funnel_clean

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Description

A ggplot theme function for clean looking funnel plots. Try funnel_grey if you like the old one.

Usage

funnel_clean()

Value

a list of ggplot theme items

See Also

funnel_grey

Examples

## Not run: funnel_plot(theme=funnel_clean())
funnel_grey

funnel_grey A grey ggplot funnel theme

Description
A classic ggplot theme function for funnel plots. Try funnel_clean if you don’t like the grey background.

Usage
funnel_grey()

Value
a list of ggplot theme items

See Also
funnel_clean

Examples
## Not run: funnel_plot(theme=funnel_grey())

funnel_plot Funnel plots for comparing institutional performance

Description
An implementation of funnel plots for indirectly standardised ratios, as described by Spiegelhalter (2005) <https://doi.org/10.1002/sim.1970>. There are several parameters for the input, with the assumption that you will want smooth, overdispersed, funnel control limits. Limits may be inflated for overdispersion based on the methods of DerSimonian & Laird (1986), by calculating a between unit standard deviation (τ) and constructing an additive random effects models, originally used for meta-analyses of clinical trials data.

Usage
funnel_plot(
  numerator,
  denominator,
  group,
  data_type = "SR",
  limit = 99,
  label = "outlier",
  highlight = NA,
draw_unadjusted = FALSE,
draw_adjusted = TRUE,
sr_method = "SHMI",
trim_by = 0.1,
title = "Untitled Funnel Plot",
multiplier = 1,
x_label = "Expected",
y_label,
x_range = "auto",
y_range = "auto",
plot_cols = c("#FF7F0EFF", "#FF7F0EFF", "#1F77B4FF", "#1F77B4FF", "#9467BDFF",
"#9467BDFF", "#2CA02CFF", "#2CA02CFF"),
theme = funnel_clean(),
label_outliers,
Poisson_limits,
OD_adjust,
xrange,
yrange

Arguments

numerator A vector of the numerator (observed events/counts) values. Used as numerator of the Y-axis
denominator A vector of denominator (predicted/population etc.) Used as denominator of the Y-axis and the scale of the x-axis
group A vector of group names as character or factor. Used to aggregate and group points on plots
data_type A string identifying the type of data used for in the plot, the adjustment used and the reference point. One of: "SR" for indirectly standardised ratios, such SHMI, "PR" for proportions, or "RC" for ratios of counts. Default is "SR".
limit Plot limits, accepted values are: 95 or 99, corresponding to 95% or 99.8% quantiles of the distribution. Default=99, and applies to OD limits if both OD and Poisson are used.
label Whether to label outliers, highlighted groups, both or none. Default is "outlier", by accepted values are:
  - "outlier" - Labels upper and lower outliers, determined in relation to the 'limit' argument.
  - "outlier_lower" - Labels just and lower outliers, determined in relation to the 'limit' argument.
  - "outlier_upper" - Labels just upper, determined in relation to the 'limit' argument.
  - "highlight" - Labels the value(s) given in the 'highlight' argument.
  - "both" - Labels both the highlighted values(s), upper and lower outliers, determined in relation to the 'limit' argument.
funnel_plot

• "both_lower" - Labels both the highlighted values(s) and lower outliers, determined in relation to the 'limit' argument.
• "both_upper" - Labels both the highlighted values(s) and upper outliers, determined in relation to the 'limit' argument.
• NA - No labels applied

highlight  Single or vector of points to highlight, with a different colour and point style. Should correspond to values specified to 'group'. Default is NA, for no highlighting.

draw_unadjusted  Draw control limits without overdispersion adjustment. (default=FALSE)
draw_adjusted  Draw overdispersed limits using hierarchical model, assuming at group level, as described in Spiegelhalter (2012). It calculates a second variance component \( \tau \) for the 'between' standard deviation, that is added to the 'within' standard deviation (\( \sigma \)). (default=TRUE)
sr_method  Method for adjustment when using indirectly standardised ratios (type="SR") Either "CQC" or "SHMI" (default). There are a few methods for standardisation. "CQC"/Spiegelhalter uses a square-root transformation and Winsorises (rescales the outer most values to a particular percentile). SHMI, instead, uses log-transformation and doesn't Winsorise, but truncates the distribution before assessing overdisperison. Both methods then calculate a dispersion ratio (\( \phi \)) on this altered dataset. This ratio is then used to scale the full dataset, and the plot is drawn for the full dataset.
trim_by  Proportion of the distribution for winsorisation/truncation. Default is 10% (0.1). Note, this is applied in a two-sided fashion, e.g. 10% refers to 10% at each end of the distribution (20% winsorised/truncated)
title  Plot title
multiplier  Scale relative risk and funnel by this factor. Default to 1, but 100 sometime used, e.g. in some hospital mortality ratios.
x_label  Title for the funnel plot x-axis. Usually expected deaths, readmissions, incidents etc.
y_label  Title for the funnel plot y-axis. Usually a standardised ratio.
x_range  Manually specify the y-axis min and max, in form c(min, max), e.g. c(0, 200). Default, "auto", allows function to estimate range.
y_range  Manually specify the y-axis min and max, in form c(min, max), e.g. c(0.7, 1.3). Default, "auto", allows function to estimate range.
plot_cols  A vector of 8 colours for funnel limits, in order: 95% Poisson (lower/upper), 99.8% Poisson (lower/upper), 95% OD-adjusted (lower/upper), 99.8% OD-adjusted (lower/upper). Default has been chosen to avoid red and green which can lead to subconscious value judgements of good or bad. Default is hex colours: c("#FF7F0EFF", "#FF7F0EFF", "#1F77B4FF", "#1F77B4FF", "#9467BDFF", "#9467BDFF", "#2CA02CFF", "#2CA02CFF")
theme  a ggplot theme function. This can be a canned theme such as theme_bw(), a theme() with arguments, or your own custom theme function. Default is new funnel_clean(), but funnel_classic() is original format.
funnel_plot

label_outliers  Deprecated. Please use the 'label' argument instead.
Poisson_limits  Deprecated. Please use the 'draw_unadjusted' argument instead.
OD_adjust  Deprecated. Please use the 'draw_adjusted' argument instead.
xrange  Deprecated. Please use the 'x_range' argument instead.
yrange  Deprecated. Please use the 'y_range' argument instead.

Details

Outliers are marked based on the grouping, and the limits chosen, corresponding to either 95% or 99.8% quantiles of the normal distribution.
Labels can be attached using the 'label' argument.
Overdispersion can be factored in based on the methods in Spiegelhalter et al. (2012), set `draw_adjusted` to FALSE to suppress this.
To use Poisson limits set `draw_unadjusted=TRUE`.
The plot colours deliberately avoid red-amber-green colouring, but you could extract this from the ggplot object and change manually if you like. Future versions of 'funnelplotr' may allow users to change this.

Value

A fitted 'funnelplot' object. A 'funnelplot' object is a list containing the following components:

print
plot
limits_lookup
aggregated_data
outlier
tau2
phi
draw_adjusted
draw_unadjusted

A data frame of the outliers from the data.
The between-groups standard deviation, τ².
The dispersion ratio, φ.
Whether overdispersion-adjusted limits were used.
Whether unadjusted Poisson limits were used.

References

Examples

# We will use the 'medpar' dataset from the 'COUNT' package.
# Little reformatting needed

library(COUNT)
data(medpar)
medpar$provnum<-factor(medpar$provnum)
medpar$los<-as.numeric(medpar$los)

mod<- glm(los ~ hmo + died + age80 + factor(type),
          family="poisson", data=medpar)

# Get predicted values for building ratio
medpar$prds<- predict(mod, type="response")

# Draw plot, returning just the plot object
fp<- funnel_plot(denominator=medpar$prds, numerator=medpar$los,
                 group = medpar$provnum, limit=95, 
                 title="An example funnel plot")

# Methods for viewing/extracting
print(fp)
plot(fp)
summary(fp)
limits(fp)
outliers(fp)
source_data(fp)
phi(fp)
tau2(fp)

limits

Funnel plot limits

Description

Limits class for funnel plots

Usage

limits(x)

Arguments

x object of class funnel plot
outliers

*Funnel plot outliers*

**Description**

Outliers class for funnel plots

**Usage**

`outliers(x)`

**Arguments**

- `x`: object of class funnel plot

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phi

*dispersion ratio, $\phi$, for Funnel plots*

**Description**

Phi class for funnel plots

**Usage**

`phi(x)`

**Arguments**

- `x`: object of class funnel plot

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source_data

*source data used to create Funnel plots*

**Description**

Source data class for funnel plots

**Usage**

`source_data(x)`

**Arguments**

- `x`: object of class funnel plot
Description

Tau2 class for funnel plots

Usage

tau2(x)

Arguments

x object of class funnel plot
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