Package ‘usefun’

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Type Package

Title A Collection of Useful Functions by John

Version 0.4.7

Description A set of general functions that I have used in various projects and in other R packages. They support some miscellaneous operations on data frames, matrices and vectors like adding a row on a ternary (3-value) data.frame based on positive and negative vector-indicators, rearranging a list of data.frames by rownames, pruning rows or columns of a data.frame that contain only one specific value given by the user, pruning and reordering a vector according to the common elements between its names and elements of another given vector, finding the non-common elements between two vectors (outer-section), normalization of a vector, matrix or data.frame's numeric values in a specified range, pretty printing of vector names and values in an R Markdown document. Also included is a function that returns the statistics needed for plotting a ROC curve.

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URL https://github.com/bblodfon/usefun

BugReports https://github.com/bblodfon/usefun/issues

Encoding UTF-8

LazyData true

RoxygenNote 7.1.0

Imports graphics, stats, utils, dplyr

Suggests testthat, covr, readr

NeedsCompilation no

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add_row_to_ternary_df

Add a row to a 3-valued (ternary) data.frame

Description

Use this function on a data.frame object (with values only in the 3-element set \{-1,0,1\} ideally - specifying either a positive, negative or none/absent condition/state/result about something) and add an extra **first or last row vector** with zero values, where 1 and -1 will be filled when the column names of the given data.frame match the values in the values.pos or values.neg vector parameters respectively.
add_row_to_ternary_df

Usage

add_row_to_ternary_df(
  df,
  values.pos,
  values.neg,
  pos = "first",
  row.name = NULL
)

Arguments

df                    a data.frame object with values only in the the 3-element set {-1,0,1}. The
                      column names should be node names (gene, protein names, etc.).
values.pos         a character vector whose elements are indicators of a positive state/condition and
                      will be assigned a value of 1. These elements must be a subset of the column
                      names of the given df parameter. If empty, no values equal to 1 will be added
                      to the new row.
values.neg         a character vector whose elements are indicators of a negative state/condition
                      and will be assigned a value of -1. If empty, no values equal to -1 will be added
                      to the new row. These elements must be a subset of the column names of the
                      given df parameter.
pos               string. The position where we should put the new row that will be generated.
                      Two possible values: "first" (default) or "last".
row.name        string. The name of the new row that we will added. Default value: NULL.

Value

the df with one extra row, having elements from the {-1,0,1} set depending on values.pos
and values.neg vectors.

Examples

df = data.frame(c(0,-1,0), c(0,1,-1), c(1,0,0))
colnames(df) = c("A", "B", "C")
df.new = add_row_to_ternary_df(df, values.pos = c("A"), values.neg = c("C"), row.name = "Hello!")

add_vector_to_df

Add vector to a (n x 2) data frame

Description

Given a vector, adds each value and its corresponding name to a data frame of 2 columns as new
rows, where the name fills in the 1st column and the value the 2nd column.
Usage

```r
add_vector_to_df(df, vec)
```

Arguments

- `df`  data.frame, with n rows and 2 columns
- `vec`  a vector

Value

a data.frame with additional rows and each element as a character.

Examples

```r
df = data.frame(c(0,0,1), c(0,0,2))
vec = 1:3
names(vec) = c("a","b","c")
add_vector_to_df(df, vec)
```

---

**binarize_to_thres**  
Binarize matrix to given threshold

Description

Simple function that checks every element of a given matrix (or data.frame) if it surpasses the given threshold either positively or negatively and it outputs 1 for that element, otherwise 0.

Usage

```r
binarize_to_thres(mat, thres)
```

Arguments

- `mat`  a matrix or data.frame object
- `thres`  a positive numerical value

Value

a binarized matrix (values either 0 or 1): elements that have 1 correspond to values of mat that they were either larger than the threshold or smaller than it’s negative.

Examples

```r
mat = matrix(data = -4:4, nrow = 3, ncol = 3)
binarize_to_thres(mat, thres = 0.5)
binarize_to_thres(mat, thres = 2.5)
```
get_common_names

**Get the common names of two vectors**

**Description**

This function prints and returns the common names of two vectors. The two vectors don’t have to be the same length.

**Usage**

```r
get_common_names(vec1, vec2, vector.names.str = "nodes", with.gt = TRUE)
```

**Arguments**

- `vec1`: vector with names attribute
- `vec2`: vector with names attribute
- `vector.names.str`: string. Used for printing, it tell us what are the names of the two vectors (use plural form). Default value: "nodes".
- `with.gt`: logical. Determines if the ">" sign will be appended for nice printing in an R notebook (use with the chuck option `results = 'asis'`). Default value: TRUE.

**Value**

the character vector of the common names. If there is only one name in common, the `vector.names.str` gets the last character stripped for readability. If there is no common names, it returns FALSE.

**See Also**

- `pretty_print_vector_values`
- `pretty_print_string`

**Examples**

```r
vec1 = c(1,1,1)
vec2 = c(1,2)
names(vec1) = c("a","b","c")
names(vec2) = c("c","b")

common.names = get_common_names(vec1, vec2)
```
get_common_values  
Get the common values of two vectors

Description

This function prints and returns the common values of two vectors. The two vectors don’t have to be the same length.

Usage

get_common_values(vec1, vec2, vector.values.str = "nodes", with.gt = TRUE)

Arguments

vec1 vector
vec2 vector
vector.values.str string. Used for printing, it tells us what are the values of the two vectors (use plural form). Default value: "nodes".
with.gt logical. Determines if the "->" sign will be appended for nice printing in an R notebook (use with the chunk option results = 'asis'). Default value: TRUE.

Value

the vector of the common values. If there is only one value in common, the vector.values.str gets the last character stripped for readability. If there are no common values, it returns NULL.

See Also

pretty_print_vector_values, pretty_print_string

Examples

vec1 = c(1,2,3)
vec2 = c(3,4,1)
common.names = get_common_values(vec1, vec2)
get_parent_dir

Retrieve the parent directory

Description
Use this function to retrieve the parent directory from a string representing the full path of a file or a directory.

Usage
get_parent_dir(pathStr)

Arguments
- pathStr: string. The name of the directory, can be a full path filename.

Value
a string representing the parent directory. When a non-file path is used as input (or something along those lines :) then it returns the root ("/") directory.

Examples
- get_parent_dir("/home/john")
- get_parent_dir("/home/john/a.txt")
- get_parent_dir("/home")

get_percentage_of_matches

Get percentage of matches between two vectors

Description
Use this function on two numeric vectors with the same names attribute (columns) and same length, in order to find the percentage of common elements (value matches between the two vectors). The same names for the two vectors ensures that their values are logically matched one-to-one.

Usage
get_percentage_of_matches(vec1, vec2)

Arguments
- vec1: numeric vector with names attribute
- vec2: numeric vector with names attribute
get_roc_stats

Generate ROC statistics

Description
Use this function to generate the most useful statistics related to the generation of a basic ROC (Receiver Operating Characteristic) curve.

Usage
get_roc_stats(df, pred_col, label_col, direction = "<")

Arguments

df a data.frame with (at least) two columns. See next two parameters for what values these two columns should have (which should match one to one).
pred_col string. The name of the column of the df data.frame that has the prediction values. The values can be any numeric, negative, positive or zero. What matters is the ranking of these values which is clarified with the direction parameter.
label_col string. The name of the column of the df data.frame that has the true positive labelings/observed classes for the prediction values. This column must have either 1 or 0 elements representing either a positive or negative classification label for the corresponding values.
direction string. Can be either > or < (default value) and indicates the direction/ranking of the prediction values with respect to the positive class labeling (for a specific threshold). If smaller prediction values indicate the positive class label use < whereas if larger prediction values indicate the positive class label (e.g. probability of positive class), use >.
get_roc_stats

Value

A list with two elements:

- `roc_stats`: a tibble which includes the **thresholds** for the ROC curve and the **confusion matrix stats** for each threshold as follows: TP (#True Positives), FN (#False Negatives), TN (#True Negatives), FP (#False Positives), FPR (False Positive Rate - the x-axis values for the ROC curve) and TPR (True Positive Rate - the y-axis values for the ROC curve). Also included are the `dist-from-chance` (the vertical distance of the corresponding (FPR,TPR) point to the chance line or positive diagonal) and the `dist-from-0-1` (the euclidean distance of the corresponding (FPR,TPR) point from (0,1)).

- `AUC`: a number representing the Area Under the (ROC) Curve.

The returned results provide an easy way to compute two optimal **cutpoints** (thresholds) that dichotomize the predictions to positive and negative. The first is the **Youden index**, which is the maximum vertical distance from the ROC curve to the chance line or positive diagonal. The second is the point of the ROC curve closest to the (0,1) - the point of perfect differentiation. See examples below.

Examples

```r
# load libraries
library(readr)
library(dplyr)

# load test tibble
test_file = system.file("extdata", "test_df.tsv", package = "usefun", mustWork = TRUE)
test_df = readr::read_tsv(test_file, col_types = "di")

# get ROC stats
res = get_roc_stats(df = test_df, pred_col = "score", label_col = "observed")

# Plot ROC with a legend showing the AUC value
plot(x = res$roc_stats$FPR, y = res$roc_stats$TPR,
     type = "l", lwd = 2, col = "#377EB8", main = "ROC curve",
     xlab = "False Positive Rate (FPR)", ylab = "True Positive Rate (TPR)"
     legend("bottomright", legend = round(res$AUC, digits = 3),
     title = "AUC", col = "#377EB8", pch = 19)
grd()
abline(a = 0, b = 1, col = "#FF726F", lty = 2)

# Get two possible cutoffs
youden_index_df = res$roc_stats %>%
   filter(dist_from_chance == max(dist_from_chance))
min_classification_df = res$roc_stats %>%
   filter(dist_from_0_1 == min(dist_from_0_1))
```
get_stats_for_unique_values

Get stats for unique values

Description

Use this function on two vectors with same names attribute (column names), to find for each unique (numeric) value of the first vector, the average and standard deviation values of the second vector’s values (matching is done by column name)

Usage

get_stats_for_unique_values(vec1, vec2)

Arguments

vec1 vector with names attribute
vec2 vector with names attribute

Value

A data.frame consisting of 3 column vectors. The data.frame size is nx3, where n is the number of unique values of vec1 (rows). The columns vectors are:

1. the first input vector pruned to its unique values
2. a vector with the average values for each unique value of the first vector (the matching is done by column name)
3. a vector with the standard deviation values for each unique value of the first vector (the matching is done by column name)

Examples

vec1 = c(1, 2, 3, 2)
vec2 = c(20, 2, 2.5, 8)
names.vec = c(seq(1,4))
names(vec1) = names.vec
names(vec2) = names.vec

res = get_stats_for_unique_values(vec1, vec2)
get_ternary_class_id

Description
Helper function that checks if a value surpasses the given threshold either positively, negatively or not at all and returns a value indicating in which class (i.e. interval) it belongs.

Usage
get_ternary_class_id(value, threshold)

Arguments
value numeric
threshold numeric

Value
an integer. There are 3 cases:
• 1: when value > threshold
• -1: when value < -threshold
• 0: otherwise

is_between

Description
This function checks if a given value is inside an interval specified by two boundary values.

Usage
is_between(value, low.thres, high.thres, include.high.value = FALSE)

Arguments
value numeric
low.thres numeric. Lower boundary of the interval.
high.thres numeric. Upper boundary of the interval.
include.high.value logical. Whether the upper bound is included in the interval or not. Default value: FALSE.
Value

a logical specifying if the value is inside the interval \([\text{low.thres}, \text{high.thres})\) (default behaviour) or inside the interval \([\text{low.thres}, \text{high.thres}]\) if \text{include.high.value} is TRUE.

Examples

is_between(3,2,4)
is_between(4,2,4)
is_between(4,2,4,\text{include.high.value}=\text{TRUE})

<table>
<thead>
<tr>
<th>is_empty</th>
<th>Is object empty?</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRUE</td>
<td></td>
</tr>
<tr>
<td>FALSE</td>
<td></td>
</tr>
</tbody>
</table>

Description

A function to test whether an object is empty. It checks the length of the object, so it has different behaviour than \text{is.null}.

Usage

is_empty(obj)

Arguments

obj a general object

Value

a logical specifying if the object is NULL or not.

Examples

# TRUE
is_empty(NULL)
is_empty(c())

# FALSE
is_empty(""")
is_empty(NA)
is_empty(NaN)
ldf_arrange_by_rownames

Rearrange a list of data frames by rownames

Description

Rearrange a list of data frames by rownames

Usage

```r
ldf_arrange_by_rownames(list_df)
```

Arguments

- `list_df` a (non-empty) list of `data.frame` objects. The data frames must have the same `colnames` attribute.

Value

a rearranged list of data frames, where the names of the elements of the `list_df` (the 'ids' of the data frames) and the rownames of the data frames have switched places: the unique row names of the original list's combined data frames serve as names for the returned list of data frames, while the data frame 'ids' (names of the original list's elements) now serve as rownames for the data frames in the new list.

E.g. if in the given list there was a `data.frame` with id 'A':

```r
c = list_df[["A"]]
rownames(a) = c("row1", "row2").
```

then in the rearranged list there would be two data frames with ids "row1" and "row2", each of them having a row with name 'A' where also these data rows would be the same as before:

```r
list_df[["A"]]["row1",] == returned_list[["row1"]]["A",] and list_df[["A"]]["row2",] == returned_list[["row2"]]["A",] respectively.
```

Examples

```r
df.1 = data.frame(matrix(data = 0, nrow = 3, ncol = 3, dimnames = list(c("row1", "row2", "row3"), c("C.1", "C.2", "C.3"))))
df.2 = data.frame(matrix(data = 1, nrow = 3, ncol = 3, dimnames = list(c("row1", "row2", "row4"), c("C.1", "C.2", "C.3"))))
list_df = list(df.1, df.2)
names(list_df) = c("zeros", "ones")
res_list_df = ldf_arrange_by_rownames(list_df)
```
make_color_bar_plot   Make a color bar plot

Description

Use this function when you want to visualize some numbers and their respective color values. Note that more than 42 colors won’t be nice to see (too thin bars)!

Usage

make_color_bar_plot(color.vector, number.vector, title, x.axis.label = "")

Arguments

color.vector  vector of color values
number.vector  vector of numeric values (same length with color.vector)
title         string. The title of the barplot
x.axis.label  string. The x-axis label. Default value: empty string

Examples

    color.vector = rainbow(10)
    number.vector = 1:10
    title = "First 10 rainbow() colors"
    make_color_bar_plot(color.vector, number.vector, title)

make_multiple_density_plot

Multiple densities plot

Description

Combine many density distributions to one common plot.

Usage

make_multiple_density_plot(
    densities,
    legend.title,
    title,
    x.axis.label,
    legend.size = 1
)
Arguments

densities a list, each element holding the results from executing the `density` function to a (different) vector. Note that you need to provide a name for each list element for the legend (see example).

legend.title string. The legend title.

title string. The plot title.

x.axis.label string. The x-axis label.

legend.size numeric. Default value: 1.

Examples

```r
mat = matrix(rnorm(60), ncol=20)
densities = apply(mat, 1, density)
names(densities) = c("1st", "2nd", "3rd")
make_multiple_density_plot(densities, legend.title = "Samples",
                          x.axis.label = "", title = "3 Normal Distribution Samples")
```

---

**mat_equal**

*Matrix equality*

Description

Check if two matrices are equal. Equality is defined by both of them being matrices in the first place, having the same dimensions as well as the same elements.

Usage

```r
mat_equal(x, y)
```

Arguments

- `x, y` matrices

Value

a logical specifying if the two matrices are equal or not.
### normalize_to_range  \hspace{1em} \textit{Range normalization}

**Description**

Normalize a vector, matrix or data.frame of numeric values in a specified range.

**Usage**

\[
\text{normalize_to_range}(x, \text{range} = c(0, 1))
\]

**Arguments**

- \(x\) vector, matrix or data.frame with at least two different elements
- \(\text{range}\) vector of two elements specifying the desired normalized range. Default value is \(c(0,1)\)

**Value**

the normalized data

**Examples**

\[
\begin{align*}
\text{vec} & = 1:10 \\
\text{normalize_to_range}(\text{vec}) & \\
\text{normalize_to_range}(\text{vec}, \text{range} = c(-1,1)) & \\
\text{mat} & = \text{matrix}(c(0,2,1), ncol = 3, nrow = 4) \\
\text{normalize_to_range}(\text{mat}, \text{range} = c(-5,5)) &
\end{align*}
\]

### outersect  \hspace{1em} \textit{Outersect}

**Description**

Performs set \textit{outersection} on two vectors. The opposite operation from \textit{intersect}!

**Usage**

\[
\text{outersect}(x, y)
\]

**Arguments**

- \(x, y\) vectors
pretty_print_bold_string

Value

a vector of the non-common elements of x and y.

See Also

intersect

Examples

x = 1:10
y = 2:11

# c(1,11)
outersect(x,y)

---

pretty_print_bold_string

Pretty print a bold string

Description

Prints a bold string only when 'html.output' is enabled. Otherwise, it prints a normal string. The the ">" sign can be appended if nice output in an R notebook is desired.

Usage

pretty_print_bold_string(string, with.gt = TRUE, html.output = TRUE)

Arguments

string a string

with.gt logical. Determines if the ">" sign will be appended for nice printing in an R notebook. (use with the chuck option results = 'asis'). Default value: TRUE.

html.output logical. If TRUE, it encapsulates the string with the bold tags for an HTML document. Default value: TRUE.

See Also

pretty_print_string
pretty_print_name_and_value

Pretty print a name and value

Description

Pretty print a name and value

Usage

pretty_print_name_and_value(name, value, with.gt = FALSE, with.comma = TRUE)

Arguments

name string
value string
with.gt logical. Determines if the ">" sign will be appended for nice printing in an R notebook (use with the chuck option results = 'asis'). Default value: FALSE.
with.comma logical. Determines if the comma (,) character will be appended to the end of the output. Default value: TRUE.

Examples

pretty_print_name_and_value("aName", "aValue", with.gt = TRUE)
pretty_print_name_and_value("aName", "aValue", with.comma = FALSE)

pretty_print_string

Pretty print a string

Description

Nice printing of a string in an R notebook (default behaviour). Otherwise, it prints the string to the standard R output.

Usage

pretty_print_string(string, with.gt = TRUE)

Arguments

string a string
with.gt logical. Determines if the ">" sign will be appended for nice printing in an R notebook (use with the chuck option results = 'asis'). Default value: TRUE.

See Also

cat
pretty_print_vector_names

Pretty printing of a vector’s names attribute

Description

Pretty printing of a vector’s names attribute

Usage

pretty_print_vector_names(
  vec,
  vector.names.str = "nodes",
  sep = ", ",
  with.gt = TRUE
)

Arguments

vec vector

vector.names.str string. It tell us what are the names of the vector (use plural form) in order to fill the print message. Default value: "nodes".

sep string. The separator character to use to distinguish between the names values. Default value: ", ".

with.gt logical. Determines if the ">" sign will be appended for nice printing in an R notebook (use with the chuck option results = 'asis'). Default value: TRUE.

See Also

pretty_print_string

pretty_print_vector_names_and_values

Pretty printing of a vector’s names and values

Description

It outputs a vector’s names and values in this format: name1: value1, name2: value2,... You can choose how many elements to show in this format. Use with the chuck option results = 'asis' to get a nice printing in an R notebook.

Usage

pretty_print_vector_names_and_values(vec, n = -1)
pretty_print_vector_values

Arguments

vec vector with names attribute
n the number of elements that you want to print in a nice way. Default value: -1 (pretty print all elements). For any n < 1, all elements are printed.

See Also

pretty_print_name_and_value

pretty_print_vector_values

Pretty printing of a vector’s values

Description

Pretty printing of a vector’s values

Usage

pretty_print_vector_values(
vec,
vector.values.str = "nodes",
sep = "", ",",
with.gt = TRUE
)

Arguments

vec vector
vector.values.str string. It tell us what are the values of the vector (use plural form) in order to fill the print message. Default value: "nodes".
sep string. The separator character to use to distinguish between the vector values. Default value: ",", ",",
with.gt logical. Determines if the ">" sign will be appended for nice printing in an R notebook (use with the chuck option results = 'asis'). Default value: TRUE.

See Also

pretty_print_string
print_empty_line  Print an empty line

Description

Print an empty line

Usage

print_empty_line(html.output = FALSE)

Arguments

html.output  logical. If TRUE, it outputs an empty line for an HTML document, else an empty line for the standard R output. Default value: FALSE.

See Also

cat

prune_and_reorder_vector  Prune and reorder vector elements

Description

Given two vectors, the first one’s elements are pruned and reordered according to the common values of the second vector and the elements’ names (attribute) of the first. If there no common such values, an empty vector is returned.

Usage

prune_and_reorder_vector(vec, filter.vec)

Arguments

vec  a vector with names attribute
filter.vec  a character vector whose values will be used to filter the vec elements

Value

the pruned and re-arranged vector.
prune_columns_from_df

Prune single-value columns from a data frame

Description
Given a data.frame and an integer value, it checks whether there is a column vector whose values match the given one. If so, it prunes that single-valued column from the data.frame.

Usage
prune_columns_from_df(df, value)

Arguments
- df: data.frame
- value: an integer value

Value
the column-pruned data.frame

Examples
```r
df = data.frame(c(0,0,0), c(0,1,0), c(1,0,0))
prune_columns_from_df(df, value = 0)
```
prune_rows_from_df

Prune single-value rows from a data frame

Description
Given a data.frame and an integer value, it checks whether there is a row vector whose values match the given one. If so, it prunes that single-valued row from the data.frame.

Usage
prune_rows_from_df(df, value)

Arguments
- df: data.frame
- value: an integer value

Value
the row-pruned data.frame

Examples
df = data.frame(c(0,0,0), c(0,1,0), c(1,0,0))
prune_rows_from_df(df, value = 0)

remove_commented_and_empty_lines

Remove commented and empty lines

Description
Removes empty or commented lines from a character vector (each element being a line)

Usage
remove_commented_and_empty_lines(lines)

Arguments
- lines: a character vector, usually the result from using the readLines function

Value
a character vector of the pruned lines
save_df_to_file  Save data frame to a specified file

Description

Function for saving a data.frame to a specified file. Column and row names are written by default and the tab is used as a delimiter.

Usage

save_df_to_file(df, file)

Arguments

df  data.frame
file  string. The name of the file, can be a full path.

save_mat_to_file  Save matrix to a specified file

Description

Function for saving a matrix to a specified file. Uses the save_df_to_file function.

Usage

save_mat_to_file(mat, file)

Arguments

mat  matrix
file  string. The name of the file, can be a full path.
save_vector_to_file  

Save vector to a specified file

Description

Function for saving a vector with or without its row names to a specified file. By default the `tab` is used as a delimiter.

Usage

```r
save_vector_to_file(vector, file, with.row.names = FALSE)
```

Arguments

- `vector` vector
- `file` string. The name of the file, can be a full path.
- `with.row.names` logical. If TRUE, then the `names(vector)` will be included in the output file. Default value: FALSE.

specify_decimal  

Specify decimal

Description

Use this function to transform a given decimal number to the desired precision by choosing the number of digits after the decimal point.

Usage

```r
specify_decimal(number, digits.to.keep)
```

Arguments

- `number` numeric
- `digits.to.keep` numeric. Refers to the digits to keep after decimal point `.`. This value should be 15 or less.

Value

the pruned number in string format

Examples

```r
# 0.123
specify_decimal(0.1233213, 3)
```
Description

A collection of useful functions by John

Details

For a complete list of functions, use `library(help = "usefun")`
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