

# Package ‘Rseb’

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**Type** Package

**Title** A package for NGS data managing and visualization

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**Author** Sebastian Gregoricchio

**Maintainer** Sebastian Gregoricchio <sebastian.gregoricchio@gmail.com>

**Description**

An R-package for daily tasks necessary to handle biological data as well avoid re-coding of small functions for quick but necessary data managing.

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**Depends**

R, BiocManager, Biostrings, biomaRt, GO.db, rtracklayer, cowplot, data.table, dplyr, ggplot2, ggrepel, matrixStats, plyr, purrr, robustbase, stringr, tidyr, tools

**biocViews**

**Imports** Biostrings, biomaRt, GO.db, rtracklayer, cowplot, data.table, dplyr, ggplot2, ggrepel, matrixStats, plyr, purrr, robustbase, stringr, tidyr, tools

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**git\_url** <https://github.com/sebastian-gregoricchio/Rseb/>

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---

calculate.mode	<i>Mode calculation</i>
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---

**Description**

Calculate the mode value of a vector of numeric values.

**Usage**

calculate.mode(v)

**Arguments**

v                      A vector of numeric numbers

**Value**

A single number corresponding to the mode of the list of numbers give as input

**Examples**

mode = calculate.mode(v = c(6, 8, 4, 845, 8, 5, 55, 84, 8, 84, 45, 5))

---

cmyk	<i>CMYK color converter</i>
------	-----------------------------

---

**Description**

Converts CMYK color values to hexadecimal color values

**Usage**

```
cmyk(C, M, Y, K)
```

**Arguments**

C	Value in the 0-100 range for the Cyan component.
M	Value in the 0-100 range for the Magenta component.
Y	Value in the 0-100 range for the Yellow component.
K	Value in the 0-100 range for the Key component.

**Value**

The result is a string for the color in hexadecimal scale, eg. "#FFFFFF".

**Examples**

```
color = cmyk(0, 0, 0, 0)
```

---

combine.lists	<i>List combiner</i>
---------------	----------------------

---

**Description**

Combines two or more lists in a single one keeping the element names.

**Usage**

```
combine.lists(list.of.lists)
```

**Arguments**

`list.of.lists` A list of lists.

**Value**

It returns a list that is a combination of the lists in the input list.  
If the list is not a nested list of list the original input is returned.

## Examples

```
combined_list = combine.lists(list.of.lists = list(list(c(1:2), c(1:3)), list("X" = c("A", "B"), "Y" = 2)))

combined_list = combine.lists(list.of.lists = list(c(1:2), c(1:3)))
```

---

convert_sequence	<i>Nucleic acid sequences converter.</i>
------------------	--

---

## Description

Obtains de complementary, reverse complementary or the reverse of a DNA/RNA sequence.

## Usage

```
convert_sequence(sequence = NULL, mode = "not specified", nucleic.acid = "DNA")
```

## Arguments

sequence	A string containing the sequence to be converted. By default NULL, it returns an help for the mode.
mode	A string value to define the modality of conversion. Possible options: - Reverse complement = revComp — RC — rc — reverseComplement - Reverse = rev — R — r — reverse - Complement = comp — C — c — complement. By default "not specified", it returns an help for the mode.
nucleic.acid	A string to define the type of nucleic acid to which the input sequence belongs. Available options "DNA", default value, or "RNA".

## Value

It returns a string with the converted sequence.

## Examples

```
convert_sequence(sequence = "AATTCCCGTCGAT",
                 mode = "reverse",
                 nucleic.acid = "DNA")
```

---

data.frame.to.list	<i>Data frame conversion to a list of columns.</i>
--------------------	--

---

**Description**

Converts each column of a data.frame in a element of a list with the corresponding name of the original column. Useful for further use in functions such as purrr::pmap().

**Usage**

```
data.frame.to.list(x)
```

**Arguments**

x	A data.frame to be converted
---	------------------------------

**Value**

A list of vectors in which each element is a column of input the data.frame.

**Examples**

```
data.frame.to.list(mtcars)
```

---

data.summary	<i>Statistical data summary generator</i>
--------------	---

---

**Description**

Produces a table with a summary of the statistics for a specific column of an input data.frame by a group of values defined by a group defined by another column.

**Usage**

```
data.summary(data, variable, group.names)
```

**Arguments**

data	Input data.frame to be analyzed.
variable	A string with the name of the column to be analyzed.
group.names	A string with the name of the column indicating the groups.

**Value**

It returns a list that is a combination of the lists in the input list.  
If the list is not a nested list of list the original input is returned.

## Examples

```
data.summary(data = mtcars, variable = "mpg", group.names = "disp")
```

---

DE.status

*Differential Expression status calculator for RNA-seq data*


---

## Description

Defines the differential expression status of genes from RNA-seq data depending on fold change expression and adjusted p-value.

## Usage

```
DE.status(
  log2FC,
  p.value.adjusted,
  FC_threshold = 1.5,
  FC_NoResp_left = 0.9,
  FC_NoResp_rigth = NULL,
  p.value_threshold = 0.05,
  low.FC.status.label = "DOWN",
  high.FC.status.label = "UP",
  unresponsive.label = "NoResp",
  null.label = "NULL"
)
```

## Arguments

log2FC	Numeric vector of log2(fold change expression) values.
p.value.adjusted	Numeric vector of p-values. Use of adjusted p-values is recommended.
FC_threshold	Value of the threshold to use for the fold change expression to define differentially expressed genes, expressed as linear value. By default 1.5 and by consequence 1/1.5.
FC_NoResp_left	Value of the threshold to use for the fold change expression to define unresponsive genes when $FC < 1$ , expressed as linear value. By default 0.9. If NULL it will be calculated symmetrically from FC_NoResp_rigth as $1/FC\_NoResp\_rigth$ .
FC_NoResp_rigth	Value of the threshold to use for the fold change expression to define unresponsive genes when $FC > 1$ , expressed as linear value. By default 1.1. If NULL it will be calculated symmetrically from FC_NoResp_left as $1/FC\_NoResp\_left$ .
p.value_threshold	Value of the threshold to use for the p-values to define differentially expressed genes, expressed as linear value. By default 0.05.

```

low.FC.status.label      String to define the label indicating the differentially expressed genes with
                          a FoldChange < FC.threshold.
high.FC.status.label     String to define the label indicating the differentially expressed genes with
                          a FoldChange > FC.threshold.
unresponsive.label       String to define the label indicating the unresponsive genes identified as
                          FC.NoResp.left < FoldChange < FC.NoResp.rigth and p.value > p.value.threshold.
null.label               String to define the label indicating the null genes.

```

### Value

It returns a vector containing the differential expression status for each original value in the same order used in the input.

---

density_plot	<i>Plot density signal of NGS data.</i>
--------------	---

---

### Description

Plots the density profile of NGS data (e.g. ChIP-seq, ATAC-seq, MeDIP-seq, etc.). Used by the function [plot.density.profile](#).

### Usage

```

density_plot(
  samples,
  scores,
  positions,
  variance_scores,
  xlab = "Distance from regions center [bp]",
  ylab = "Average density signal",
  line_type = "solid",
  y_lim = NULL,
  x_lim = NULL,
  x_intercept = 0,
  colors = c("blue", "red", "purple", "orange", "green"),
  title = "Density profile",
  text_size = 12,
  variance = T,
  print_plot = F,
  line_width = 1,
  variance_opacity = 0.25
)

```

**Arguments**

<code>samples</code>	A character vector containing the samples list.
<code>scores</code>	A numeric vector containing the scores for the Y-axis.
<code>positions</code>	A numeric vector containing the position for the X-axis.
<code>variance_scores</code>	A numeric vector containing the variance/error value at each position.
<code>xlab</code>	A string containing the label for the X-axis. By default "Distance from regions center [bp]".
<code>ylab</code>	A string containing the label for the Y-axis. By default "Average density signal".
<code>line_type</code>	Vector to define each line type. Both numeric and string codes are accepted. if only one element is given this will be applied to all the lines. By default "solid". Example 1: <code>c("solid","dashed")</code> . Example 2: <code>c(1,2)</code>
<code>y_lim</code>	List of numeric vectors with two elements each to define the range of the Y-axis. To set only one side use NA for the side to leave automatic. If only one range is given this one will be applied to all the plots. By default NULL, the range will be defined automatically. Example <code>list(c(0,20),c(NA,30),c(0,NA),c(NA,NA))</code> .,
<code>x_lim</code>	List of numeric vectors with two elements each to define the range of the X-axis. To set only one side use NA for the side to leave automatic. If only one range is given this one will be applied to all the plots. By default NULL, the range will be defined automatically. Example <code>list(c(0,20),c(NA,30),c(0,NA),c(NA,NA))</code> .,
<code>x_intercept</code>	A vector indicating the X intercepts for the vertical lines. By default 0.
<code>colors</code>	Vector to define the colors of the lines. If only one value is provided or the number of values are less then the required ones only the first value will be used. All standard R.colors values are accepted. By default <code>c("blue","red","purple","orange","green")</code> .
<code>title</code>	A string containing the label for the X-axis. By default "Density profile".
<code>text_size</code>	Numeric value to define the size of the text for the labels of all the plots. By default 12.
<code>variance</code>	Logic value to define whether to plot the error/variance around the signal. By default TRUE.
<code>print_plot</code>	Logic value to define whether to print the plot once generated or not. By default FALSE.
<code>line_width</code>	Numeric value to define the line width for all the plots. By default 1.,
<code>variance_opacity</code>	Numeric value to define the alpha/transparency of the error/variance. By default 0.25. Parameter considered only when <code>variance = TRUE</code> ).

**Value**

Returns a plot in ggplot2 format.



---

doughnut	<i>Donut/Doughnut plot</i>
----------	----------------------------

---

## Description

Generation of a donut/doughnut plot (equivalent of a pie chart)

## Usage

```
doughnut(  
  x,  
  labels = as.character(x),  
  edges = 200,  
  outer.radius = 0.8,  
  inner.radius = 0.4,  
  clockwise = FALSE,  
  init.angle = if (clockwise) 90 else 0,  
  density = NULL,  
  angle = 45,  
  col = NULL,  
  border = FALSE,  
  lty = NULL,  
  main = NULL,  
  ...  
)
```

## Arguments

x	A vector containing the values to be plotted.
labels	A string vector for the labels of the different sectors. By default <code>as.character(x)</code> .
edges	Number of edges of the shape. By default 200.
outer.radius	Fraction of the area to dedicate to the outer circle. By default 0.8.
inner.radius	Fraction of the area to dedicate to the inner circle. By default 0.4.
clockwise	Logic value to define whether the values should be plotted in clockwise sense. By default FALSE.
init.angle	Numeric value to define the starting angle for the data. By default if <code>clockwise = TRUE</code> 90, otherwise 0.
density	A vector or single number to define the density of the lines in the filling color of each value plotted. By default NULL.
angle	A vector or single number to define the angle of the lines in the filling color of each value plotted. By default 45.
col	A vector of R standard colors for each value to be plotted. By default NULL.

border	Logic value to define whether plot the border of the sectors. By default FALSE.
lty	Numeric value to define the type of line for the borders. By default NULL.
main	String to set the title of the plot. By default NULL.

## References

<https://magesblog.com/>

## Examples

```
doughnut(x = c(3,5,9,12), inner.radius=0.5, col=c("red", "blue", "green", "yellow"))
```

---

get.gene.name	<i>Conversion of ENSEMBL gene IDs.</i>
---------------	--

---

## Description

Conversion of ENSEMBL gene IDs to gene symbols.

## Usage

```
get.gene.name(ensembl.id, type = "gene", organism = "mmusculus")
```

## Arguments

ensembl.id	String vector of ENSEMBL genes IDs
type	String to define the type of ENSEMBL inputs. By default gene to indicate "ensembl_gene_id". If different from "gene" it will be set to "ensembl_transcript_id_version".
organism	String to define de organism, e.g. mmusculus, hsapiens, etc. By default mmusculus.

## Value

A string vector with the corresponding gene\_symbols.

## Examples

```
gene_symbols =
get.gene.name(
  ensembl.id = c("ENSMUSG00000002111", "ENSMUSG000000027381"),
  type = "gene",
  organism = "mmusculus")
```

---

grepl.data.frame	<i>Grep a pattern in a full data.frame.</i>
------------------	---

---

## Description

The function helps to define which rows of an input data.frame contain a specific patter.

## Usage

```
grepl.data.frame(
  data.frame,
  pattern,
  ignore.case = FALSE,
  perl = FALSE,
  fixed = FALSE,
  useBytes = FALSE
)
```

## Arguments

data.frame	Input data.frame.
pattern	Character string containing a regular expression (or character string for fixed = TRUE) to be matched in the given character vector. Coerced by as.character to a character string if possible. If a character vector of length 2 or more is supplied, the first element is used with a warning. Missing values are allowed except for regexpr and gregexpr.
ignore.case	If FALSE, the pattern matching is case sensitive and if TRUE, case is ignored during matching. By default FALSE.
perl	Logical value to define if Perl-compatible regexps should be used. By default FALSE.
fixed	Logical value to define if the pattern is a string to be matched as is. Overrides all conflicting arguments. By default FALSE.
useBytes	Logical value to define if the matching is done byte-by-byte rather than character-by-character. By default FALSE.

## Value

It will be return a logic vector with an element per each row of the data.frame. The value is TRUE when the patter is found at least once in the corresponding data.frame row.

## Examples

```
iris = iris %>% filter(grepl.data.frame(iris, pattern = "setosa"))
```

---

GSEA.to.GOnumber	<i>Conversion of GSEA terms into Gene Ontology numbers</i>
------------------	--

---

## Description

Helps to convert the terms of GSEA analyses into Gene Ontology (GO) ID numbers.

## Usage

```
GSEA.to.GOnumber(
  input_terms,
  input_pvalue,
  return_table = T,
  export_table = F,
  output_file_name = paste(getwd(), "GO_numbers_table.tsv", sep = "/")
)
```

## Arguments

<code>input_terms</code>	A character vector containing the GSEA terms to be converted.
<code>input_pvalue</code>	A numeric vector containing the p-values of the GSEA terms.
<code>return_table</code>	Logic value to define whether to return the resulting data.frame. By default TRUE.
<code>export_table</code>	Logic value to define whether to export the resulting data.frame. By default FALSE.
<code>output_file_name</code>	Path and file name of the output table if export is required. By default <working.directory>/GO_numbers_table.tsv.

## Details

This functions requires the package GO.db.

If problems are encountered during the installation see <https://www.biostars.org/p/50564/>.

## Value

If required, returns a data.frame with 3 columns: GO\_number, GO\_annotation, p.value. This table could be directly exported.

---

IGVsnap	<i>Script generator for Integrative Genomics Viewer (IGV) batch tasks.</i>
---------	--

---

## Description

Helps to the generation of a script file that can be run on IGV to generate multiple screen-shots at specific genomic regions.

## Usage

```
IGVsnap(
  loci_vector,
  input_type,
  biomaRt = "ensembl",
  dataset = "mmusculus_gene_ensembl",
  reference_genome = NULL,
  fivePrime = 1000,
  threePrime = 1000,
  snap_names = NULL,
  IGV_batch_file = paste(getwd(), "/IGV_batch.txt", sep = ""),
  snap_image_format = "png",
  snap_directory = getwd(),
  maxPanelHeight = 1000,
  session = NULL,
  exit = FALSE,
  help = FALSE
)
```

## Arguments

<code>loci_vector</code>	Either a gene name vector (e.g. <code>c("Gapdh", "Spi1", ...)</code> ) or a regions vector (eg. <code>c('chr1:253000-256503', ...)</code> ). All IGV formats are allowed.
<code>input_type</code>	Define the input type. Allowed values are <code>genes</code> and <code>regions</code> .
<code>biomaRt</code>	Defines the <code>biomaRt</code> parameter for <code>biomaRt</code> package, by default <code>ensembl</code> .
<code>dataset</code>	Defines the <code>dataset</code> parameter for <code>biomaRt</code> package, by default <code>mmusculus_gene_ensembl</code> .
<code>reference_genome</code>	[optional] Defines the genome to use, e.g. <code>"mm10"</code> , <code>"hg19"</code> , ... . By default <code>NULL</code> .
<code>fivePrime</code>	Numeric value to define how many bases [bp] expand from full gene position at it's 5'-end, default 1000bp.
<code>threePrime</code>	Numeric value to define how many bases [bp] expand from full gene position at it's 3'-end, default 1000bp.
<code>snap_names</code>	[optional] String vector to define the names of images (without extension), by default uses <code>loci_vector</code> .

IGV_batch_file	String for the batch_script_file_name/path, by default <working_directory>/IGV_batch.txt.
snap_image_format	String to define the format of the images, e.g. "png", "jpeg", "svg", ... . By default png.
snap_directory	String for the output directory for the snapshots. By default {working_directory}.
maxPanelHeight	Numeric value to define the height in pixel of the IGV pannel that will be captured on IGV.
session	[optional] FULL path to an IGV session file (session.xml) to use for the images. By default NULL.
exit	Logical value to indicate whether exit IGV after image capture ended. By default FALSE.
help	Logical value to indicate whether display the help. By default FALSE.

### Details

For more info on how batch tasks work on IGV see:

<https://software.broadinstitute.org/software/igv/PortCommands>.

### Value

Exports a .txt file ready-to-use on IGV.

---

install.pkg.source	<i>Package installer from source archive.</i>
--------------------	---

---

### Description

Allows the installation of R packages using the source archive file.

### Usage

```
install.pkg.source(pkg.path)
```

### Arguments

pkg.path           String to define the path for the archive file to be installed.

### Value

No returned value. The package required will be installed.

---

is.nan_df	is.nan() <i>applied to a data.frame</i>
-----------	---

---

### Description

Applies the function `is.nan()` to a full `data.frame`.

### Usage

```
is.nan_df(data.frame)
```

### Arguments

`data.frame`      Input `data.frame`.

### Value

It returns a matrix/array containing logic values for each element of the input `data.frame`.  
When TRUE it means that the corresponding element is a NaN.

### Examples

```
is.nan_df(mtcars)
```

---

mass.to.volume	<i>Get solvent volume to make a solution with a given amount of a compound.</i>
----------------	---

---

### Description

Given a specific ammount of solute calculates the volume of solvent necessary to obtain a certain final molarity concentration.

### Usage

```
mass.to.volume(  
  final_concentration,  
  final_concentration_unit = "M",  
  mass,  
  mass_unit = "g",  
  MW  
)
```

**Arguments**

<code>final_concentration</code>	Numeric value for the final concentration wanted.
<code>final_concentration_unit</code>	String to define the unit of the final concentration wanted. Available units are: "M", "mM", "uM", "nM", "pM", "fM". By default "M".
<code>mass</code>	Numeric value for the solute mass ammount.
<code>mass_unit</code>	String to define the unit of the mass. Available units are: "kg", "g", "mg", "ug", "ng". By default "g".
<code>MW</code>	Numeric value for the Molecular Weigth (MW) of the compound expressed in g/mol.

**Value**

It returns a string with the volume of solvent to use.

**Examples**

```
mass.to.volume(final_concentration = 5, mass = 10, MW = 215)
```

---

<code>molarity.to.mass</code>	<i>Get solvent volume to make a solution with a given amount of a compound.</i>
-------------------------------	---

---

**Description**

Given a specific volume of solution wanted calculates the mass of solute necessary to obtain a certain final molarity concentration.

**Usage**

```
molarity.to.mass(
  final_concentration,
  final_concentration_unit = "M",
  final_volume,
  final_volume_unit = "mL",
  MW
)
```

**Arguments**

<code>final_concentration</code>	Numeric value for the final concentration wanted.
<code>final_concentration_unit</code>	String to define the unit of the final concentration wanted. Available units are: "M", "mM", "uM", "nM", "pM", "fM". By default "M".



final_volume	Numeric value for the final volume wanted.
final_volume_unit	String to define the unit of the volume. Available units are: "L", "mL", "uL". By default "mL".
MW	Numeric value for the Molecular Weigth (MW) of the compound expressed in g/mol.

### Value

It returns a string with the mass of compound to use.

### Examples

```
molarity.to.mass(final_concentration = 5, final_volume = 10, MW = 215)
```

---

move.df.col	<i>Function to change easily the order of specific columns in a data.frame.</i>
-------------	---

---

### Description

Allows to change the position of a column in a data.frame using other columns as reference.

### Usage

```
move.df.col(data.frame, move.command)
```

### Arguments

data.frame	An input data.frame.
move.command	A string containing the moving command. The command is formed as follows: "columnA movingCommand columnB". The basic options are: "first", "last", "before", "after". Compounded moves must be separated by a semicolon. Example: "g first; a last; e before c".

### Value

It returns the original data.frame but with the columns moved as demanded.

### References

<https://stackoverflow.com/questions/3369959/moving-columns-within-a-data-frame-without-retyping>

**Examples**

```
new.mtcars = move.df.col(mtcars, "mpg last")

new.mtcars = move.df.col(mtcars, "wt before carb")

new.mtcars = move.df.col(mtcars, "am before carb; cyl first")
```

---

pkg.version	<i>Get session info and package versions.</i>
-------------	---

---

**Description**

Retrieves the information of the current session and the version of the packages loaded.

**Usage**

```
pkg.version(return.session = F, print.versions = T, return.versions = F)
```

**Arguments**

`return.session` Logic value to define if to save the session info. By default FALSE.

`print.versions` Logic value to define if to print the session and version info. By default TRUE.

`return.versions` Logic value to define if to save package versions info. By default FALSE.

**Value**

If `return.session` and/or `return.versions` TRUE a list with these informations is returned. Otherwise nothing is returned.

---

plot.density.profile	<i>Plot of NGS density signal at specific regions from deepTools matrices.</i>
----------------------	--

---

**Description**

Plots the density profile of signals computed by deeptools's computeMatrix function. Creates a plot starting from the matrix.gz generated by deepTools.

**Usage**

```

plot.density.profile(
  matrix.file,
  plot.by.group = T,
  missing.data.as.zero = NULL,
  sample.names = NULL,
  region.names = NULL,
  signal.type = "mean",
  error.type = "sem",
  plot.error = T,
  error.transparency = 0.125,
  title = NULL,
  x.lab = NULL,
  y.lab = NULL,
  line.type = "solid",
  line.width = 0.5,
  x.lim = NULL,
  y.lim = NULL,
  y.identical.auto = T,
  y.ticks.number = 5,
  text.size = 12,
  plot.vertical.lines = T,
  write.reference.points = T,
  colors = c("#00A5CF", "#F8766D", "#AC88FF", "#E08B00", "#00BA38", "#BB9D00",
    "#FF61C9", "gray30"),
  n.row.multiplot = 1,
  export.multiplot = F,
  multiplot.export.file = paste(getwd(), "/multiplot.", Sys.Date(), "_", gsub(pattern =
    ":", replacement = ".", x = format(Sys.time(), "%X")), ".pdf", sep = ""),
  real.width.single.plot = 2.5,
  real.height.single.plot = 3,
  print.multiplot = F
)

```

**Arguments**

- |                                   |  |
|-----------------------------------|--|
| <code>matrix.file</code>          | Input <code>matrix.file.gz</code> generated by <code>deeptools</code> 's function <code>computeMatrix</code> from <code>deepTools</code> .   |
| <code>plot.by.group</code>        | Logic value to define whether plot by group of regions or by sample. By default <code>TRUE</code> .  |
| <code>missing.data.as.zero</code> | Logic value to define whether treat missing data as 0. If set as <code>FALSE</code> missing data will be converted to <code>NA</code> and will be excluded from the computations of the signal. By default <code>TRUE</code> .       |
| <code>sample.names</code>         | Samples names could be defined by a string vector. If set as <code>NULL</code> sample names will be get automatically by the matrix file. By default <code>NULL</code> .<br>Example: <code>c("sample1", "sample2", "sample3")</code> |

<code>region.names</code>	Region names could be defined by a string vector. If set as NULL sample names will be get automatically by the matrix file. By default NULL. Example: <code>c("regionA","regionB")</code>
<code>signal.type</code>	String indicating the signal to be computed and plotted. Available parameters are "mean", "median" and "sum". By default "mean".
<code>error.type</code>	String indicating the type of error to be computed and plotted. Available parameters are "sem" and "sd", standard error mean and standard deviation respectively. By default "sem". Parameter considered only when <code>plot.error = TRUE</code> ).
<code>plot.error</code>	Logic value to define whether to plot the error around the signal. By default TRUE.
<code>error.transparency</code>	Numeric value to define the alpha/transparency of the error. By default 0.125. Parameter considered only when <code>plot.error = TRUE</code> ).
<code>title</code>	Title of each plot could be defined by a string vector. If set as NULL titles will be generated automatically. By default NULL. Example: <code>c("Title1","Title2")</code>
<code>x.lab</code>	Single string to define the X-axis label for all the plots. By default NULL, the label will be defined automatically.
<code>y.lab</code>	Single string to define the Y-axis label for all the plots. By default NULL, the label will be defined automatically.
<code>line.type</code>	Vector to define each line type. Both numeric and string codes are accepted. If only one element is given this will be applied to all the lines. By default "solid". Example 1: <code>c("solid","dashed")</code> . Example 2: <code>c(1,2)</code>
<code>line.width</code>	Numeric value to define the line width for all the plots. By default 0.5.
<code>x.lim</code>	List of numeric vectors with two elements each to define the range of the X-axis. To set only one side use NA for the side to leave automatic. If only one range is given this one will be applied to all the plots. By default NULL, the range will be defined automatically. Example <code>list(c(0,20),c(NA,30),c(0,NA),c(NA,NA))</code> .,
<code>y.lim</code>	List of numeric vectors with two elements each to define the range of the Y-axis. To set only one side use NA for the side to leave automatic. If only one range is given this one will be applied to all the plots. By default NULL, the range will be defined automatically. Example <code>list(c(0,20),c(NA,30),c(0,NA),c(NA,NA))</code> .,
<code>y.identical.auto</code>	Logical value to define whether use the same Y-axis range for all the plots automatically depending on the values. Not used when <code>y.lim</code> is not NULL. By default TRUE.
<code>y.ticks.number</code>	Define the number of ticks to display in the Y-axis. By default 5. Active only when <code>y.identical.auto = TRUE</code> .
<code>text.size</code>	Numeric value to define the size of the text for the labels of all the plots. By default 12.

<code>plot.vertical.lines</code>	Logic value to define whether to plot a dashed gray vertical line in correspondence of the reference points of each plot. By default TRUE.
<code>write.reference.points</code>	Logic value to define whether to indicate the reference points on each plot. Applied only when <code>x.lim</code> is NULL. By default TRUE.
<code>colors</code>	Vector to define the colors of the lines. If only one value is provided or the number of values are less than the required ones only the first value will be used. All standard R.colors values are accepted. By default <code>c("#00A5CF", "#F8766D", "#AC88FF", "#E08B00", "#00BA38", "#BB9D00", "#FF61C9", "gray30")</code> .
<code>n.row.multiplot</code>	Numeric value to define the number of rows in the final multiplot.
<code>export.multiplot</code>	Logic value to define whether to export the multiplot generated by the function. By default FALSE.
<code>multiplot.export.file</code>	Name of the PDF file of the multiplot to be exported when <code>export.multiplot</code> = T. By default <code>"/working_directory/multiplot_current.date.current.time.pdf"</code> .
<code>real.width.single.plot</code>	Numeric value, in inches, to define the real width of each plot in the multiplot exported, if required. By default 2.5 inches.
<code>real.height.single.plot</code>	Numeric value, in inches, to define the real height of each plot in the multiplot exported, if required. By default 3 inches.
<code>print.multiplot</code>	Logic value to define whether to print the multiplot once created. By default FALSE.

## Details

To know more about the deepTools's function `computeMatrix` see the package manual at the following link:

<https://deeptools.readthedocs.io/en/develop/content/tools/computeMatrix.html>.

## Value

The functions returns a list containing:

- `data.table` with the computed values used for the plot;
- `metadata` table with the information get from the `matrix_file.gz`;
- `plot.list` with a plot for each list element;
- `multiplot` with the image of all the plots together.

## Examples

```
plot.density.profile(
  matrix.file = "/path.to/matrix.file.gz", plot.by.group = TRUE,
  missing.data.as.zero = NULL, sample.names = NULL, region.names = NULL,
  signal.type = "mean", error.type = "sem", plot.error = TRUE,
  error.transparency = 0.125, title = NULL, x.lab = NULL, y.lab = NULL,
  line.type = "solid", line.width = 0.5, x.lim = NULL, y.lim = NULL,
  y.identical.auto = TRUE, y.ticks.number = 5, text.size = 12,
  plot.vertical.lines = TRUE, colors = c("red", "blue", "#00BA38"),
  n.row.multiplot = 1, export.multiplot = FALSE,
  multiplot.export.file = "/path.to/multiplot.pdf",
  real.width.single.plot = 2.5, real.height.single.plot = 3,
  print.multiplot = FALSE)
```

---

pStars

*P-value significance stars definer.*

---

## Description

Converts a p-value score in equivalent stars of significance.

## Usage

```
pStars(p.value, one = 0.05, two = 0.01, three = 0.001, four = 1e-04)
```

## Arguments

p.value	A single numeric value indicating the p-value to evaluate.
one	A numeric value to define the p-value threshold for the first level of significance (*). By default 0.05.
two	A numeric value to define the p-value threshold for the second level of significance (**). By default 0.01.
three	A numeric value to define the p-value threshold for the third level of significance (***). By default 0.001.
four	A numeric value to define the p-value threshold for the fourth level of significance (****). By default 0.0001.

## Value

It returns a string with the corresponding level of significance: NS, \*, \*\*, \*\*\*, \*\*\*\*.

## Examples

```
significance = pStars(0.002)

require(dplyr)
data.frame =
  data.frame %>%
  mutate(p.stars = sapply(data.frame$p.value.column, pStars))
```

---

restore_packages	<i>Restores packages installed from a .rda file.</i>
------------------	--

---

## Description

Installs the packages contained in a .rda file. This file can be generated by the [store.packages](#) function of this package.

## Usage

```
restore_packages(rda_file)
```

## Arguments

rda_file	Path to the .rda from which get the information for the packages to re-install.
----------	---

## Value

If it was not possible to re-install all packages, the list of not restored packages will be returned.

---

restriction.sites.to.bed	<i>Generator of a bed file for enzymatic restriction sites.</i>
--------------------------	---

---

## Description

The function allows to create a bed file that can be added on IGV both as regions and track. It will show the restriction sites of a sequences if starting from the cut positions depending on sequence length. Chromosome, start and end of the input sequence are required.

**Usage**

```
restriction.sites.to.bed(
  cut_positions,
  chromosome,
  genome_start,
  return_bed = TRUE,
  export_bed_file = FALSE,
  output_file_name = paste(getwd(), "restriction_positions.bed", sep = "/"),
  enzyme_cut_length = 4,
  include_region_description = TRUE,
  region_name = "site",
  append = FALSE
)
```

**Arguments**

<code>cut_positions</code>	A numeric vector with the list of the restriction/cut positions.
<code>chromosome</code>	Chromosome number of the region analyzed.
<code>genome_start</code>	Start position on the genome of the region analyzed.
<code>return_bed</code>	Logic value to define if to return the bed as data.frame. By default TRUE.
<code>export_bed_file</code>	Logic value to define if to export the resulting .bed file. By default FALSE.
<code>output_file_name</code>	String corresponding to the path to the exported .bed file. By default "<working.directory>/restriction_positions.bed".
<code>enzyme_cut_length</code>	Numeric value to define the length of cut of the restriction enzyme. By default 4.
<code>include_region_description</code>	Logic value to define whether to include a fourth column containing the region name define by the parameter <code>region_description</code> . By default TRUE.
<code>region_name</code>	Regions base name. Automatically it will be added a number to the base name. By default "site", the resulting regions will be: site_1, site_2, ... .
<code>append</code>	Logic value to define if to append the result to the file. By default FALSE, the file will be overwritten.

**Details**

To map the positions of restriction enzymes it is possible to use <http://restrictionmapper.org/> with the option Map (version 3).

**Value**

If required, it will be returned a classic bed file (chr start end [name]) with the regions centered on the cut position in the genome.



## Examples

```
restriction.sites.to.bed(cut_positions = c(230, 235, 1250, 36),
                        chromosome = 10,
                        genome_start = 1205126,
                        region_name = "EcoRI_cut_site")
```

---

sort.bed	<i>Sorter function for .bed files.</i>
----------	--

---

## Description

Sorts .bed files by chromosome and position.

## Usage

```
sort.bed(
  bed,
  bed.header = F,
  sep = "\t",
  return.bed = T,
  export.bed = F,
  export.file.name = paste(getwd(), "sorted.bed", sep = "/"),
  export.header = F
)
```

## Arguments

bed	Two options are possible: - String with the path to a .bed file; - Data.frame corresponding to a bed file format (all the columns and their names will be kept).
bed.header	Logic value to define whether the .bed file contains an header or not. By default FALSE.
sep	String containing the separator character for a .bed file. By default "\t".
return.bed	Logic value to define if to return the bed as a data.frame. By default TRUE. Only unique rows are kept.
export.bed	Logic value to define if to export the bed file. By default FALSE. Only unique rows are kept.
export.file.name	String to define the path to the file to be exported, if required. By default "<working.directory>/sorted.bed".
export.header	Logic value to define whether the header should be exported in the sorted bed file. By default FALSE.

## Details

The function keeps only unique rows.

To get more information about the bed file format see the following page:

<https://genome.ucsc.edu/FAQ/FAQformat.html#format1>.

## Value

If required, returns a data.frame corresponding to the sorted .bed file.

---

store_packages	<i>Stores the information of installed packages in a .rda file.</i>
----------------	---

---

## Description

Saves the list of all the installed packages in a .rda file. This file can be used to restore the packages from a computer to another or after installation of a new R version by the function [restore\\_packages](#) of this package.

## Usage

```
store_packages(output_directory = getwd())
```

## Arguments

`output_directory`  
Path to the directory in which export the .rda file. By default <working.directory>.

## Value

Nothing is returned. An .rda file will be exported at the `output_directory` indicated.

---

subtract.bw	<i>Combination of two or more list in a unique one.</i>
-------------	---

---

## Description

Combines two or more lists in a single one keeping the elements names

## Usage

```
subtract.bw(
  bw1,
  bw2,
  wd = getwd(),
  return.subtracted.bw = F,
  export.subtracted.bw = T,
  subtracted.bw.file = paste(getwd(), "subtraction.bw", sep = "/")
)
```

**Arguments**

- bw1** Full path to the first bigWig (the second one will be subtracted to this one).
- bw2** Full path to the second bigWig (it will be subtracted to the first one).
- return.subtracted.bw** Logic value to define whether return the resulting bigWig as GRanges object. By default FALSE.
- export.subtracted.bw** Logic value to define whether export the resulting bigWig. By default TRUE.
- subtracted.bw.file** String for the path of the resulting bigwig file to be exported. By default `<working.directory>/subtraction.bw`.

**Value**

If required a subtraction bigWig is returned as GRanges object. The resulting bigWig can be also directly exported.

---

update_pkgs	<i>function to automatically update the R packages.</i>
-------------	---

---

**Description**

Automatically updates the R packages from CRAN and BioConductor repositories.

**Usage**

```
update_pkgs(ask = FALSE)
```

**Arguments**

- ask** Logical indicating whether to ask the user to select packages before they are downloaded and installed, or the character string "graphics", which brings up a widget to allow the user to (de-)select from the list of packages which could be updated. (The latter value only works on systems with a GUI version of `select.list`, and is otherwise equivalent to `ask = TRUE`). By default FALSE.

**Value**

Nothing. The packages will be updated.

**Examples**

```
update_pkgs()
```

---

volcano

*Volcano plot generator for RNA-seq data.*


---

## Description

Generates a volcano plot in order to visualize the differentially expressed genes. The plot is highly customizable.

## Usage

```
volcano(
  log2FC_data,
  padj_data,
  FC_t = 1.5,
  p_t = 0.05,
  FC_unresponsive_rigth = 1.1,
  FC_unresponsive_left = 1/FC_unresponsive_rigth,
  x_ends = NULL,
  y_min = 0,
  y_max = NULL,
  left_label = "UP",
  right_label = "DOWN",
  unresponsive_label = "NoResp",
  null_label = "NULL",
  names = as.character(c(1:length(log2FC_data))),
  left_names = FALSE,
  right_names = FALSE,
  padding = FALSE,
  names_size = 10,
  print_plot = F,
  left_color = "#00BA38",
  right_color = "#F8766D",
  unresponsive_color = "#00A5CF",
  null_color = "gray30",
  point_size = 0.5,
  legend = TRUE,
  legend_title = "Expression status",
  x_label = "log2(fold change expression)",
  y_label = "-log10(p-value adjusted)",
  title = "Volcano plot",
  sub_title = NULL,
  add_threshold_lines = T,
  threshold_line_color = "gray70",
  threshold_line_type = "dotted",
  font_family = "Helvetica",
  ...
)
```

**Arguments**

<code>log2FC_data</code>	Numeric vector containing the $\log_2(\text{FoldChange})$ values of each gene.
<code>padj_data</code>	Numeric vector of p-values. Use of adjusted p-values is recommended.
<code>FC_t</code>	Value of the threshold to use for the fold change expression to define differentially expressed genes, expressed as linear value. By default 1.5 and by consequence $1/1.5$ .
<code>p_t</code>	Value of the threshold to use for the p-values to define differentially expressed genes, expressed as linear value. By default 0.05.
<code>FC_unresponsive_righth</code>	Value of the threshold to use for the fold change expression to define unresponsive genes when $\text{FC} > 1$ , expressed as linear value. By default 1.1. If NULL it will be calculated symmetrically from <code>FC_NoResp_left</code> as $1/\text{FC\_NoResp\_left}$ .
<code>FC_unresponsive_left</code>	Value of the threshold to use for the fold change expression to define unresponsive genes when $\text{FC} < 1$ , expressed as linear value. By default $1/\text{FC\_unresponsive\_righth}$ . If NULL it will be calculated symmetrically from <code>FC_NoResp_righth</code> as $1/\text{FC\_NoResp\_righth}$ .
<code>x_ends</code>	Numeric positive value to define manually the range of the X-axis: it will be calculated as $c(-x\_ends, x\_ends)$ , for this reason the plot will be symmetrical. By default NULL, the range is assigned automatically and the plot can be asymmetrical.
<code>y_min</code>	Numeric value for the minimum value of the Y-axis. By default 0. Set it to NULL for automatic computation.
<code>y_max</code>	Numeric value for the maximum value of the Y-axis. By default NULL.
<code>left_label</code>	String to indicate the label to use for the set of genes in the left side of the graph (those with $\text{FoldChange} < 1/\text{FC\_t}$ and $p.\text{value} < p\_t$ . By default "UP".
<code>right_label</code>	String to indicate the label to use for the set of genes in the right side of the graph (those with $\text{FoldChange} > \text{FC\_t}$ and $p.\text{value} < p\_t$ . By default "DOWN".
<code>unresponsive_label</code>	String to indicate the label to use for the set of unresponsive genes (those with $\text{FC\_unresponsive\_left} < \text{FoldChange} < \text{FC\_unresponsive\_righth}$ and $p.\text{value} > p\_t$ . By default "NoResp".
<code>null_label</code>	String to indicate the label to use for the set of null genes (those with $1/\text{FC\_t} < \text{FoldChange} < \text{FC\_t}$ and $p.\text{value} < p\_t$ . By default "NULL".
<code>names</code>	String vector with the names to be plotted if required, eg. gene names. By default <code>as.character(c(1:length(log2FC_data)))</code> .
<code>left_names</code>	Logic value to indicate if to print the set of differentially expressed genes in the left side of the graph (those with $\text{FoldChange} < 1/\text{FC\_t}$ and $p.\text{value} < p\_t$ . By default FALSE.
<code>right_names</code>	Logic value to indicate if to print the set of differentially expressed genes in the right side of the graph (those with $\text{FoldChange} > \text{FC\_t}$ and $p.\text{value} < p\_t$ . By default FALSE.

<code>padding</code>	Logic value to indicate if to plot the padding around the names of genes. By default FALSE.
<code>names_size</code>	Numeric value to define de size of the point names size. By default 10.
<code>print_plot</code>	Logic value to define whether to print the volcano plot once created. By default FALSE.
<code>left_color</code>	String to indicate the color to use for the set of genes in the left side of the graph (those with <code>FoldChange &lt; 1/FC_t</code> and <code>p.value &lt; p_t</code> . By default "#00BA38", a green.
<code>right_color</code>	String to indicate the color to use for the set of genes in the right side of the graph (those with <code>FoldChange &gt; FC_t</code> and <code>p.value &lt; p_t</code> . By default "#F8766D", a pink/red.
<code>unresponsive_color</code>	String to indicate the color to use for the set of unresponsive genes (those with <code>FC_unresponsive_left &lt; FoldChange &lt; FC_unresponsive_rigth</code> and <code>p.value &gt; p_t</code> . By default "#00A5CF", a light blue.
<code>null_color</code>	String to indicate the color to use for the set of null genes (those with <code>1/FC_t &lt; FoldChange &lt; FC_t</code> and <code>p.value &lt; p_t</code> . By default "gray30", a dark gray.
<code>point_size</code>	Numeric value to define de size of the points. By default 0.5.
<code>legend</code>	Logic value to define if to print the legend. By default TRUE.
<code>legend.title</code>	A string to indicate the label of the legend title. By default "Expression status".
<code>x_label</code>	A string to indicate the X-axis label. By default "log2(fold change expression)".
<code>y_label</code>	A string to indicate the Y-axis label. By default "-log10(p-value adjusted)".
<code>title</code>	A string to indicate the title of the plot. By default "Volcano plot".
<code>sub_title</code>	A string to indicate the subtitle of the plot. By default NULL, no subtitle is written.
<code>add_threshold_lines</code>	Logic value to define if lines for the thresholds, both FC and p.value, should be plotted. By default TRUE.
<code>threshold_line_color</code>	String to define the color of the threshold lines. By default "gray70"
<code>threshold_line_type</code>	String or numeric value to define the threshold lines type. Both numeric and string standard R codes are accepted. By default "dotted", equivalent to 2.
<code>font_family</code>	String to define the font family to use in the plot writings. By default "Helvetica".

## Value

A plot in ggplot2 format.

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