

Package ‘elements’

September 19, 2025

Title Tools for Data Treatment and Visualization

Version 0.1.0

Description

Advanced plotting and statistical analysis tools for environmental and ecotoxicological datasets.

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Encoding UTF-8

Roxygen list(markdown = TRUE)

RoxygenNote 7.3.1

Imports dplyr,

broom,

rlang,

forcats,

tibble,

multcompView,

FSA,

ggplot2,

rcompanion,

scales,

cowplot,

grid,

gridExtra,

glue,

magrittr,

stats,

utils,

ggnewscale,

RColorBrewer,

patchwork,

biostat

Remotes github::GegznaV/biostat

URL <https://github.com/ArnaudMarois/elements>

BugReports <https://github.com/ArnaudMarois/elements/issues>

R topics documented:

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get.plot	<i>Generate statistical plots with tests, post-hoc results, and compact letter displays</i>
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Description

This function creates boxplots or mean plots for one or more response variables, performs the specified statistical tests, and optionally adds post-hoc results, compact letter displays (CLD), and annotations. It can also arrange plots into a grid, save plots to files, and export statistical summaries to a PDF.

Usage

```
get.plot(  
  data,  
  response,  
  factor,  
  method = NULL,  
  adjust = NULL,  
  var.method = NULL,  
  var.adjust = NULL,  
  flip = FALSE,  
  filter.na = FALSE,  
  group.order = NULL,  
  print.test = FALSE,  
  export.test = FALSE,  
  show.test = FALSE,  
  show.ph = FALSE,  
  show.letters = FALSE,  
  show.brackets = FALSE,  
  plot.type = "boxplot",  
  fill = FALSE,  
  fill.box = "white",  
  box.alpha = 1,  
  fill.point = "white",  
  point.alpha = 1,  
  fill.mean = "black",  
  mean.alpha = 1,  
  log = FALSE,  
  group.label = NULL,  
  show.legend = FALSE,  
  point.shape = 21,  
  mean.shape = 21,  
  point.size = 2.5,  
  mean.size = 2.5,  
  jitter.width = 0.2,  
  error.width = 0.2,  
  error.alpha = 1,  
  axis.title.x = NULL,  
  axis.title.y = NULL,
```

```

axis.breaks.size = 12,
axis.title.size = 12,
axis.title.face = "plain",
label.angle = 0,
label.face = "plain",
letters.face = "plain",
letters.size = 5,
text.family = "sans",
theme.style = "classic",
padding = 0.2,
grid = FALSE,
grid.axis = FALSE,
ncol,
nrow,
grid.axis.x = factor,
grid.axis.y = "Concentration",
x.title.shift = 0.02,
var.size = 18,
var.face = "bold",
save.plot = FALSE,
by.var = FALSE,
plot.height = 5,
plot.width = 5,
plot.name = "plot_{var}.png",
save.grid = FALSE,
grid.name = "grid.png",
grid.height = 8,
grid.width = 7
)

```

Arguments

data	A data.frame.
response	Character vector of response variables.
factor	Character string for the factor variable.
method	The statistical test to perform. Available options are: <ul style="list-style-type: none"> • "aov" or "anova": Analysis of Variance (ANOVA). TukeyHSD as default posthoc test (pairwise t.test with an adjustment method). • "kw" or "kruskal" or "kruskal-wallis": Kruskal-Wallis test. Dunn's test as default posthoc test. • "t.test" or "student" or "t": Student's t-test. • "wilcox" or "wilcox.test" or "wilcoxon" or "mann-whitney": Wilcoxon test.
adjust	The p-value adjustment method to apply in post-hoc tests. Available options are "holm", "hochberg", "bonferroni", "bh", "by", "fdr", "hommel" (for aov), "sidak" (for kw), "hs" (for kw), and "none". Default is "none".
var.method	Named character vector specifying the statistical test to use for each response variable. The names must match exactly the variable names provided in response, and the values must be valid options accepted for the method argument.

<code>var.adjust</code>	Named character vector specifying the p-value adjustment method to use for each response variable. The names must match exactly the variable names provided in response, and the values must be valid options accepted for the <code>adjust</code> argument.
<code>flip</code>	Logical. If TRUE, the axes are inverted: the factor variable is plotted on the y-axis, and the response variables are plotted on the x-axis. Default is FALSE.
<code>filter.na</code>	Logical. If TRUE, rows with NA values in the current response variable are removed before analysis. Default is FALSE.
<code>group.order</code>	Optional character vector specifying the order of the x-axis categories in the plot. Values must exactly match the factor levels in <code>x</code> .
<code>print.test</code>	Logical. If TRUE, prints the test summary results to the console. Default is FALSE.
<code>export.test</code>	Logical. If TRUE, exports statistical test details (test table, post-hoc, CLD) to a PDF report. Default is FALSE.
<code>show.test</code>	Logical. If TRUE, the statistical test name and p-value are displayed in the top-left corner. Default is FALSE.
<code>show.ph</code>	Logical. If TRUE, the post-hoc test name and p-value are displayed in the top-left corner. Default is FALSE.
<code>show.letters</code>	Logical. If TRUE, significance letters for all groups are displayed (only for ANOVA and Kruskal-Wallis). Default is FALSE.
<code>show.brackets</code>	Logical. If TRUE when <code>show.letters</code> is TRUE, a bracket is displayed for adjacent groups sharing the same letter. Default is FALSE.
<code>plot.type</code>	Character string specifying the type of plot to produce. Either "boxplot" for box-and-whisker plots or "meanplot" for plots with group means and error bars. Default is "boxplot".
<code>fill</code>	Optional character. Specifies which plot element is filled with colors based on the factor variable. Default is FALSE. <ul style="list-style-type: none"> • With <code>plot.type = "boxplot"</code>: <ul style="list-style-type: none"> – "box": fills the boxes according to the factor levels. – "point": fills the points according to the factor levels. – "both": fills both boxes and points independently. • With <code>plot.type = "meanplot"</code>: <ul style="list-style-type: none"> – "point": fills the points according to the factor levels. • If FALSE, no elements are colored by factor.
<code>fill.box</code>	Optional. Depending on the <code>fill</code> argument, is either a single color (e.g., "white") applied to all boxes, a character vector of colors (length matching the number of factor levels), or the name of a ColorBrewer palette to fill the boxes. Default is "white".
<code>box.alpha</code>	Optional numeric between 0 and 1. Specifies the transparency (alpha) of the box fill when <code>plot.type = "boxplot"</code> . Default is 1 (fully opaque).
<code>fill.point</code>	Optional. Depending on the <code>fill</code> argument, is either a single color (e.g., "black") applied to all points, a character vector of colors (length matching the number of factor levels), or the name of a ColorBrewer palette to fill the points. Default is "white".
<code>point.alpha</code>	Optional numeric between 0 and 1. Specifies the transparency (alpha) of the points. Default is 1 (fully opaque).

fill.mean	Optional. A single color used to fill all mean points when <code>plot.type = "meanplot"</code> . Default is "black".
mean.alpha	Optional numeric between 0 and 1. Specifies the transparency (alpha) of the mean points when <code>plot.type = "meanplot"</code> . Default is 1 (fully opaque).
log	Logical. If TRUE, y-axis breaks and limits are adjusted to properly accommodate data values that may be negative or positive as a result of a logarithmic transformation. Default is FALSE.
group.label	Optional character vector specifying the labels to display on the x-axis.
show.legend	Logical. If TRUE, the plot legend is displayed. Default is FALSE.
point.shape	Optional numeric. Specifies the shape of the points in the plot. Default is 21.
mean.shape	Optional numeric. Specifies the shape of the mean points in the plot. Default is 21.
point.size	Optional numeric. Specifies the size of the points in the plot. Default is 2.5.
mean.size	Optional numeric. Specifies the size of the mean points in the plot. Default is 2.5.
jitter.width	Optional numeric. Specifies the amount of horizontal jitter applied to points. Default is 0.2.
error.width	Optional numeric. Specifies the width of the error bars when <code>plot.type = "meanplot"</code> . Default is 0.2.
error.alpha	Optional numeric between 0 and 1. Specifies the transparency (alpha) of the error bars when <code>plot.type = "meanplot"</code> . Default is 1 (fully opaque).
axis.title.x	Optional character string to rename the x-axis title. If not provided, the default x variable name is used.
axis.title.y	Optional character string to rename the y-axis title. If not provided, the default y variable name is used.
axis.breaks.size	Optional numeric. Specifies the size of all axis breaks text. Default is 12.
axis.title.size	Optional numeric. Specifies the size of the axis title text. Default is 12.
axis.title.face	Optional character. Specifies the font face (e.g., "plain", "bold", "italic") for both axis titles. Default is "plain".
label.angle	Optional numeric. Angle of the axis tick labels. Default is 0.
label.face	Optional character. Font face for the axis tick labels. Default is "plain".
letters.face	Optional character. Specifies the font face for all significance letters. Default is "plain".
letters.size	Optional numeric. Specifies the size of all significance letters. Default is 5.
text.family	Optional character. Specifies the font family for all text elements in the plot. Default is "sans".
theme.style	Character. Specifies the ggplot2 theme style preset to apply to the plot. Options include "classic", "bw", "minimal", "light", "dark", "gray", and "void". Default is "classic".
padding	Optional numeric. Proportion of extra space added to the top of the y-axis to avoid clipping letters/brackets. Default is 0.2.
grid	Optional logical. If TRUE, arranges all response variable plots into a combined grid layout. Default is FALSE.

<code>grid.axis</code>	Optional logical. If TRUE and <code>grid = TRUE</code> , individual plot axes are hidden and shared x and y axes are displayed for the entire grid. Default is FALSE.
<code>ncol</code>	Integer. Number of columns in the combined grid plot.
<code>nrow</code>	Integer. Number of rows in the combined grid plot.
<code>grid.axis.x</code>	Optional character string to name the shared x-axis title. Default is factor.
<code>grid.axis.y</code>	Optional character string to name the shared y-axis title. Default is "Concentration".
<code>x.title.shift</code>	Optional numeric. Horizontal shift applied to the shared x-axis label in grid layouts. Default is 0.02.
<code>var.size</code>	Optional numeric. Size of the labels displaying the name of each individual plot in the combined grid. Default is 18.
<code>var.face</code>	Optional character. Specifies the font face of the labels displaying the name of each individual plot in the combined grid. Default is "bold".
<code>save.plot</code>	Optional logical. If TRUE, saves each individual plot as a png file in the working directory. Default is FALSE.
<code>by.var</code>	Optional logical. Used only if <code>save.plot = TRUE</code> . If TRUE, saves each plot individually in separate folders named after each response variable. Default is FALSE.
<code>plot.height</code>	Optional numeric. Height of the saved plot image in inches when <code>save.plot = TRUE</code> . Default is 5.
<code>plot.width</code>	Optional numeric. Width of the saved plot image in inches when <code>save.plot = TRUE</code> . Default is 5.
<code>plot.name</code>	Optional character. Name of the saved plot file. Defaults to "plot_{var}.png", where {var} is replaced by the response variable name when saving multiple plots.
<code>save.grid</code>	Optional logical. If TRUE, saves the combined grid as a JPEG file in the working directory. Default is FALSE.
<code>grid.name</code>	Optional character. Name of the saved combined grid plot file. Default is "grid.png".
<code>grid.height</code>	Optional numeric. Height of the saved combined grid plot image in inches when <code>save.grid = TRUE</code> . Default is 8.
<code>grid.width</code>	Optional numeric. Width of the saved combined grid plot image in inches when <code>save.grid = TRUE</code> . Default is 7.

Value

- If `grid = TRUE`: returns a single ggplot object representing the combined grid of all response variable plots.
- If `grid = FALSE`: the function invisibly prints each plot to the current graphics device and stores them in internal lists (`plots`, `plots1`) for grid construction if needed.
- If `export.test = TRUE`: in addition to `plots`, a PDF file (`Stats_Report.pdf`) is created in the "elements" folder containing tables of statistical test results, post-hoc results, and compact letter displays (CLD).
- If `save.plot = TRUE` or `save.grid = TRUE`: plots are saved to file as PNG images in the specified location.

In all cases, the function is primarily used for its side effects (plots and exports). The main value returned is either a grid ggplot object (if `grid = TRUE`) or NULL invisibly.

Examples

```
# Example dataset
df <- data.frame(
  group = rep(c("A", "B", "C"), each = 10),
  value1 = c(rnorm(10, 5), rnorm(10, 6), rnorm(10, 7)),
  value2 = c(rnorm(10, 3), rnorm(10, 4), rnorm(10, 5))
)

# Basic boxplot with ANOVA and significance letters
get.plot(
  data = df,
  response = "value1",
  factor = "group",
  method = "aov",
  group.order = c("A", "B", "C"),
  show.letters = TRUE,
  plot.type = "boxplot"
)

# Mean plot with Kruskal-Wallis test and error bars
get.plot(
  data = df,
  response = "value2",
  factor = "group",
  method = "kw",
  group.order = c("A", "B", "C"),
  plot.type = "meanplot",
  fill = "point",
  show.test = TRUE
)

# Multiple response variables arranged in a grid
get.plot(
  data = df,
  response = c("value1", "value2"),
  factor = "group",
  method = "aov",
  group.order = c("A", "B", "C"),
  grid = TRUE,
  nrow = 1,
  ncol = 2,
  grid.axis = TRUE,
  grid.axis.x = "Experimental group",
  grid.axis.y = "Measured value"
)
```

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