

# Package ‘DataExplorer’

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**Title** Automate Data Exploration and Treatment

**Version** 0.8.3

**Description** Automated data exploration process for analytic tasks and predictive modeling, so that users could focus on understanding data and extracting insights. The package scans and analyzes each variable, and visualizes them with typical graphical techniques. Common data processing methods are also available to treat and format data.

**Depends** R (>= 3.6)

**Imports** data.table (>= 1.13.4), reshape2 (>= 1.4.3), scales (>= 1.1.0), ggplot2, gridExtra, rmarkdown (>= 2.5), networkD3 (>= 0.4), stats, utils, tools, parallel

**Suggests** testthat, covr, knitr, jsonlite, nycflights13

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**License** MIT + file LICENSE

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---

configure_report	<i>Configure report template</i>
------------------	----------------------------------

---

## Description

This function configures the content of the to-be-generated data profiling report.

## Usage

```
configure_report(
  add_introduce = TRUE,
  add_plot_intro = TRUE,
  add_plot_str = TRUE,
  add_plot_missing = TRUE,
  add_plot_histogram = TRUE,
  add_plot_density = FALSE,
  add_plot_qq = TRUE,
  add_plot_bar = TRUE,
  add_plot_correlation = TRUE,
  add_plot_prcomp = TRUE,
  add_plot_boxplot = TRUE,
  add_plot_scatterplot = TRUE,
  introduce_args = list(),
  plot_intro_args = list(),
  plot_str_args = list(type = "diagonal", fontSize = 35, width = 1000, margin = list(left
    = 350, right = 250)),
```

```

plot_missing_args = list(),
plot_histogram_args = list(),
plot_density_args = list(),
plot_qq_args = list(sampled_rows = 1000L),
plot_bar_args = list(),
plot_correlation_args = list(cor_args = list(use = "pairwise.complete.obs")),
plot_prcomp_args = list(),
plot_boxplot_args = list(),
plot_scatterplot_args = list(sampled_rows = 1000L),
global_ggtheme = quote(theme_gray()),
global_theme_config = list()
)

```

### Arguments

**add\_introduce**    add [introduce](#)? Default is TRUE.  
**add\_plot\_intro**    add [plot\\_intro](#)? Default is TRUE.  
**add\_plot\_str**    add [plot\\_str](#)? Default is TRUE.  
**add\_plot\_missing**  
                   add [plot\\_missing](#)? Default is TRUE.  
**add\_plot\_histogram**  
                   add [plot\\_histogram](#)? Default is TRUE.  
**add\_plot\_density**  
                   add [plot\\_density](#)? Default is FALSE.  
**add\_plot\_qq**    add [plot\\_qq](#)? Default is TRUE.  
**add\_plot\_bar**    add [plot\\_bar](#)? Default is TRUE.  
**add\_plot\_correlation**  
                   add [plot\\_correlation](#)? Default is TRUE.  
**add\_plot\_prcomp**  
                   add [plot\\_prcomp](#)? Default is TRUE.  
**add\_plot\_boxplot**  
                   add [plot\\_boxplot](#)? Default is TRUE.  
**add\_plot\_scatterplot**  
                   add [plot\\_scatterplot](#)? Default is TRUE.  
**introduce\_args**    arguments to be passed to [introduce](#). Default is list().  
**plot\_intro\_args**  
                   arguments to be passed to [plot\\_intro](#). Default is list().  
**plot\_str\_args**    arguments to be passed to [plot\\_str](#). Default is list(type = "diagonal", fontSize = 35, width = 1000, margin = list(left = 350, right = 250)).  
**plot\_missing\_args**  
                   arguments to be passed to [plot\\_missing](#). Default is list().  
**plot\_histogram\_args**  
                   arguments to be passed to [plot\\_histogram](#). Default is list().  
**plot\_density\_args**  
                   arguments to be passed to [plot\\_density](#). Default is list().

`plot_qq_args` arguments to be passed to [plot\\_qq](#). Default is `list(sampled_rows = 1000L)`.

`plot_bar_args` arguments to be passed to [plot\\_bar](#). Default is `list()`.

`plot_correlation_args` arguments to be passed to [plot\\_correlation](#). Default is `list("cor_args" = list("use" = "pairwise.complete.obs"))`.

`plot_prcomp_args` arguments to be passed to [plot\\_prcomp](#). Default is `list()`.

`plot_boxplot_args` arguments to be passed to [plot\\_boxplot](#). Default is `list()`.

`plot_scatterplot_args` arguments to be passed to [plot\\_scatterplot](#). Default is `list(sampled_rows = 1000L)`.

`global_ggtheme` global setting for [theme](#). Default is `quote(theme_gray())`.

`global_theme_config` global setting for [theme](#). Default is `list()`.

### Note

Individual settings will overwrite global settings. For example: if `plot_intro_args` has `ggtheme` set to `theme_light()` while `global_ggtheme` is set to `theme_gray()`, `theme_light()` will be used.

When setting global themes using `global_ggtheme`, please pass an unevaluated call to the theme function, e.g., `quote(theme_light())`.

### See Also

[create\\_report](#)

### Examples

```
## Get default configuration
configure_report()

## Set global theme
configure_report(global_ggtheme = quote(theme_light(base_size = 20L)))
```

---

create\_report

*Create report*

---

### Description

This function creates a data profiling report.

**Usage**

```

create_report(
  data,
  output_format = html_document(toc = TRUE, toc_depth = 6, theme = "yeti"),
  output_file = "report.html",
  output_dir = getwd(),
  y = NULL,
  config = configure_report(),
  report_title = "Data Profiling Report",
  ...
)

```

**Arguments**

data	input data
output_format	output format in <a href="#">render</a> . Default is <code>html_document(toc = TRUE, toc_depth = 6, theme = "yeti")</code> .
output_file	output file name in <a href="#">render</a> . Default is "report.html".
output_dir	output directory for report in <a href="#">render</a> . Default is user's current directory.
y	name of response variable if any. Response variables will be passed to appropriate plotting functions automatically.
config	report configuration generated by <a href="#">configure_report</a> .
report_title	report title. Default is "Data Profiling Report".
...	other arguments to be passed to <a href="#">render</a> .

**Details**

`config` is a named list to be evaluated by `create_report`. Each name should exactly match a function name. By doing so, that function and corresponding content will be added to the report. If you do not want to include certain functions/content, do not add it to `config`.

[configure\\_report](#) generates the default template. You may customize the content using that function.

All function arguments will be passed to [do.call](#) as a list.

**Note**

If both `y` and `plot_prcomp` are present, `y` will be removed from `plot_prcomp`.

If there are multiple options for the same function, all of them will be plotted. For example, `create_report(..., y = "a", config = list("plot_bar" = list("with" = "b")))` will create 3 bar charts:

- regular frequency bar chart
- bar chart aggregated by response variable "a"
- bar chart aggregated by 'with' variable "b"

**See Also**[configure\\_report](#)**Examples**

```

## Not run:
# Create report
create_report(iris)
create_report(airquality, y = "Ozone")

# Load library
library(ggplot2)
library(data.table)
library(rmarkdown)

# Set some missing values
diamonds2 <- data.table(diamonds)
for (j in 5:ncol(diamonds2)) {
  set(diamonds2,
      i = sample.int(nrow(diamonds2), sample.int(nrow(diamonds2), 1)),
      j,
      value = NA_integer_)
}

# Create customized report for diamonds2 dataset
create_report(
  data = diamonds2,
  output_format = html_document(toc = TRUE, toc_depth = 6, theme = "flatly"),
  output_file = "report.html",
  output_dir = getwd(),
  y = "price",
  config = configure_report(
    add_plot_prcomp = TRUE,
    plot_qq_args = list("by" = "cut", sampled_rows = 1000L),
    plot_bar_args = list("with" = "carat"),
    plot_correlation_args = list("cor_args" = list("use" = "pairwise.complete.obs")),
    plot_boxplot_args = list("by" = "cut"),
    global_ggtheme = quote(theme_light())
  )
)

## Configure report without `configure_report`
config <- list(
  "introduce" = list(),
  "plot_intro" = list(),
  "plot_str" = list(
    "type" = "diagonal",
    "fontSize" = 35,
    "width" = 1000,
    "margin" = list("left" = 350, "right" = 250)
  ),
  "plot_missing" = list(),

```

```

    "plot_histogram" = list(),
    "plot_density" = list(),
    "plot_qq" = list(sampled_rows = 1000L),
    "plot_bar" = list(),
    "plot_correlation" = list("cor_args" = list("use" = "pairwise.complete.obs")),
    "plot_prcomp" = list(),
    "plot_boxplot" = list(),
    "plot_scatterplot" = list(sampled_rows = 1000L)
  )

  ## End(Not run)

```

---

 drop\_columns

*Drop selected variables*


---

## Description

Quickly drop variables by either column names or positions.

## Usage

```
drop_columns(data, ind)
```

## Arguments

data	input data
ind	a vector of either names or column positions of the variables to be dropped.

## Details

**This function updates [data.table](#) object directly.** Otherwise, output data will be returned matching input object class.

## Examples

```

# Load packages
library(data.table)

# Generate data
dt <- data.table(sapply(setNames(letters, letters), function(x) {assign(x, rnorm(10))}))
dt2 <- copy(dt)

# Drop variables by name
names(dt)
drop_columns(dt, letters[2L:25L])
names(dt)

# Drop variables by column position
names(dt2)

```

```
drop_columns(dt2, seq(2, 25))
names(dt2)

# Return from non-data.table input
df <- data.frame(sapply(setNames(letters, letters), function(x) {assign(x, rnorm(10))}))
drop_columns(df, letters[2L:25L])
```

---

dummify

*Dummify discrete features to binary columns*


---

### Description

Data dummification is also known as one hot encoding or feature binarization. It turns each category to a distinct column with binary (numeric) values.

### Usage

```
dummify(data, maxcat = 50L, select = NULL)
```

### Arguments

data	input data
maxcat	maximum categories allowed for each discrete feature. Default is 50.
select	names of selected features to be dummified. Default is NULL.

### Details

Continuous features will be ignored if added in select.  
select features will be ignored if categories exceed maxcat.

### Value

dummified dataset (discrete features only) preserving original features. However, column order might be different.

### Note

This is different from [model.matrix](#), where the latter aims to create a full rank matrix for regression-like use cases. If your intention is to create a design matrix, use [model.matrix](#) instead.

### Examples

```
## Dummify iris dataset
str(dummify(iris))

## Dummify diamonds dataset ignoring features with more than 5 categories
data("diamonds", package = "ggplot2")
str(dummify(diamonds, maxcat = 5))
str(dummify(diamonds, select = c("cut", "color")))
```



---

group_category	<i>Group categories for discrete features</i>
----------------	---

---

## Description

Sometimes discrete features have sparse categories. This function will group the sparse categories for a discrete feature based on a given threshold.

## Usage

```
group_category(  
  data,  
  feature,  
  threshold,  
  measure,  
  update = FALSE,  
  category_name = "OTHER",  
  exclude = NULL  
)
```

## Arguments

data	input data
feature	name of the discrete feature to be collapsed.
threshold	the bottom x% categories to be grouped, e.g., if set to 20%, categories with cumulative frequency of the bottom 20% will be grouped
measure	name of feature to be used as an alternative measure.
update	logical, indicating if the data should be modified. The default is FALSE. Setting to TRUE will modify the input <a href="#">data.table</a> object directly. Otherwise, input class will be returned.
category_name	name of the new category if update is set to TRUE. The default is "OTHER".
exclude	categories to be excluded from grouping when update is set to TRUE.

## Details

If a continuous feature is passed to the argument feature, it will be force set to [character-class](#).

## Value

If update is set to FALSE, returns categories with cumulative frequency less than the input threshold. The output class will match the class of input data. If update is set to TRUE, updated data will be returned, and the output class will match the class of input data.

## Examples

```
# Load packages
library(data.table)

# Generate data
data <- data.table("a" = as.factor(round(rnorm(500, 10, 5))), "b" = rexp(500, 500))

# View cumulative frequency without collapsing categories
group_category(data, "a", 0.2)

# View cumulative frequency based on another measure
group_category(data, "a", 0.2, measure = "b")

# Group bottom 20% categories based on cumulative frequency
group_category(data, "a", 0.2, update = TRUE)
plot_bar(data)

# Exclude categories from being grouped
dt <- data.table("a" = c(rep("c1", 25), rep("c2", 10), "c3", "c4"))
group_category(dt, "a", 0.8, update = TRUE, exclude = c("c3", "c4"))
plot_bar(dt)

# Return from non-data.table input
df <- data.frame("a" = as.factor(round(rnorm(50, 10, 5))), "b" = rexp(50, 10))
group_category(df, "a", 0.2)
group_category(df, "a", 0.2, measure = "b", update = TRUE)
group_category(df, "a", 0.2, update = TRUE)
```

---

introduce

*Describe basic information*

---

## Description

Describe basic information for input data.

## Usage

```
introduce(data)
```

## Arguments

data            input data

## Value

Describe basic information in input data class:

- rows: number of rows
- columns: number of columns

- `discrete_columns`: number of discrete columns
- `continuous_columns`: number of continuous columns
- `all_missing_columns`: number of columns with everything missing
- `total_missing_values`: number of missing observations
- `complete_rows`: number of rows without missing values. See [complete.cases](#).
- `total_observations`: total number of observations
- `memory_usage`: estimated memory allocation in bytes. See [object.size](#).

### Examples

```
introduce(mtcars)
```

---

plot_bar	<i>Plot bar chart</i>
----------	-----------------------

---

### Description

Plot bar chart for each discrete feature, based on either frequency or another continuous feature.

### Usage

```
plot_bar(
  data,
  with = NULL,
  by = NULL,
  by_position = "fill",
  maxcat = 50,
  order_bar = TRUE,
  binary_as_factor = TRUE,
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 3L,
  ncol = 3L,
  parallel = FALSE
)
```

### Arguments

<code>data</code>	input data
<code>with</code>	name of continuous feature to be summed. Default is NULL, i.e., frequency.
<code>by</code>	discrete feature name to be broken down by.
<code>by_position</code>	position argument in <a href="#">geom_bar</a> if <code>by</code> is supplied. Default is "fill".
<code>maxcat</code>	maximum categories allowed for each feature. Default is 50.

order_bar	logical, indicating if bars should be ordered. Default is TRUE.
binary_as_factor	treat binary as categorical? Default is TRUE.
title	plot title
ggtheme	complete ggplot2 themes. Default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a>
nrow	number of rows per page. Default is 3.
ncol	number of columns per page. Default is 3.
parallel	enable parallel? Default is FALSE.

### Details

If a discrete feature contains more categories than `maxcat` specifies, it will not be passed to the plotting function.

### Value

invisibly return the named list of ggplot objects

### Examples

```
# Plot bar charts for diamonds dataset
library(ggplot2)
plot_bar(diamonds)
plot_bar(diamonds, maxcat = 5)

# Plot bar charts with `price`
plot_bar(diamonds, with = "price")

# Plot bar charts by `cut`
plot_bar(diamonds, by = "cut")
plot_bar(diamonds, by = "cut", by_position = "dodge")
```

---

plot\_boxplot

*Create boxplot for continuous features*

---

### Description

This function creates boxplot for each continuous feature based on a selected feature.

**Usage**

```
plot_boxplot(  
  data,  
  by,  
  binary_as_factor = TRUE,  
  geom_boxplot_args = list(),  
  geom_jitter_args = list(),  
  scale_y = "continuous",  
  title = NULL,  
  ggtheme = theme_gray(),  
  theme_config = list(),  
  nrow = 3L,  
  ncol = 4L,  
  parallel = FALSE  
)
```

**Arguments**

data	input data
by	feature name to be broken down by. If selecting a continuous feature, boxplot will be grouped by 5 equal ranges, otherwise, all existing categories for a discrete feature.
binary_as_factor	treat binary as categorical? Default is TRUE.
geom_boxplot_args	a list of other arguments to <a href="#">geom_boxplot</a>
geom_jitter_args	a list of other arguments to <a href="#">geom_jitter</a> . If empty, <a href="#">geom_jitter</a> will not be added.
scale_y	scale of original y axis (before <code>coord_flip</code> ). See <a href="#">scale_y_continuous</a> for all options. Default is continuous.
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .
nrow	number of rows per page
ncol	number of columns per page
parallel	enable parallel? Default is FALSE.

**Value**

invisibly return the named list of ggplot objects

**See Also**

[geom\\_boxplot](#)

**Examples**

```

plot_boxplot(iris, by = "Species", ncol = 2L)
plot_boxplot(iris, by = "Species", geom_boxplot_args = list("outlier.color" = "red"))

# Plot skewed data on log scale
set.seed(1)
skew <- data.frame(y = rep(c("a", "b"), 500), replicate(4L, rbeta(1000, 1, 5000)))
plot_boxplot(skew, by = "y", ncol = 2L)
plot_boxplot(skew, by = "y", scale_y = "log10", ncol = 2L)

# Plot with `geom_jitter`
plot_boxplot(iris, by = "Species", ncol = 2L,
geom_jitter_args = list(width = NULL)) # Turn on with default settings

```

---

plot_correlation	<i>Create correlation heatmap for discrete features</i>
------------------	---

---

**Description**

This function creates a correlation heatmap for all discrete categories.

**Usage**

```

plot_correlation(
  data,
  type = c("all", "discrete", "continuous"),
  maxcat = 20L,
  cor_args = list(),
  geom_text_args = list(),
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(legend.position = "bottom", axis.text.x = element_text(angle = 90))
)

```

**Arguments**

data	input data
type	column type to be included in correlation calculation. "all" for all columns, "discrete" for discrete features, "continuous" for continuous features.
maxcat	maximum categories allowed for each discrete feature. The default is 20.
cor_args	a list of other arguments to <a href="#">cor</a>
geom_text_args	a list of other arguments to <a href="#">geom_text</a>
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .

**Details**

For discrete features, the function first dummifies all categories, then calculates the correlation matrix (see [cor](#)) and plots it.

**Value**

invisibly return the ggplot object

**Examples**

```
plot_correlation(iris)
plot_correlation(iris, type = "c")
plot_correlation(airquality, cor_args = list("use" = "pairwise.complete.obs"))
```

---

plot_density	<i>Plot density estimates</i>
--------------	-------------------------------

---

**Description**

Plot density estimates for each continuous feature

**Usage**

```
plot_density(
  data,
  binary_as_factor = TRUE,
  geom_density_args = list(),
  scale_x = "continuous",
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 4L,
  ncol = 4L,
  parallel = FALSE
)
```

**Arguments**

data	input data
binary_as_factor	treat binary as categorical? Default is TRUE.
geom_density_args	a list of other arguments to <a href="#">geom_density</a>
scale_x	scale of x axis. See <a href="#">scale_x_continuous</a> for all options. Default is continuous.
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .

theme\_config a list of configurations to be passed to [theme](#).  
 nrow number of rows per page. Default is 4.  
 ncol number of columns per page. Default is 4.  
 parallel enable parallel? Default is FALSE.

**Value**

invisibly return the named list of ggplot objects

**See Also**

[geom\\_density](#) [plot\\_histogram](#)

**Examples**

```

# Plot iris data
plot_density(iris, ncol = 2L)

# Add color to density area
plot_density(iris, geom_density_args = list("fill" = "black", "alpha" = 0.6), ncol = 2L)

# Plot skewed data on log scale
set.seed(1)
skew <- data.frame(replicate(4L, rbeta(1000, 1, 5000)))
plot_density(skew, ncol = 2L)
plot_density(skew, scale_x = "log10", ncol = 2L)

```

---

plot_histogram	<i>Plot histogram</i>
----------------	-----------------------

---

**Description**

Plot histogram for each continuous feature

**Usage**

```

plot_histogram(
  data,
  binary_as_factor = TRUE,
  geom_histogram_args = list(bins = 30L),
  scale_x = "continuous",
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 4L,
  ncol = 4L,
  parallel = FALSE
)

```



**Arguments**

data	input data
binary_as_factor	treat binary as categorical? Default is TRUE.
geom_histogram_args	a list of other arguments to <a href="#">geom_histogram</a>
scale_x	scale of x axis. See <a href="#">scale_x_continuous</a> for all options. Default is continuous.
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .
nrow	number of rows per page. Default is 4.
ncol	number of columns per page. Default is 4.
parallel	enable parallel? Default is FALSE.

**Value**

invisibly return the named list of ggplot objects

**See Also**

[geom\\_histogram](#) [plot\\_density](#)

**Examples**

```
# Plot iris data
plot_histogram(iris, ncol = 2L)

# Plot skewed data on log scale
set.seed(1)
skew <- data.frame(replicate(4L, rbeta(1000, 1, 5000)))
plot_histogram(skew, ncol = 2L)
plot_histogram(skew, scale_x = "log10", ncol = 2L)
```

---

plot\_intro

*Plot introduction*

---

**Description**

Plot basic information (from [introduce](#)) for input data.

**Usage**

```
plot_intro(  
  data,  
  geom_label_args = list(),  
  title = NULL,  
  ggtheme = theme_gray(),  
  theme_config = list()  
)
```

**Arguments**

data	input data
geom_label_args	a list of other arguments to <a href="#">geom_label</a>
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .

**Value**

invisibly return the ggplot object

**See Also**

[introduce](#)

**Examples**

```
plot_intro(airquality)  
plot_intro(iris)
```

---

plot_missing	<i>Plot missing value profile</i>
--------------	-----------------------------------

---

**Description**

This function returns and plots frequency of missing values for each feature.

**Usage**

```
plot_missing(  
  data,  
  group = list(Good = 0.05, OK = 0.4, Bad = 0.8, Remove = 1),  
  group_color = list(Good = "#1B9E77", OK = "#E6AB02", Bad = "#D95F02", Remove =  
    "#E41A1C"),  
  missing_only = FALSE,
```

```

  geom_label_args = list(),
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(legend.position = c("bottom"))
)

```

## Arguments

data	input data
group	missing profile band taking a list of group name and group upper bounds. Default is <code>list("Good" = 0.05, "OK" = 0.4, "Bad" = 0.8, "Remove" = 1)</code> .
group_color	bar color list for each of the group. Default is <code>list("Good" = "#1B9E77", "OK" = "#E6AB02", "Bad" = "#D95F02", "Remove" = "#E41A1C")</code> .
missing_only	plot features with missing values only? Default is FALSE.
geom_label_args	a list of other arguments to <a href="#">geom_label</a>
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .

## Value

invisibly return the ggplot object

## See Also

[profile\\_missing](#)

## Examples

```

plot_missing(airquality)
plot_missing(airquality, missing_only = TRUE)

## Customize band
plot_missing(airquality, group = list("B1" = 0, "B2" = 0.06, "B3" = 1))
plot_missing(airquality, group = list("Awesome!" = 0.2, "Oh no!" = 1),
group_color = list("Awesome!" = "green", "Oh no!" = "red"))

## Shrink geom_label size
library(ggplot2)
plot_missing(airquality, geom_label_args = list("size" = 2,
"label.padding" = unit(0.1, "lines")))

```

---

plot\_prcomp

*Visualize principal component analysis*


---

### Description

Visualize output of [prcomp](#).

### Usage

```
plot_prcomp(
  data,
  variance_cap = 0.8,
  maxcat = 50L,
  prcomp_args = list(scale. = TRUE),
  geom_label_args = list(),
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 3L,
  ncol = 3L,
  parallel = FALSE
)
```

### Arguments

data	input data
variance_cap	maximum cumulative explained variance allowed for all principal components. Default is 80%.
maxcat	maximum categories allowed for each discrete feature. The default is 50.
prcomp_args	a list of other arguments to <a href="#">prcomp</a>
geom_label_args	a list of other arguments to <a href="#">geom_label</a>
title	plot title starting from page 2.
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .
nrow	number of rows per page
ncol	number of columns per page
parallel	enable parallel? Default is FALSE.

### Details

When cumulative explained variance exceeds `variance_cap`, remaining principal components will be ignored. Set `variance_cap` to 1 for all principal components.

Discrete features containing more categories than `maxcat` specifies will be ignored.

**Value**

invisibly return the named list of ggplot objects

**Note**

Discrete features will be [dummify](#)-ed first before passing to [prcomp](#).

Missing values may create issues in [prcomp](#). Consider [na.omit](#) your input data first.

Features with zero variance are dropped.

**Examples**

```
plot_prcomp(na.omit(airquality), nrow = 2L, ncol = 2L)
```

---

plot_qq	<i>Plot QQ plot</i>
---------	---------------------

---

**Description**

Plot quantile-quantile for each continuous feature

**Usage**

```
plot_qq(
  data,
  by = NULL,
  sampled_rows = nrow(data),
  geom_qq_args = list(),
  geom_qq_line_args = list(),
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 3L,
  ncol = 3L,
  parallel = FALSE
)
```

**Arguments**

data	input data
by	feature name to be broken down by. If selecting a continuous feature, it will be grouped by 5 equal ranges, otherwise, all existing categories for a discrete feature. Default is NULL.
sampled_rows	number of rows to sample if data has too many rows. Default is all rows, which means do not sample.
geom_qq_args	a list of other arguments to <a href="#">geom_qq</a>

```

geom_qq_line_args  a list of other arguments to geom\_qq\_line
title              plot title
ggtheme            complete ggplot2 themes. Default is theme\_gray.
theme_config       a list of configurations to be passed to theme
nrow               number of rows per page. Default is 3.
ncol               number of columns per page. Default is 3.
parallel           enable parallel? Default is FALSE.

```

**Value**

invisibly return the named list of ggplot objects

**Examples**

```

plot_qq(iris)
plot_qq(iris, by = "Species", ncol = 2L)

plot_qq(
  data = airquality,
  geom_qq_args = list(na.rm = TRUE),
  geom_qq_line_args = list(na.rm = TRUE)
)

```

---

plot\_scatterplot      *Create scatterplot for all features*

---

**Description**

This function creates scatterplot for all features fixing on a selected feature.

**Usage**

```

plot_scatterplot(
  data,
  by,
  sampled_rows = nrow(data),
  geom_point_args = list(),
  geom_jitter_args = list(),
  scale_x = NULL,
  scale_y = NULL,
  title = NULL,
  ggtheme = theme_gray(),
  theme_config = list(),
  nrow = 3L,
  ncol = 3L,
  parallel = FALSE
)

```

**Arguments**

data	input data
by	feature name to be fixed at
sampled_rows	number of rows to sample if data has too many rows. Default is all rows, which means do not sample.
geom_point_args	a list of other arguments to <a href="#">geom_point</a>
geom_jitter_args	a list of other arguments to <a href="#">geom_jitter</a> . If empty, <a href="#">geom_jitter</a> will not be added.
scale_x	scale of original x axis (before coord_flip). See <a href="#">scale_x_continuous</a> for all options. Default is NULL.
scale_y	scale of original y axis (before coord_flip). See <a href="#">scale_y_continuous</a> for all options. Default is NULL.
title	plot title
ggtheme	complete ggplot2 themes. The default is <a href="#">theme_gray</a> .
theme_config	a list of configurations to be passed to <a href="#">theme</a> .
nrow	number of rows per page
ncol	number of columns per page
parallel	enable parallel? Default is FALSE.

**Value**

invisibly return the named list of ggplot objects

**See Also**

[geom\\_point](#)

**Examples**

```
plot_scatterplot(iris, by = "Species")

# Plot skewed data on log scale
set.seed(1)
skew <- data.frame(replicate(5L, rbeta(1000, 1, 5000)))
plot_scatterplot(skew, by = "X5", ncol = 2L)
plot_scatterplot(skew, by = "X5", scale_x = "log10",
scale_y = "log10", ncol = 2L)

# Plot with `geom_jitter`
plot_scatterplot(iris, by = "Species",
geom_jitter_args = list(width = NULL)) # Turn on with default settings
plot_scatterplot(iris, by = "Species",
geom_jitter_args = list(width = 0.1, height = 0.1))

## Not run:
```

```

# Customize themes
library(ggplot2)
plot_scatterplot(
  data = mpg,
  by = "hwy",
  geom_point_args = list(size = 1L),
  theme_config = list("axis.text.x" = element_text(angle = 90)),
  ncol = 4L
)

## End(Not run)

```

---

plot\_str

*Visualize data structure*


---

### Description

Visualize data structures in D3 network graph

### Usage

```

plot_str(
  data,
  type = c("diagonal", "radial"),
  max_level = NULL,
  print_network = TRUE,
  ...
)

```

### Arguments

data	input data
type	type of network diagram. Defaults to <a href="#">diagonalNetwork</a> .
max_level	integer threshold of nested level to be visualized. Minimum 1 nested level and defaults to all.
print_network	logical indicating if network graph should be plotted. Defaults to TRUE.
...	other arguments to be passed to plotting functions. See <a href="#">diagonalNetwork</a> and <a href="#">radialNetwork</a> .

### Value

input data structure in nested list. Could be transformed to json format with most JSON packages.

### See Also

[str](#)



**Examples**

```
## Visualize structure of iris dataset
plot_str(iris)

## Visualize object with radial network
plot_str(rep(list(rep(list(mtcars), 6)), 4), type = "r")

## Generate complicated data object
obj <- list(
  "a" = list(iris, airquality, list(mtcars = mtcars, USArrests = USArrests)),
  "b" = list(list(ts(1:10, frequency = 4))),
  "c" = lm(rnorm(5) ~ seq(5)),
  "d" = lapply(1:5, function(x) return(as.function(function(y) y + 1)))
)
## Visualize data object with diagonal network
plot_str(obj, type = "d")
## Visualize only top 2 nested levels
plot_str(obj, type = "d", max_level = 2)
```

---

profile\_missing

*Profile missing values*

---

**Description**

Analyze missing value profile

**Usage**

```
profile_missing(data)
```

**Arguments**

data            input data

**Value**

missing value profile, such as frequency, percentage and suggested action.

**See Also**

[plot\\_missing](#)

**Examples**

```
profile_missing(airquality)
```

---

set_missing	<i>Set all missing values to indicated value</i>
-------------	--

---

## Description

Quickly set all missing values to indicated value.

## Usage

```
set_missing(data, value, exclude = NULL)
```

## Arguments

data	input data, in <a href="#">data.table</a> format only.
value	a single value or a list of two values to be set to. See 'Details'.
exclude	column index or name to be excluded.

## Details

The class of value will determine what type of columns to be set, e.g., if value is 0, then missing values for continuous features will be set. When supplying a list of two values, only one numeric and one non-numeric is allowed.

**This function updates [data.table](#) object directly.** Otherwise, output data will be returned matching input object class.

## Examples

```
# Load packages
library(data.table)

# Generate missing values in iris data
dt <- data.table(iris)
for (j in 1:4) set(dt, i = sample.int(150, j * 30), j, value = NA_integer_)
set(dt, i = sample.int(150, 25), 5L, value = NA_character_)

# Set all missing values to 0L and unknown
dt2 <- copy(dt)
set_missing(dt2, list(0L, "unknown"))

# Set missing numerical values to 0L
dt3 <- copy(dt)
set_missing(dt3, 0L)

# Set missing discrete values to unknown
dt4 <- copy(dt)
set_missing(dt4, "unknown")

# Set missing values excluding some columns
```

```
dt5 <- copy(dt)
set_missing(dt4, 0L, 1L:2L)
set_missing(dt4, 0L, names(dt5)[3L:4L])

# Return from non-data.table input
set_missing(airquality, 999999L)
```

---

split\_columns

*Split data into discrete and continuous parts*

---

### Description

This function splits the input data into two [data.table](#) objects: discrete and continuous. A feature is continuous if `is.numeric` returns TRUE.

### Usage

```
split_columns(data, binary_as_factor = FALSE)
```

### Arguments

`data` input data  
`binary_as_factor` treat binary as categorical? Default is FALSE.

### Details

Features with all missing values will be dropped from the output data, but will be counted towards the column count.

The elements in the output list will have the same class as the input data.

### Value

`discrete` all discrete features  
`continuous` all continuous features  
`num_discrete` number of discrete features  
`num_continuous` number of continuous features  
`num_all_missing` number of features with no observations (all values are missing)

### Examples

```
output <- split_columns(iris)
output$discrete
output$continuous
output$num_discrete
output$num_continuous
output$num_all_missing
```

---

update_columns	<i>Update variable types or values</i>
----------------	--

---

### Description

Quickly update selected variables using column names or positions.

### Usage

```
update_columns(data, ind, what)
```

### Arguments

data	input data
ind	a vector of either names or column positions of the variables to be dropped.
what	either a function or a non-empty character string naming the function to be called. See <a href="#">do.call</a> .

### Details

**This function updates [data.table](#) object directly.** Otherwise, output data will be returned matching input object class.

### Examples

```
str(update_columns(iris, 1L, as.factor))
str(update_columns(iris, c("Sepal.Width", "Petal.Length"), "as.integer"))

## Apply log transformation to all columns
summary(airquality)
summary(update_columns(airquality, names(airquality), log))

## Force set factor to numeric
df <- data.frame("a" = as.factor(sample.int(10L)))
str(df)
str(update_columns(df, "a", function(x) as.numeric(levels(x))[x]))
```

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