Arguments

.x Object to test.

.object Object to get or remove exposure attribute from.

Value

get_exposure() returns object if it is exposure and its attribute 'exposure' otherwise.

remove_exposure() returns object with removed attributed 'exposure'.

Examples

my_col_packs <- col_packs(
  col_sum_props = . %>% dplyr::summarise_all(
    rules(
      col_sum_low = sum(.) > 100,
      col_sum_high = sum(.) < 1000
    )
  )
)

mtcars_exposed <- mtcars %>% expose(my_col_packs)

mtcars_exposure <- mtcars_exposed %>% get_exposure()

is_exposure(mtcars_exposure)

identical(remove_exposure(mtcars_exposed), mtcars)

identical(get_exposure(mtcars_exposure), mtcars_exposure)
Description

Group rule pack is a **rule pack** which defines a set of rules for groups of rows as a whole, i.e. functions which convert groups of interest to logical values. It should return a data frame with the following properties:

- There should be present some columns which combined values **uniquely** describe group. They should be defined during creation with **group_packs()**.
- Number of rows equals to **number of checked groups**.
- Names of non-grouping columns should be treated as **rule names**.
- Values indicate whether the **group as a whole** follows the rule.

Details

This format is inspired by **dplyr's summarise()** applied to grouped data.

The most common way to define data pack is by creating a **functional sequence** with grouping and ending with **summarise(...)**.

Interpretation

Group pack output is interpreted in the following way:

- All grouping columns are **united** with delimiter **.group_sep** (which is an argument of **group_packs()**).
- Levels of the resulting column are treated as names of some new variables which should be exposed as a whole. Names of non-grouping columns are treated as rule names. They are transformed in **column pack** format and interpreted accordingly.

Exposure result of group pack is different from others in a way that column **var** in **exposure report** doesn’t represent the actual column in data.

See Also

Data pack, Column pack, row pack, cell pack.

Examples

```r
vs_am_rules <- .
dplyr::group_by(vs, am)
dplyr::summarise(
  nrow_low = n(.) > 10,
  nrow_up = n(.) < 20,
  rowmeans_low = rowMeans(.) > 19
)
```

```r
group_packs(vs_am = vs_am_rules, .group_vars = c("vs", "am"))
```
inside_punct  

Inside punctuation regular expression

**Description**

Function to construct regular expression of form: 'non alpha-numeric characters' + 'some characters' + 'non alpha-numeric characters'.

**Usage**

```r
inside_punct(.x = "\._\\."")
```

**Arguments**

- **.x**: Middle characters to be put between non alpha-numeric characters.

**Examples**

```r
inside_punct()
inside_punct("abc")
```

packs_info  

Packs info

**Description**

An S3 class `packs_info` to represent information about packs in `exposure`. It is a tibble with the following structure:

- **name** <chr>: Name of the pack.
- **type** <chr>: Pack type.
- **fun** <list>: List (preferably unnamed) of rule pack functions.
- **remove_obeyers** <lg>l: value of `.remove_obeyers` argument of `expose()` with which pack was applied.

**Usage**

```r
is_packs_info(.x, .skip_class = FALSE)
get_packs_info(.object)
```
Arguments

.x Object to test.
.skip_class Whether to skip checking inheritance from packs_info.
.object Object to get packs_info value from exposure attribute.

Details

To avoid possible confusion it is preferred (but not required) that list-column fun doesn’t have names. Names of packs are stored in name column. During exposure fun is always created without names.

Value

get_packs_info() returns packs_info attribute of object if it is exposure and of its ‘exposure’ attribute otherwise.

Examples

my_row_packs <- row_packs(
  row_mean_props = . %>% dplyr::transmute(row_mean = rowMeans(.)) %>%
    dplyr::transmute(
      row_mean_low = row_mean > 20,
      row_mean_high = row_mean < 60
    ),
  row_outlier = . %>% dplyr::transmute(row_sum = rowSums(.)) %>%
    dplyr::transmute(
      not_row_outlier = abs(row_sum - mean(row_sum)) / sd(row_sum) < 1.5
    )
)
my_data_packs <- data_packs(
  data_dims = . %>% dplyr::summarise(
    nrow = nrow(.) == 32,
    ncol = ncol(.) == 5
  )
)

mtcars_exposed <- mtcars %>
  expose(my_data_packs, .remove_obeyers = FALSE) %>
  expose(my_row_packs)

mtcars_exposed %>
  get_packs_info()

mtcars_exposed %>
  get_packs_info() %>
  is_packs_info()
**Description**

Row rule pack is a rule pack which defines a set of rules for rows as a whole, i.e. functions which convert rows of interest to logical values. It should return a data frame with the following properties:

- Number of rows equals to number of checked rows.
- Column names should be treated as rule names.
- Values indicate whether the row as a whole follows the rule.

**Details**

This format is inspired by `dplyr`'s `transmute()`.

The most common way to define row pack is by creating a functional sequence containing `transmute(...)`.

**Note about rearranging rows**

Note that during exposure packs are applied to keyed object with id key. So they can rearrange rows as long as it is done with functions supported by keyholder. Rows will be tracked and recognized as in the original data frame of interest.

**See Also**

Data pack, group pack, column pack, cell pack.

**Examples**

```r
some_row_mean_rules <- . %>%
  dplyr::slice(1:3) %>%
  dplyr::mutate(row_mean = rowMeans(.)) %>%
  dplyr::transmute(
    row_mean_low = row_mean > 10,
    row_mean_up = row_mean < 20
  )
all_row_sum_rules <- . %>%
  dplyr::mutate(row_sum = rowSums(.)) %>%
  dplyr::transmute(row_sum_low = row_sum > 30)

row_packs(
  some_row_mean_rules,
  all_row_sum_rules
)
```
rule-packs  

Create rule packs

Description

Functions for creating different kinds of rule packs. **Rule** is a function which converts data unit of interest (data, group, column, row, cell) to logical value indicating whether this object satisfies certain condition. **Rule pack** is a function which combines several rules into one functional block. It takes a data frame of interest and returns a data frame with certain structure and column naming scheme. Types of packs differ in interpretation of their output.

Usage

```r
data_packs(...)

group_packs(..., .group_vars, .group_sep = ".")

col_packs(...)

row_packs(...)

cell_packs(...)
```

Arguments

- `...`: Functions which define packs. They can be in pure form or inside a list (at any depth).
- `.group_vars`: Character vector of names of grouping variables.
- `.group_sep`: String to be used as separator when uniting grouping levels for `var` column in exposure report.

Details

These functions convert `...` to list, apply Rlang’s `squash()` and add appropriate classes (`group_packs()` also adds necessary attributes). Also they are only constructors and do not check for validity of certain pack. **Note** that it is allowed for elements of `...` to not have names: they will be computed during exposure. However it is a good idea to manually name packs.

Value

- `data_packs()` returns a list of what should be **data rule packs**.
- `group_packs()` - **group rule packs**.
- `col_packs()` - **column rule packs**.
- `row_packs()` - **row rule packs**.
- `cell_packs()` - **cell rule packs**.
Description

A tibble representing the data validation result of certain data units in tidy way:

- **pack** <chr>: Name of rule pack from column 'name' of corresponding packs_info object.
- **rule** <chr>: Name of the rule defined in rule pack.
- **var** <chr>: Name of the variable which validation result is reported. Value '.all' is reserved and interpreted as 'all columns as a whole'. **Note** that var doesn’t always represent the actual column in data frame (see group packs).
- **id** <int>: Index of the row in tested data frame which validation result is reported. Value 0 is reserved and interpreted as 'all rows as a whole'.
- **value** <lgl>: Whether the described data unit obeys the rule.

Usage

```r
is_report(.x, .skip_class = FALSE)
get_report(.object)
```

Arguments

- **.x** Object to test.
- **.skip_class** Whether to skip checking inheritance from ruler_report.
- **.object** Object to get report value from exposure attribute.

Details

There are four basic combinations of var and id values which define five basic data units:

- **var == '.all' and id == 0**: Data as a whole.
- **var != '.all' and id == 0**: Group (var shouldn’t be an actual column name) or column (var should be an actual column name) as a whole.
- **var == '.all' and id != 0**: Row as a whole.
- **var != '.all' and id != 0**: Described cell.

Value

`get_report()` returns report element of object if it is exposure and of its 'exposure' attribute otherwise.
Examples

```r
my_row_packs <- row_packs(
  row_mean_props = . %>% dplyr::transmute(row_mean = rowMeans(.)) %>%
  dplyr::transmute(
    row_mean_low = row_mean > 20,
    row_mean_high = row_mean < 60
  ),
  row_outlier = . %>% dplyr::transmute(row_sum = rowSums(.)) %>%
  dplyr::transmute(
    not_row_outlier = abs(row_sum - mean(row_sum)) / sd(row_sum) < 1.5
  )
)
my_data_packs <- data_packs(
  data_dims = . %>% dplyr::summarise(
    nrow = nrow(.) == 32,
    ncol = ncol(.) == 5
  )
)
mtcars_exposed <- mtcars %>%
expose(my_data_packs, .remove_obeyers = FALSE) %>%
expose(my_row_packs)
mtcars_exposed %>% get_report()
```

rules

`rules()` is a function designed to create input for `.funs` argument of scoped `dplyr` "mutating" verbs (such as `summarise_all()` and `transmute_all()`). For version of `dplyr` less than 0.8.0 it is a direct wrapper for `funs()` which does custom name repair (see 'Details'). For newer versions it converts bare expressions with `. as input into formulas and repairs names of the output.

Description

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Usage

`rules(..., .args = list(), .prefix = "_._")`

Arguments

... Element(s) suitable as `.funs` argument (in scoped "mutating" verbs) for current version of `dplyr`. It can also be a bare expression with `. as input even if `dplyr` version is 0.8.0 or newer.
.args A named list of additional arguments to be added to all function calls (as in \texttt{dplyr::funs}()). \textbf{Note} that this argument isn’t used if installed version of \texttt{dplyr} is 0.8.0 or newer. Use other methods to supply arguments: \ldots argument in \texttt{scoped verbs} or make own explicit functions.

.prefix Prefix to be added to function names.

\textbf{Details}

\texttt{rules()} repairs names by the following algorithm:

- Absent names are replaced with the ‘rule\_\ind\’ where \ind\ is the index of function position in the \ldots.
- .\prefix is added at the beginning of all names. The default is \_\_. It is picked for its symbolism (it is the Morse code of letter ‘R’) and rare occurrence in names. In those rare cases it can be manually changed but this will not be tracked further. \textbf{Note} that it is a good idea for .\prefix to be \texttt{syntactic}, as newer versions of \texttt{dplyr} (\geq 0.8.0) will force tibble names to be syntactic. To check if string is “good”, use it as input to \texttt{make.names}(): if output equals that string than it is a “good” choice.

\textbf{Examples}

\begin{verbatim}
if (utils::packageVersion("dplyr") < "0.8.0") {
  rules_1 <- rules(mean, sd, .args = list(na.rm = TRUE))
  rules_1_ref <- dplyr::funs(
    "_.rule__1" = mean, "_.rule__2" = sd,
    .args = list(na.rm = TRUE)
  )
  identical(rules_1, rules_1_ref)

  rules_2 <- rules(mean, sd = sd, "var")
  rules_2_ref <- dplyr::funs(
    "_.rule__1" = mean,
    "_.sd" = sd,
    "_.rule__3" = "var"
  )
  identical(rules_2, rules_2_ref)

  rules_3 <- rules(mean, .prefix = "a_a_")
  rules_3_ref <- dplyr::funs("a_a_rule__1" = mean)
  identical(rules_3, rules_3_ref)
}

if (utils::packageVersion("dplyr") \geq "0.8.0") {
  # `rules()` also accepts bare expression calls with `.` as input, which is
  # not possible with advised `list()` approach of `dplyr`
  dplyr::summarise_all(mtcars[, 1:2], rules(sd, "sd", sd(.), ~ sd(.)))
  dplyr::summarise_all(mtcars[, 1:2], rules(sd, .prefix = "a_a_"))

  # Use `\ldots` in `summarise_all()` to supply extra arguments
  dplyr::summarise_all(data.frame(x = c(1:2, NA)), rules(sd), na.rm = TRUE)
}\end{verbatim}
**Description**

Function that is used during interpretation of group pack output. It converts grouped summary into column pack format.

**Usage**

```r
spread_groups(.tbl, ..., .group_sep = ".", .col_sep = "_.")
```

**Arguments**

- `.tbl` Data frame with result of grouped summary.
- `...` A selection of grouping columns (as in `tidyr::unite()`).
- `.group_sep` A string to be used as separator of grouping levels.
- `.col_sep` A string to be used as separator in column pack.

**Details**

Multiple grouping variables are converted to one with `tidyr::unite()` and separator `.group_sep`. New values are then treated as variable names which should be validated and which represent the group data as a whole.

**Value**

A data frame in column pack format.

**Examples**

```r
mtcars_grouped_summary <- mtcars %>%
  dplyr::group_by(vs, am) %>%
  dplyr::summarise(n_low = dplyr::n() > 6, n_high = dplyr::n() < 10)

spread_groups(mtcars_grouped_summary, vs, am)

spread_groups(mtcars_grouped_summary, vs, am, .group_sep = "__")

spread_groups(mtcars_grouped_summary, vs, am, .col_sep = "__")
```
Index

about applied packs, 2
act_after_exposure, 3, 5
act_after_exposure(), 4
actions, 2
any_breaker, 3, 4, 5
appropriate function, 11
assert about rule breakers, 2
assert_any_breaker, 3, 4
bind_exposures, 5
Cell pack, 11
cell pack, 8, 10, 14, 17
cell packs, 10
cell rule packs, 18
cell_pack, 6
cell_packs (rule-packs), 18
col packs, 10
col_packs (rule-packs), 18
Column pack, 10, 11, 14
column pack, 7, 14, 17, 22
column packs, 18
column_pack, 8
Data pack, 7, 8, 11, 14, 17
data rule packs, 18
data-pack, 9
data_packs (rule-packs), 18
detecting, 4
dplyr, 6
Expose, 2
expose, 10
expose(), 15
exposing, 13
exposure, 2–5, 7, 8, 11, 12, 15, 16
exposure report, 14, 18
functional sequence, 7–9, 14, 17
functions supported by keyholder, 7, 17
funs(), 11, 20
get_exposure (exposure), 12
get_packs_info (packs_info), 15
get_report (ruler-report), 19
Group pack, 10
group pack, 7, 8, 11, 17, 22
group packs, 19
group rule packs, 18
group-pack, 14
group_packs (rule-packs), 18
group_packs(), 14
id key, 7, 17
inside_punct, 15
is_exposure (exposure), 12
is_exposure(), 5
is_packs_info (packs_info), 15
is_report (ruler-report), 19
keyed object, 7, 17
Pack type, 15
packs, 2
packs (rule-packs), 18
packs_info, 6
packs_info, 13, 15, 19
pipe, 3, 5, 11
remove_exposure (exposure), 12
report, 5
Row pack, 11
row pack, 7, 8, 10, 14
row rule packs, 18
row-pack, 17
row_packs (rule-packs), 18
rule pack, 6, 8, 9, 14, 17
rule-packs, 18
ruler (ruler-package), 2
ruler-package, 2
ruler-report, 19
rules, 20
rules(), 7, 8, 11

scoped variants of summarise(), 8
scoped variants of transmute(), 7
scoped verbs, 11, 21
spread_groups, 22
squash(), 18
summarise(), 9, 14
summarise_all(), 7, 8, 20
summary, 22
syntactic, 21

tidy data validation report, 2, 13
tidyr::unite(), 22
transmute(), 17
transmute_all(), 7, 8, 20

united, 14

validation report, 7, 8