

Package ‘coveffectsplot’

October 12, 2022

Title Produce Forest Plots to Visualize Covariate Effects

Version 1.0.2

Description Produce forest plots to visualize covariate effects using either the command line or an interactive 'Shiny' application.

URL <https://github.com/smouksassi/coveffectsplot>

BugReports <https://github.com/smouksassi/coveffectsplot/issues>

Depends R (>= 3.6.0), data.table (>= 1.9.8)

Imports colourpicker, egg, grid, ggplot2 (>= 3.3.2), shiny, stats, utils

Suggests markdown, dplyr, tidyr, shinyjs, shinymeta, table1, clipr, formatR, MASS, knitr, rmarkdown, mrgsolve, GGally, ggridges, ggrepel, ggstance, patchwork, plotly, scales, shinyAce, Rcpp, gamlss.dist, ggh4x, ggpmisc, quantreg

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SystemRequirements pandoc with https support

LazyData true

VignetteBuilder knitr

RoxygenNote 7.2.0

Encoding UTF-8

NeedsCompilation no

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| | |
|------------|-----------------------------------|
| covdatasim | <i>Correlated Covariates data</i> |
|------------|-----------------------------------|

Description

A example dataset used to illustrate multivariate joint covariate effects.

Usage

```
covdatasim
```

Format

A dataset with 2000 rows and 5 variables

ID Subject ID

AGE Age in years

WT Weight in kg

Sex 0=male; 1=female

ALB Albumin in g/dL

Source

simulated based on a real dataset

| | |
|----------|--|
| draw_key | <i>Horizontal key drawing functions from ggstance in case it is deprecated</i> |
|----------|--|

Description

Horizontal key drawing functions from ggstance in case it is deprecated

Usage

```
draw_key_hpath(data, params, size)
```

```
draw_key_pointrangeh(data, params, size)
```

Arguments

| | |
|--------|---|
| data | A single row data frame containing the scaled aesthetics to display in this key |
| params | A list of additional parameters supplied to the geom. |
| size | Width and height of key in mm. |

Value

A grid grob.

| | |
|-------------|--------------------|
| forest_plot | <i>Forest plot</i> |
|-------------|--------------------|

Description

Produce forest plots to visualize covariate effects

Usage

```
forest_plot(  
  data,  
  facet_formula = "covname~paramname",  
  xlabel = "",  
  ylabel = "",  
  x_facet_text_size = 13,  
  y_facet_text_size = 13,  
  x_facet_text_angle = 0,  
  y_facet_text_angle = 0,  
  x_facet_text_vjust = 0.5,  
  y_facet_text_vjust = 0.5,  
  x_facet_text_hjust = 0.5,
```

```
y_facet_text_hjust = 0.5,
xy_facet_text_bold = TRUE,
x_label_text_size = 16,
y_label_text_size = 16,
break_ylabel = FALSE,
y_label_text_width = 25,
table_text_size = 7,
base_size = 22,
theme_benrich = FALSE,
table_title = "",
table_title_size = 15,
ref_legend_text = "",
area_legend_text = "",
interval_legend_text = "",
legend_order = c("pointinterval", "ref", "area", "shape"),
combine_area_ref_legend = TRUE,
combine_interval_shape_legend = FALSE,
legend_position = "top",
show_ref_area = TRUE,
ref_area = c(0.8, 1.25),
show_ref_value = TRUE,
ref_value = 1,
ref_area_col = "#BEBEBE50",
ref_value_col = "black",
ref_value_size = 1,
ref_value_linetype = "dashed",
interval_col = "blue",
interval_size = 1,
interval_fatten = 4,
bsv_col = "red",
bsv_text_id = c("BSV", "bsv", "IIV", "Bsv"),
interval_bsv_text = "",
strip_col = "#E5E5E5",
paramname_shape = FALSE,
paramname_color = FALSE,
legend_shape_reverse = FALSE,
facet_switch = c("both", "y", "x", "none"),
facet_scales = c("fixed", "free_y", "free_x", "free"),
facet_space = c("fixed", "free_x", "free_y", "free"),
facet_labeller = "label_value",
label_wrap_width = 55,
facet_labeller_multiline = FALSE,
strip_placement = c("inside", "outside"),
strip_outline = TRUE,
facet_spacing = 5.5,
major_x_ticks = NULL,
minor_x_ticks = NULL,
x_range = NULL,
```

```

logxscale = FALSE,
show_yaxis_gridlines = TRUE,
show_xaxis_gridlines = TRUE,
show_table_facet_stripe = "none",
table_facet_switch = c("both", "y", "x", "none"),
show_table_yaxis_tick_label = FALSE,
reserve_table_xaxis_label_space = TRUE,
table_panel_border = TRUE,
table_position = c("right", "below", "none"),
plot_table_ratio = 4,
vertical_dodge_height = 0.8,
legend_space_x_mult = 1,
legend_ncol_interval = 1,
legend_ncol_shape = 1,
plot_margin = c(5.5, 5.5, 5.5, 5.5),
table_margin = c(5.5, 5.5, 5.5, 5.5),
legend_margin = c(0, 0.1, -0.1, 0),
parse_xlabel = FALSE,
parse_ylabel = FALSE,
plot_title = "\n",
return_list = FALSE
)

```

Arguments

| | |
|--------------------|--------------------------------------|
| data | Data to use. |
| facet_formula | Facet formula. |
| xlabel | X axis title. |
| ylabel | Y axis title. |
| x_facet_text_size | Facet text size X. |
| y_facet_text_size | Facet text size Y. |
| x_facet_text_angle | Facet text angle X. |
| y_facet_text_angle | Facet text angle Y. |
| x_facet_text_vjust | Facet text vertical justification. |
| y_facet_text_vjust | Facet text vertical justification. |
| x_facet_text_hjust | Facet text horizontal justification. |
| y_facet_text_hjust | Facet text horizontal justification. |
| xy_facet_text_bold | Bold Facet text. Logical TRUE FALSE. |

x_label_text_size X axis labels size.
y_label_text_size Y axis labels size.
break_ylabel Split Y axis labels into multiple lines. Logical FALSE TRUE.
y_label_text_width Number of characters to break Y axis labels.
table_text_size Table text size.
base_size theme_bw base_size for the plot and table.
theme_benrich apply Benjamin Rich's theming.
table_title What text to use for table title (theme_benrich has a default).
table_title_size table title size.
ref_legend_text Reference legend text.
area_legend_text Area legend text.
interval_legend_text Pointinterval Legend text.
legend_order Legend order. A four-element vector with the following items ordered in your desired order: "pointinterval", "ref", "area", "shape". if an item is absent the legend will be omitted.
combine_area_ref_legend Combine reference and area legends if they share the same text?
combine_interval_shape_legend Combine interval and shape legends when paramname_color=TRUE ?
legend_position where to put the legend: "top", "bottom", "right", "none"
show_ref_area Show reference window?
ref_area Reference area. Two-element numeric vector multiplying the ref_value.
show_ref_value Show reference line?
ref_value X intercept of reference line.
ref_area_col Reference area background color.
ref_value_col Reference line color.
ref_value_size Reference line size.
ref_value_linetype Reference line linetype.
interval_col Point range color. One or Multiple values.
interval_size Point range size. Default to 1
interval_fatten Point range fatten. Default to 4

| | |
|---------------------------------|--|
| bsv_col | BSV pointinterval color. One value. |
| bsv_text_id | Text string(s) to identify BSV. Default to c("BSV", "bsv", "IIV", "Bsv") |
| interval_bsv_text | BSV legend text. |
| strip_col | Strip background color. |
| paramname_shape | Map symbol to parameter(s)? |
| paramname_color | Map symbol to parameter(s)? |
| legend_shape_reverse | TRUE or FALSE. |
| facet_switch | Facet switch to near axis. Possible values: "both", "y", "x", "none". |
| facet_scales | Facet scales. Possible values: "free_y", "fixed", "free_x", "free". |
| facet_space | Facet spaces. Possible values: "fixed", "free_x", "free_y", "free". |
| facet_labeller | Facet Labeller. Default "label_value" any other valid 'facet_grid' labeller can be specified. |
| label_wrap_width | How many characters before breaking the line. Numeric value. any other valid 'facet_grid' labeller can be specified. |
| facet_labeller_multiline | break facet strips into multiple lines. Logical TRUE FALSE. |
| strip_placement | Strip placement. Possible values: "inside", "outside". |
| strip_outline | Draw rectangle around the Strip. Logical TRUE FALSE. |
| facet_spacing | Control the space between facets in points. |
| major_x_ticks | X axis major ticks. Numeric vector. |
| minor_x_ticks | X axis minor ticks. Numeric vector. |
| x_range | Range of X values. Two-element numeric vector. |
| logxscale | X axis log scale. Logical TRUE FALSE. |
| show_yaxis_gridlines | Draw the y axis gridlines. Logical TRUE FALSE. |
| show_xaxis_gridlines | Draw the x axis gridlines. Logical TRUE FALSE. |
| show_table_facet_strip | Possible values: "none", "both", "y", "x". |
| table_facet_switch | Table facet switch to near axis. Possible values: "both", "y", "x", "none". |
| show_table_yaxis_tick_label | Show table y axis ticks and labels? |
| reserve_table_xaxis_label_space | keep space for the x axis label to keep alignment. |

`table_panel_border` Draw the panel border for the table. Logical TRUE FALSE.

`table_position` Table position. Possible values: "right", "below", "none".

`plot_table_ratio` Plot-to-table ratio. Suggested value between 1-5.

`vertical_dodge_height` Amount of vertical dodging to apply on segments and table text.

`legend_space_x_mult` Multiplier to adjust the spacing between legend items.

`legend_ncol_interval` Control the number of columns for the pointinterval legend.

`legend_ncol_shape` Control the number of columns for the shape legend.

`plot_margin` Control the white space around the main plot. Vector of four numeric values for the top, right, bottom and left sides.

`table_margin` Control the white space around the table. Vector of four numeric values for the top, right, bottom and left sides.

`legend_margin` Control the white space around the plot legend. Vector of four numeric values for the top, right, bottom and left sides.

`parse_xlabel` treat xlabel as an expression. Logical FALSE TRUE.

`parse_ylabel` treat ylabel as an expression. Logical FALSE TRUE.

`plot_title` main plot title default to a line break.

`return_list` What to return if True a list of the main and table plots is returned instead of the gtable/plot.

Examples

```
library(dplyr)
library(ggplot2)

# Example 1

plotdata <- get_sample_data("forest-plot-table.csv")
plotdata <- plotdata %>%
  mutate(midlabel = format(round(mid,2), nsmall = 2),
         lowerlabel = format(round(lower,2), nsmall = 2),
         upperlabel = format(round(upper,2), nsmall = 2),
         LABEL = paste0(midlabel, " [", lowerlabel, "-", upperlabel, "]"))
param <- "BZD AUC"
plotdata <- filter(plotdata,paramname==param)
plotdata$covname <- reorder(plotdata$covname,plotdata$upper,FUN =max)
plotdata$label <- reorder(plotdata$label,plotdata$scen)
covs <- c("WEIGHT","AGE")
plotdata <- filter(plotdata,covname%in%covs)
forest_plot(plotdata,
            ref_legend_text = "Reference (vertical line)",
            area_legend_text = "Reference (vertical line)",
```



```

xlabel = paste("Fold Change in", param, "Relative to Reference"),
logxscale = TRUE, major_x_ticks =c(0.1,1,1.5),
show_ref_area = FALSE,
paramname_color =TRUE,
interval_col =c("steelblue", "red", "steelblue", "red"),
facet_formula = "covname~.",
facet_scales = "free_y",
facet_space = "free_y",
show_table_facet_strip = "none",
table_position = "right",
plot_table_ratio = 4)

# Example 2

plotdata <- get_sample_data("forest-plot-table.csv")
plotdata <- plotdata %>%
  mutate(midlabel = format(round(mid,2), nsmall = 2),
         lowerlabel = format(round(lower,2), nsmall = 2),
         upperlabel = format(round(upper,2), nsmall = 2),
         LABEL = paste0(midlabel, " [", lowerlabel, "-", upperlabel, "]"))
param <- c("BZD AUC", "BZD Cmax")
plotdata <- filter(plotdata,paramname%in%param)
plotdata <- filter(plotdata,covname%in%"WEIGHT")
plotdata$covname <- reorder(plotdata$covname,plotdata$upper,FUN =max)
plotdata$label <- reorder(plotdata$label,plotdata$scen)
forest_plot(plotdata,
  ref_legend_text = "Reference (vertical line)",
  area_legend_text = "Reference (vertical line)",
  xlabel = paste("Fold Change of Parameter", "Relative to Reference"),
  show_ref_area = FALSE,
  facet_formula = "covname~paramname",
  facet_scales = "free_y",
  facet_space = "free_y",
  x_facet_text_size = 10,
  y_facet_text_size = 10,
  y_label_text_size = 10,
  y_label_text_width = 15,
  x_label_text_size = 10,
  facet_switch = "both",
  show_table_facet_strip = "both",
  show_table_yaxis_tick_label = TRUE,
  table_position = "below",
  plot_table_ratio = 1)

## Not run:

# Example 3a

plotdata <- get_sample_data("forest-plot-table.csv")
plotdata <- plotdata %>%
  mutate(midlabel = format(round(mid,2), nsmall = 2),
         lowerlabel = format(round(lower,2), nsmall = 2),
         upperlabel = format(round(upper,2), nsmall = 2),
         LABEL = paste0(midlabel, " [", lowerlabel, "-", upperlabel, "]"))

```

```

plotdata$covname <- reorder(plotdata$covname,plotdata$upper,FUN =max)
plotdata$label <- reorder(plotdata$label,plotdata$scen)

plotdata$compound <- c(rep("1-OH",18),rep("BZD",18))
plotdata$paramname <- c(rep("AUC",9),rep("CMAX",9),rep("AUC",9),rep("CMAX",9))

forest_plot(plotdata,
  ref_area = c(0.8, 1.2),
  x_facet_text_size = 13,
  y_facet_text_size = 13,
  ref_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
  area_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
  xlabel = "Fold Change Relative to Parameter",
  facet_formula = covname~compound,
  facet_switch = "both",
  facet_scales = "free",
  facet_space = "fixed",
  paramname_shape = TRUE,          paramname_color = FALSE,
  combine_interval_shape_legend = FALSE,
  table_position = "right", plot_title = "",
  ref_area_col = rgb( col2rgb("gray50")[1], col2rgb("gray50")[2],col2rgb("gray50")[3],
    max = 255, alpha = 0.1*255 ) ,
  interval_col = c("steelblue"),
  strip_col = "lightblue",
  plot_table_ratio = 1)

# Example 3

plotdata <- get_sample_data("forestplotdatacpidata.csv")
forest_plot(plotdata,
  ref_area = c(0.8, 1.2),
  x_facet_text_size = 12,
  y_facet_text_size = 12,
  y_label_text_size = 10,
  x_label_text_size = 10,
  table_text_size = 6,
  plot_table_ratio = 1.5,
  ref_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
  area_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
  xlabel = "Fold Change Relative to RHZE",
  facet_formula = "covname~paramname",
  table_position = "below",
  show_table_facet_strip = "both",
  show_table_yaxis_tick_label = TRUE)

# Example 4
plotdata <- get_sample_data("dataforest.csv")
plotdata <- plotdata %>%
  mutate(midlabel = format(round(mid,2), nsmall = 2),
    lowerlabel = format(round(lower,2), nsmall = 2),
    upperlabel = format(round(upper,2), nsmall = 2),
    LABEL = paste0(midlabel, " [", lowerlabel, "-", upperlabel, "]"))
plotdata <- plotdata %>%

```

```

    filter(covname%in%c("Weight"))
plotdata$label <- as.factor(as.character(plotdata$label))
plotdata$label <- factor(plotdata$label, c("36.2 kg", "66 kg", "110 kg"))
forest_plot(plotdata,
             ref_area = c(0.8, 1.2),
             x_facet_text_size = 13,
             y_facet_text_size = 13,
             ref_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
             area_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
             xlabel = "Fold Change Relative to Parameter",
             facet_formula = "covname~paramname",
             facet_switch = "both",
             facet_scales = "free",
             facet_space = "fixed",
             table_position = "below",
             plot_table_ratio = 1,
             show_table_facet_strip = "both",
             show_table_yaxis_tick_label = TRUE)

# Example 5

forest_plot(plotdata,
             ref_area = c(0.8, 1.2),
             x_facet_text_size = 13,
             y_facet_text_size = 13,
             ref_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
             area_legend_text = "Reference (vertical line)\n+/- 20% limits (colored area)",
             xlabel = "Fold Change Relative to Parameter",
             facet_formula = "covname~.",
             facet_switch = "both",
             facet_scales = "free",
             facet_space = "fixed",
             paramname_shape = TRUE,
             table_position = "none",
             ref_area_col = rgb( col2rgb("gray50")[1], col2rgb("gray50")[2], col2rgb("gray50")[3],
                                max = 255, alpha = 0.1*255 ) ,
             interval_col = "steelblue",
             strip_col = "lightblue",
             plot_table_ratio = 1)

## End(Not run)

```

get_sample_data

Get sample dataset

Description

Get a sample dataset that is included with the package to plot a forest plot.

Usage

```
get_sample_data(dataset = "dfall.csv")
```

Arguments

dataset A sample dataset file.

prezista

Prezista Drug Label Data

Description

A dataset containing an excerpt from the official Prezista FDA Drug Label to help in the app exploration.

Usage

```
prezista
```

Format

A dataset with 33 rows and 6 variables

covname Covariate Name, a character variable with two values Protease Inhibitors and Other Antiretrovirals

label Covariate value label, a character variable with several possible values

paramname Parameter on which the effects are shown, a character variable with three possible values Cmax, AUC and Cmin

mid Middle value for the effects, the median from the uncertainty distribution

lower Lower value for the effects usually the 5% from the uncertainty distribution

upper Upper value for the effects usually the 95% from the uncertainty distribution

Source

Table 16 from https://www.accessdata.fda.gov/drugsatfda_docs/label/2017/021976s045_202895s0201b1.pdf

`run_interactiveforestplot`*Run the interactiveforestplot application*

Description

Run the interactiveforestplot application.

Usage

```
run_interactiveforestplot(data = NULL)
```

Arguments

`data` optional data to load when the app is launched

Examples

```
if (interactive()) {  
  run_interactiveforestplot()  
}
```

`wtage`*Weight Age CDC growth charts data*

Description

Weight-for-age, 2 to 20 years, LMS parameters and selected smoothed weight percentiles in kilograms, by sex and age.

Usage`wtage`**Format**

A dataset with 436 rows and 14 variables

Sex 1=male; 2=female

Agemos Age in months

L skewness distribution parameter

M location distribution parameter

S scale distribution parameter

P3 Smoothed third percentile

- P5** Smoothed fifth percentile
- P10** Smoothed tenth percentile
- P25** Smoothed twenty fifth percentile
- P50** Smoothed fiftieth percentile
- P75** Smoothed seventy fifth percentile
- P90** Smoothed ninetieth percentile
- P95** Smoothed ninety fifth percentile
- P97** Smoothed ninety seventh percentile

Source

CDC website <https://www.cdc.gov/growthcharts/data/zscore/wtage.csv>

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