Package 'besthr'

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Type Package

Title Generating Bootstrap Estimation Distributions of HR Data

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Description Creates plots showing scored HR experiments and plots of distribution of means of ranks of HR score from bootstrapping.

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`apply_besthr_theme` *Apply besthr theme consistently*

Description

Applies the besthr theme and color scales to a ggplot object based on configuration settings. This ensures consistent theming across all plot components.

Usage

```
apply_besthr_theme(p, config, include_fill = TRUE, include_color = TRUE)
```

Arguments

`p`	A ggplot object
`config`	A besthr_plot_config object
`include_fill`	Logical, whether to apply fill scale (default TRUE)
`include_color`	Logical, whether to apply color scale (default TRUE)

Value

The ggplot object with theme and scales applied

Examples

```
library(ggplot2)
p <- ggplot(mtcars, aes(mpg, wt, color = factor(cyl))) +
  geom_point()
cfg <- besthr_plot_config(theme_style = "modern", color_palette = "okabe_ito")
apply_besthr_theme(p, cfg)
```

`besthr_data_view` *Create a unified data view for besthr plotting*

Description

Extracts and organizes data from an hrest object for plotting. Computes unified axis limits that ensure alignment between observation and bootstrap panels.

Usage

```
besthr_data_view(hrest, config = NULL)
```

Arguments

`hrest`	An hrest object from `estimate`
`config`	A besthr_plot_config object (optional). If NULL, uses defaults.

Value

An object of class "besthr_data_view" containing ranked data, original data, bootstrap samples, group means, confidence intervals, group sample sizes, unified rank limits, group column symbol, column info, control group name, and quantile values.

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
```

besthr_palette *besthr color palettes*

Description

Returns a color palette suitable for besthr visualizations. The default palette uses Okabe-Ito colorblind-safe colors.

Usage

```
besthr_palette(palette = "default", n = NULL)
```

Arguments

palette	Character string specifying the palette. Options are: • "default" - Original besthr colors • "okabe_ito" - Colorblind-safe Okabe-Ito palette • "viridis" - Viridis color scale
n	Number of colors to return. If NULL, returns all colors in palette.

Value

A character vector of hex color codes

Examples

```
besthr_palette()
besthr_palette("okabe_ito", 3)
```

besthr_plot_config *Create a besthr plot configuration*

Description

Creates a configuration object that controls the appearance and behavior of besthr plots. All parameters have defaults that reproduce the original besthr appearance for backward compatibility.

Usage

```
besthr_plot_config(
  panel_widths = c(1, 1),
  panel_spacing = grid::unit(0.5, "cm"),
  y_limits = NULL,
  y_expand = 0.05,
  point_size_range = c(2, 8),
  point_alpha = 0.8,
  mean_line_type = 3,
  mean_line_width = 1,
  density_alpha = 0.7,
  density_style = "points",
  theme_style = "modern",
  color_palette = "okabe_ito"
)
```

Arguments

panel_widths	Numeric vector of relative panel widths for patchwork layout.
panel_spacing	A grid unit specifying spacing between panels.
y_limits	Numeric vector of length 2 for y-axis limits, or NULL for auto.
y_expand	Numeric giving proportional expansion of y-axis limits.
point_size_range	Numeric vector of length 2 for min/max point sizes.
point_alpha	Numeric between 0 and 1 for point transparency.
mean_line_type	Line type for mean indicator lines.
mean_line_width	Line width for mean indicator lines.
density_alpha	Numeric between 0 and 1 for density plot transparency.
density_style	Character: "points" (default, jittered bootstrap points), "gradient" (density with CI shading), or "solid" (single color density).
theme_style	Character: "classic" or "modern".
color_palette	Character: "default", "okabe_ito", or "viridis".

Value

An object of class "besthr_plot_config" containing all plot settings.

Examples

```
cfg <- besthr_plot_config()
cfg <- besthr_plot_config(panel_widths = c(2, 1), theme_style = "modern")
```

besthr_style *Get a preset plot style*

Description

Returns a pre-configured besthr_plot_config object with sensible defaults for common use cases. This is the easiest way to customize besthr plot appearance without understanding all the configuration options.

Usage

```
besthr_style(style = "default")
```

Arguments

style	Character string specifying the style preset:

- "default" - Modern theme with colorblind-safe colors (recommended)
- "classic" - Original besthr appearance for backward compatibility
- "publication" - Clean style suitable for journal figures
- "presentation" - Larger elements for slides
- "density" - Uses gradient density instead of points for bootstrap

Value

A besthr_plot_config object

Examples

```
d <- make_data()
hr <- estimate(d, score, group)

# Quick styling with presets
plot(hr, config = besthr_style("publication"))
plot(hr, config = besthr_style("presentation"))
plot(hr, config = besthr_style("density"))

# Same as default
plot(hr, config = besthr_style("default"))
```

besthr_table *Generate a summary table from besthr results*

Description

Creates a publication-ready summary table containing group statistics, confidence intervals, and optionally effect sizes and significance.

Usage

```
besthr_table(
  hrest,
  format = "tibble",
  digits = 2,
  include_significance = FALSE
)
```

Arguments

hrest	An hrest object from estimate
format	Output format: "tibble" (default), "markdown", "html", or "latex"
digits	Number of decimal places for rounding (default 2)
include_significance	Logical, whether to include significance stars (default FALSE)

Value

A tibble (if format = "tibble") or character string (other formats)

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
besthr_table(hr)
besthr_table(hr, format = "markdown")
```

build_bootstrap_panel *Build the bootstrap distribution panel*

Description

Creates a ggplot showing ridge density plots of bootstrap distributions with confidence interval shading.

Usage

```
build_bootstrap_panel(data_view, config)
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object

Value

A ggplot object

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()

build_bootstrap_panel(dv, cfg)
```

build_observation_panel *Build the observation panel*

Description

Creates a ggplot showing either ranked observations (averaged tech reps) or raw scores with technical replicates displayed.

Usage

```
build_observation_panel(data_view, config, which = "rank_simulation")
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object
which	Character specifying panel type: "rank_simulation" for averaged ranked data, or "just_data" for raw scores with tech reps.

Value

A ggplot object

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()

build_observation_panel(dv, cfg, "rank_simulation")
```

---

compose_besthr_panels *Compose besthr panels*

Description

Combines observation and bootstrap panels using patchwork with proper alignment and shared legends.

Usage

```
compose_besthr_panels(panels, config)
```

Arguments

panels	A list of ggplot objects to compose
config	A besthr_plot_config object

Value

A patchwork object

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()

p1 <- build_observation_panel(dv, cfg)
p2 <- build_bootstrap_panel(dv, cfg)
compose_besthr_panels(list(p1, p2), cfg)
```

`compute_effect_size` *Compute effect sizes from bootstrap distributions*

Description

Calculates the effect size (difference from control) for each treatment group with bootstrap confidence intervals.

Usage

```
compute_effect_size(hrest)
```

Arguments

`hrest`	An hrest object from `estimate`

Value

A data frame with columns: group, effect, effect_ci_low, effect_ci_high

Examples

```
d <- make_data()
hr <- estimate(d, score, group, nits = 500)
compute_effect_size(hr)
```

compute_significance *Compute significance from bootstrap distributions*

Description

Determines statistical significance by checking if the bootstrap confidence interval for each treatment group overlaps with the control group's mean rank.

Usage

```
compute_significance(hrest)
```

Arguments

hrest	An hrest object from estimate

Value

A data frame with columns: group, significant (logical), p_value, stars

Examples

```
d <- make_data()
hr <- estimate(d, score, group, nits = 500)
compute_significance(hr)
```

derive_ci_colors *Derive CI colors based on palette and theme*

Description

Computes confidence interval fill colors that harmonize with the selected color palette and theme style. This ensures visual consistency between the observation panel colors and the bootstrap density shading.

Usage

```
derive_ci_colors(palette = "default", theme_style = "classic")
```

Arguments

palette	Character string specifying the color palette: "default", "okabe_ito", or "viridis"
theme_style	Character string specifying the theme: "classic" or "modern"

Value

A character vector of three hex colors with alpha for low, middle, and high CI regions

Examples

```
derive_ci_colors("default", "classic")
derive_ci_colors("okabe_ito", "modern")
derive_ci_colors("viridis", "classic")
```

`estimate` *Perform bootstrap estimation of confidence intervals of ranked HR scores*

Description

`estimate` carries out estimation of bootstrap confidence intervals on ranked score data. Returns a `hrest` object of the result Proceeeds by calculating score ranks, then bootstrapping ranks in non-control groups retaining the mean for each bootstrap iteration. Calculates low and high quantiles of bootstrap mean distributions for each group. If technical replicates are provided in a second grouping column these will be averaged before proceeding.

Usage

```
estimate(df, ..., control = "A", nits = 100, low = 0.025, high = 0.975)
```

Arguments

`df`	data frame of score and group data. Contains minimally a score and group column
`...`	bare names of columns to use, minimally the score column and the group column in that order. Optionally a third technical replicate column can be provided
`control`	the value of the grouping column taken to be the control group
`nits`	the number of bootstap iterations to be done
`low`	the low probability value of the quantile
`high`	the high probability value of the quantile

Value

a list object of class "hrest"

Examples

```
d1 <- make_data()
estimate(d1, score, group)

d2 <- make_data2()
estimate(d2, score_column_name, sample_column_name, rep_column_name )


d3 <- make_data3()
estimate(d3, score, sample, rep, nits = 1000)
```

---

layer_bootstrap_density

Create bootstrap density layer

Description

Creates a ggplot2 layer showing ridge density plots of bootstrap distributions with confidence interval shading.

Usage

```
layer_bootstrap_density(data_view, config)
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object

Value

A list of ggplot2 layers

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()
# layer_bootstrap_density returns layers to add to a ggplot
```

layer_group_means *Create group mean lines layer*

Description

Creates a ggplot2 layer showing horizontal lines at group mean ranks.

Usage

```
layer_group_means(data_view, config)
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object

Value

A ggplot2 layer

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()
# layer_group_means returns a ggplot layer
```

layer_ranked_dots *Create ranked dots layer*

Description

Creates a ggplot2 layer showing ranked observations as points, where point size indicates the count of observations at each rank/group combination.

Usage

```
layer_ranked_dots(data_view, config)
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object

Value

A list of ggplot2 layers

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
dv <- besthr_data_view(hr)
cfg <- besthr_plot_config()
# layer_ranked_dots returns layers to add to a ggplot
```

---

layer_tech_rep_dots *Create technical replicate dots layer*

Description

Creates a ggplot2 layer showing raw score observations with technical replicates displayed separately. Points are sized by observation count.

Usage

```
layer_tech_rep_dots(data_view, config)
```

Arguments

data_view	A besthr_data_view object
config	A besthr_plot_config object

Value

A list of ggplot2 layers

---

list_besthr_styles *List available style presets*

Description

Shows all available preset styles that can be used with `besthr_style()`.

Usage

```
list_besthr_styles()
```

Value

A character vector of style names (invisibly)

Examples

```
list_besthr_styles()
```

`make_data` *return a sample data set of random values for two groups*

Description

return a sample data set of random values for two groups

Usage

```
make_data()
```

Value

tibble of random values for two groups

Examples

```
d1 <- make_data()
```

`make_data2` *return a sample data set of random values for two groups with three technical reps per group*

Description

return a sample data set of random values for two groups with three technical reps per group

Usage

```
make_data2()
```

Value

tibble of random values for two groups with three technical reps per group

Examples

```
d2 <- make_data2()
```

make_data3 *return a sample data set of random values for three groups with three technical reps per group*

Description

@examples

Usage

```
make_data3()
```

Details

d3 <- make_data3()

Value

tibble of random values for three groups with three technical reps per group

plot.hrest *plots the* hrest *object*

Description

returns a ggplot object representing the hrest object from estimate. The content of left panel varies according to the value of the which parameter. If which = "rank_simulation" is used a plot of rank score values will be plotted in the left panel. In this case technical replicates will be averaged if provided. If which = "just_data" a plot of scores only is created and technical replicates are displayed as is. In each case, the right hand panel shows the rank bootstrap distribution and confidence interval boundaries for all non- control groups.

Usage

```
## S3 method for class 'hrest'
plot(
  x,
  ...,
  which = "rank_simulation",
  theme = "modern",
  colors = "okabe_ito",
  config = NULL,
  show_significance = FALSE,
  show_effect_size = FALSE
)
```

Arguments

x	the hrest object from estimate
...	Other parameters (ignored)
which	the type of left hand panel to create. Either "rank_simulation" or "just_data"
theme	the visual theme to use. Either "modern" (default, cleaner contemporary style) or "classic" (original besthr appearance)
colors	the color palette to use. Either "okabe_ito" (default, colorblind-safe), "default" (original colors), or "viridis"
config	an optional besthr_plot_config object for advanced customization. If provided, theme and colors parameters are ignored.
show_significance	Logical, whether to show significance stars on groups where CI doesn't overlap control (default FALSE)
show_effect_size	Logical, whether to show effect size annotation (default FALSE)

Value

ggplot object

Examples

```
d1 <- make_data()
hr_est <- estimate(d1, score, group)
plot(hr_est)

# Use modern theme with colorblind-safe palette
plot(hr_est, theme = "modern", colors = "okabe_ito")

# Advanced configuration
cfg <- besthr_plot_config(
  panel_widths = c(2, 1),
  point_size_range = c(3, 10)
)
plot(hr_est, config = cfg)
```

---

plot_bootstrap_raincloud

Raincloud plot showing bootstrap distributions

Description

Creates a raincloud plot specifically for bootstrap distributions, showing the distribution of bootstrap mean ranks with jittered points and summary statistics.

Usage

```
plot_bootstrap_raincloud(
  hrest,
  theme = "modern",
  colors = "okabe_ito",
  config = NULL
)
```

Arguments

hrest	An hrest object from estimate
theme	the visual theme to use. Either "modern" (default) or "classic"
colors	the color palette to use. Either "okabe_ito" (default), "default", or "viridis"
config	an optional besthr_plot_config object

Value

A ggplot object

Examples

```
d <- make_data()
hr <- estimate(d, score, group, nits = 100)
plot_bootstrap_raincloud(hr)
```

---

plot_raincloud *Raincloud plot for hrest objects*

Description

Creates a unified raincloud visualization combining:

- Jittered raw data points
- Half-violin density plots
- Mean with confidence interval as pointrange

Usage

```
plot_raincloud(
  hrest,
  theme = "modern",
  colors = "okabe_ito",
  config = NULL,
  show_bootstrap = TRUE,
  jitter_width = 0.15,
  point_size = 1.5
)
```

Arguments

hrest	An hrest object from estimate
theme	the visual theme to use. Either "modern" (default) or "classic"
colors	the color palette to use. Either "okabe_ito" (default), "default", or "viridis"
config	an optional besthr_plot_config object for advanced customization. If provided, theme and colors parameters are ignored.
show_bootstrap	Ignored (kept for backward compatibility).
jitter_width	Numeric width of jitter for data points. Default 0.15.
point_size	Numeric size for jittered points. Default 1.5.

Details

This provides an alternative to the standard two-panel besthr plot, combining all information in a single comprehensive visualization.

Value

A ggplot object

Examples

```
d <- make_data()
hr <- estimate(d, score, group)
plot_raincloud(hr)
```

---

print.besthr_data_view

Print method for besthr_data_view

Description

Print method for besthr_data_view

Usage

```
## S3 method for class 'besthr_data_view'
print(x, ...)
```

Arguments

x	A besthr_data_view object
...	Additional arguments (ignored)

Value

Invisibly returns x

print.besthr_plot_config *Print method for besthr_plot_config*

Description

Print method for besthr_plot_config

Usage

```
## S3 method for class 'besthr_plot_config'
print(x, ...)
```

Arguments

x	A besthr_plot_config object
...	Additional arguments (ignored)

Value

Invisibly returns x

print.hrest *print a summary of the hrest object*

Description

print a summary of the hrest object

Usage

```
## S3 method for class 'hrest'
print(x, ...)
```

Arguments

x	hrest object
...	other parameters

Value

null

Examples

```
d1 <- make_data()
hr_est <- estimate(d1, score, group)
print(hr_est)
```

---

save_besthr *Save besthr plot to file*

Description

Saves a besthr visualization to a file with sensible publication defaults. Supports PNG, PDF, SVG, and TIFF formats.

Usage

```
save_besthr(
  hrest,
  filename,
  type = "default",
  width = 8,
  height = 6,
  dpi = 300,
  ...
)
```

Arguments

hrest	An hrest object from estimate
filename	Output filename. Format is detected from extension.
type	Plot type: "default" (two-panel) or "raincloud"
width	Plot width in inches (default 8)
height	Plot height in inches (default 6)
dpi	Resolution in dots per inch (default 300)
...	Additional arguments passed to the plot function (e.g., theme, colors)

Value

The filename (invisibly)

Examples

```
## Not run:
d <- make_data()
hr <- estimate(d, score, group)
save_besthr(hr, "figure1.png")
save_besthr(hr, "figure1.pdf", width = 10, height = 8)
save_besthr(hr, "figure1.png", type = "raincloud")

## End(Not run)
```

`scale_color_besthr` *Discrete color scale for besthr*

Description

A discrete color scale using besthr palettes.

Usage

```
scale_color_besthr(palette = "default", ...)

scale_colour_besthr(palette = "default", ...)
```

Arguments

`palette`	Character string specifying the palette (see `besthr_palette`)
`...`	Additional arguments passed to `discrete_scale`

Value

A ggplot2 discrete color scale

Examples

```
library(ggplot2)
ggplot(mtcars, aes(mpg, wt, color = factor(cyl))) +
  geom_point() +
  scale_color_besthr("okabe_ito")
```

scale_fill_besthr *Discrete fill scale for besthr*

Description

A discrete fill scale using besthr palettes.

Usage

```
scale_fill_besthr(palette = "default", ...)
```

Arguments

palette	Character string specifying the palette (see besthr_palette)
...	Additional arguments passed to discrete_scale

Value

A ggplot2 discrete fill scale

Examples

```
library(ggplot2)
ggplot(mtcars, aes(factor(cyl), fill = factor(cyl))) +
  geom_bar() +
  scale_fill_besthr("okabe_ito")
```

theme_besthr *besthr ggplot2 theme*

Description

A custom theme for besthr plots. The "classic" theme matches the original besthr appearance, while "modern" provides a cleaner, more contemporary look.

Usage

```
theme_besthr(style = "classic", base_size = 11, base_family = "")
```

Arguments

style	Character string specifying the theme style. Options are: • "classic" - Original besthr theme (theme_minimal) • "modern" - Clean, contemporary style with refined typography
base_size	Base font size (default 11)
base_family	Base font family

Value

A ggplot2 theme object

Examples

```
library(ggplot2)
ggplot(mtcars, aes(mpg, wt)) +
  geom_point() +
  theme_besthr("modern")
```

`update_config` *Update a besthr plot configuration*

Description

Creates a new configuration by updating specific fields of an existing one.

Usage

```
update_config(config, ...)
```

Arguments

`config`	An existing besthr_plot_config object
`...`	Named arguments to update

Value

A new besthr_plot_config object

Examples

```
cfg <- besthr_plot_config()
cfg2 <- update_config(cfg, theme_style = "modern", panel_widths = c(2, 1))
```

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