Package: forestmap (via r-universe)

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Title Forest Plots with a Heatmap of Study Properties

Version 0.1.0

Description Draws a forest plot of the studies in a meta-analysis, sorted by effect size, above a heatmap of study properties such as population, design or country. Supply one row per study (effect size and 95% confidence interval) and the factor columns describing each study; the plot shows at a glance whether studies with particular properties tend to find larger or smaller effects.

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URL https://github.com/shaheedazaad/forestmap, https://shaheedazaad.github.io/forestmap/

BugReports https://github.com/shaheedazaad/forestmap/issues

Depends R (>= 4.1.0)

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`forestmap_example` *Example meta-analysis data*

Description

Made-up studies from a meta-analysis of an intervention: each study's standardised mean difference and sampling variance (the `yi`/`vi` pair that `metafor::escalc()` produces), its sample size, and four study properties. Some studies don't report their outcome measure or country (`NA`). Use it to try out `plot_forestmap()`.

Usage

```
forestmap_example
```

Format

A data frame with 60 rows (studies) and 8 columns:

study Study label (first author and year).

smd Standardised mean difference (Hedges' g).

vi Sampling variance of `smd`.

n Total sample size.

population Factor: `Adults`, `Children` or `Clinical`.

outcome Factor: `Self-report` or `Behavioural`; `NA` = not reported.

design Factor: `RCT` or `Quasi-experimental`.

country Factor: `USA`, `UK`, `Australia`, `Germany` or `Canada`; `NA` = not reported.

Source

Simulated; see `data-raw/forestmap_example.R` in the package source.

`forestmap_palettes` *Colour palettes for forestmap plots*

Description

Ready-made palettes that can be passed by name to the `palette` argument of `plot_forestmap()`. Each palette has three colours:

Usage

```
forestmap_palettes
```

Format

A named list of named character vectors (hex colours):

default Blue / red / grey.

okabe_ito Blue and vermillion from the Okabe-Ito palette (Okabe & Ito, 2008), designed to stay distinguishable with common colour-vision deficiencies; light grey for null.

viridis Teal / purple / grey.

greyscale Black / dark grey / light grey, for print.

Details

- `positive`: the 95% CI lies entirely above the null value.
- `negative`: the 95% CI lies entirely below the null value.
- `null`: the 95% CI includes the null value.

Examples

```
names(forestmap_palettes)
forestmap_palettes$okabe_ito
```

`plot_forestmap` *Forest plot of studies with a heatmap of study properties*

Description

Plots each study's effect size and 95% confidence interval, sorted from smallest to largest, above a heatmap showing each study's properties (population, design, country, ...). It shows at a glance whether studies with particular properties tend to find larger or smaller effects.

Usage

```
plot_forestmap(
  data,
  es,
  lb = NULL,
  ub = NULL,
  moderators,
  vi = NULL,
  se = NULL,
  font = "Roboto Condensed",
  palette = "default",
  text_size = 9,
  forest_height = "auto",
  null_value = 0,
  rope = NULL,
  y_limits = NULL,
  y_label = "Effect size",
  x_label = "Effect",
  max_levels = NULL,
  layout = c("standard", "compact")
)
```

Arguments

`data`	A data frame with one row per study.
`es`	Name of the column holding each study's effect size.
`lb`, `ub`	Names of the columns holding the lower and upper bounds of each study's 95% confidence interval. Give these, *or* `vi`, *or* `se`.
`moderators`	Names of the columns holding study properties (factors). Name the vector to set each moderator's heading, e.g. `c("Study design" = "design", "Population" = "population")`; unnamed entries use the column name.
`vi`	Name of a column holding each study's sampling variance (e.g. `vi` from `metafor::escalc()`). The 95% confidence interval is computed as `es` $\pm$ 1.96 $\times$ $\sqrt{}$`vi`. Use instead of `lb` and `ub`.
`se`	Name of a column holding each study's standard error. The 95% confidence interval is computed as `es` $\pm$ 1.96 $\times$ `se`. Use instead of `lb` and `ub`.
`font`	A font family installed on your computer (e.g. `"Helvetica"`), or the path to a `.ttf`/`.otf` font file. The default, `"Roboto Condensed"`, comes with the package, so it works on every computer.
`palette`	A palette name from forestmap_palettes (`"default"`, `"okabe_ito"`, `"viridis"`, `"greyscale"`) or three colours, e.g. `c(positive = "darkgreen", negative = "purple", null = "grey")`.
`text_size`	Base text size in points.
`forest_height`	Share of the plot's height given to the forest plot (the top panel), between 0 and 1 (`0.5` gives the forest plot and heatmap equal height). `"auto"` (the default) gives the heatmap more room the more rows it has.

`null_value` The value meaning "no effect": `0` for differences and log ratios, `1` for raw ratios such as odds ratios.

`rope` Optional region of practical equivalence, drawn as a shaded band: two numbers such as `c(-0.1, 0.1)`, or one number for a band symmetric around `null_value`.

`y_limits` Optional y-axis limits, e.g. `c(-1, 1)`. By default the axis is symmetric around `null_value` and shows every confidence interval in full; for ratios (`null_value` above 0 and every value positive) it starts at 0.

`y_label`, `x_label` Axis titles.

`max_levels` Optional maximum number of rows per moderator. With `max_levels = 3`, the 2 most common levels are shown and the rest are merged into one "Other" row. If levels tie for the last place, all of them are kept (with a warning). `NULL` (the default) shows every level.

`layout` `"standard"` puts a bold heading above each moderator's rows; `"compact"` puts the moderator name to the left of its rows instead, which makes the heatmap shorter.

Details

Each row of `data` is one study. Effects are coloured by their confidence interval: `positive` when it lies entirely above `null_value`, `negative` when entirely below, and `null` otherwise. Each study's heatmap tiles take the same colour.

Value

A patchwork object. Print it to display it, or save it with `ggplot2::ggsave()`.

Moderators

Each moderator (study property) gets its own block in the heatmap with one row per factor level, in the order of the factor's levels. Use `factor()` with `levels =` to control the order. A missing value (`NA`) means the study doesn't report that property, so it gets no filled tile in that block. Character columns are converted to factors (with a message).

Size and saving

The plot has no fixed physical size; choose the width and height when you save it, e.g. `ggplot2::ggsave("plot.png", p, width = 7, height = 5.25)`. `forest_height` and `text_size` control proportions and text.

PNG and SVG files saved with `ggplot2::ggsave()` always use the chosen font. Some other graphics devices only see fonts installed on your computer, and show the bundled Roboto Condensed in another font until you install it (the files are in `system.file("fonts", package = "forestmap")`):

- RStudio's Plots pane: or set *Tools > Global Options > General > Graphics > Backend* to *AGG*.
- PDF: save with `device = cairo_pdf`.

Examples

```
p <- plot_forestmap(
  forestmap_example,
  es = "smd", vi = "vi",
  moderators = c(
    "Population" = "population",
    "Outcome measure" = "outcome",
    "Study design" = "design",
    "Country" = "country"
  ),
  rope = c(-0.1, 0.1),
  y_label = "SMD (95% CI)"
)
p

# With confidence interval bounds instead of variances
dat <- forestmap_example
dat$ci_lower <- dat$smd - 1.96 * sqrt(dat$vi)
dat$ci_upper <- dat$smd + 1.96 * sqrt(dat$vi)
plot_forestmap(
  dat, es = "smd", lb = "ci_lower", ub = "ci_upper",
  moderators = c("Population" = "population", "Study design" = "design")
)

# Compact layout, Okabe-Ito palette
plot_forestmap(
  forestmap_example, "smd", vi = "vi",
  moderators = c("Population" = "population", "Study design" = "design"),
  palette = "okabe_ito",
  layout = "compact"
)

## Not run:
ggplot2::ggsave("forestmap.png", p, width = 7, height = 5.25, dpi = 300)

## End(Not run)
```

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