Package 'maraca'

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Version 1.1.0

Type Package

Title The Maraca Plot: Visualizing Hierarchical Composite Endpoints

License Apache License (>= 2)

Description Supports visual interpretation of hierarchical composite
endpoints (HCEs). HCEs are complex constructs used as primary endpoints in
clinical trials, combining outcomes of different types into ordinal endpoints,
in which each patient contributes the most clinically important event (one and
only one) to the analysis. See Karpefors M et al. (2022)
<doi:10.1177/17407745221134949>.

URL https://github.com/AstraZeneca/maraca

BugReports https://github.com/AstraZeneca/maraca/issues

Encoding UTF-8

LazyData true

Depends R (>= 3.5), hce (>= 0.8.5), ggplot2 (>= 3.4.0)

Imports dplyr (>= 1.0), tidyr (>= 1.2), checkmate (>= 2.1),
patchwork(>= 1.0.0), lifecycle

RoxygenNote 7.3.3

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2.5.0), testthat (>= 3.1), rmarkdown, gganimate, gifski

NeedsCompilation no

VignetteBuilder knitr

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Contents

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animate_plot *Creates and returns an animated version of the standard maraca plot.*

Description

Creates and returns an animated version of the standard maraca plot.

Usage

```
animate_plot(obj, ...)

## Default S3 method:
animate_plot(obj, ...)

## S3 method for class 'maraca'
animate_plot(
  obj,
  continuous_grid_spacing_x = NULL,
  trans = c("identity", "log", "log10", "sqrt", "reverse")[1],
  density_plot_type = c("default", "violin", "box", "scatter")[1],
  vline_type = NULL,
  remove_outliers = FALSE,
  theme = "maraca",
  anim_order = c("active", "control", "both")[3],
  gif_output = c(TRUE, FALSE)[1],
  gif_file_name = NULL,
  frames_per_step = 10,
  gif_duration = 10,
  end_duration = 20,
```

```
    speed_factor = NULL,
    anim_width = 700,
    anim_height = 500,
    ...
)

## S3 method for class 'adhce'
animate_plot(
    obj,
    step_outcomes = NULL,
    last_outcome = "C",
    arm_levels = c(active = "A", control = "P"),
    continuous_grid_spacing_x = NULL,
    trans = c("identity", "log", "log10", "sqrt", "reverse")[1],
    density_plot_type = c("default", "violin", "box", "scatter")[1],
    vline_type = NULL,
    remove_outliers = FALSE,
    theme = "maraca",
    anim_order = c("active", "control", "both")[3],
    gif_output = c(TRUE, FALSE)[1],
    gif_file_name = NULL,
    gif_duration = 10,
    end_duration = 20,
    speed_factor = NULL,
    anim_width = 700,
    anim_height = 500,
    compute_win_odds = FALSE,
    step_types = "tte",
    last_type = "continuous",
    lowerBetter = FALSE,
    ...
)
```

Arguments

`obj`	an object of S3 class 'maraca'
`...`	not used
`continuous_grid_spacing_x`	
	The spacing of the x grid to use for the continuous section of the plot.
`trans`	the transformation to apply to the x-axis scale for the last outcome. Possible values are "identity", "log" (only for continuous endpoint), "log10" (only for continuous endpoint), "sqrt" (only for continuous endpoint) and "reverse". The default value is "identity".
`density_plot_type`	
	which type of plot to display in the continuous part of the plot. Options are "default", "violin", "box", "scatter".
`vline_type`	what the vertical dashed line should represent. Accepts "median" (only for continuous last endpoint), "mean", "none" and NULL (default). By default

	(vline_type = NULL), vline_type will be set to "median" for a continuous last endpoint and to "mean" for a binary last endpoint.
remove_outliers	Flag indicating for last endpoint if outliers are supposed to be displayed. If TRUE, the outliers are removed and only the range not including them is displayed. Only implemented for continuous endpoints. Default value FALSE.
theme	Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "maraca_old", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Themes and Styling".
anim_order	In what order should the treatment arms be animated? Possible values are "active" (active arm is being animated first), "control" (control arm is being animated first) or "both" (both arms are being animated at the same time). Default is "both".
gif_output	Flag indicating if output should be rendered as gif. Note that the 'gifski' package need to be installed in order to create a gif output. Alternatively, if either the 'av' or 'ffmpeg' package is installed, a video file is created. As a final alternative if no dependency is installed, a list of image files is returned.
gif_file_name	If gif output should be saved in file, provide file name. If not provided (NULL), a tmp file will be created to display gif.
frames_per_step	The frame rate of the animation in frames/sec. Default is 10.
gif_duration	The length of the animation in seconds. Default is 10.
end_duration	The amount of frames the animation pauses on the last frame of the animation. Default is 20.
speed_factor	This factor tries to balance the times that it takes to animate the step outcomes towards the last outcome. If not provided (NULL), the function tries to estimate a number that approximately leads to a similar speed between them. The user can try to experiment with manually setting the number to get the best speed.
anim_width	Width (in pixels) of the animation. Default value is 700.
anim_height	Height (in pixels) of the animation. Default value is 500.
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot. By default (when set to NULL) this is automatically updated by taking the non-continuous outcomes from the GROUP variable in alphabetical order.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot. Default value "C".
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
compute_win_odds	If TRUE compute the win odds, otherwise (default) don't compute them.
step_types	The type of each outcome in the step_outcomes vector. Can be a single string (if all outcomes of same type) or a vector of same length as step_outcomes. Possible values in the vector are "tte" (default) or "binary".

last_type   A single string giving the type of the last outcome. Possible values are "contin-
                   uous" (default), "binary" or "multinomial".

lowerBetter   Flag for the final outcome variable, indicating if lower values are considered
                   better/advantageous. This flag is need to make sure the win odds are calcu-
                   lated correctly. Default value is FALSE, meaning higher values are considered
                   advantageous.

Value

Depending on which dependencies are installed, a gif, video or list of image files are returned.

Examples

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  step_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  last_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)

## Not run:
animation <- animate_plot(hce_test,
                          anim_order = "control",
                          gif_duration = 20)

## End(Not run)
```

---

component_plot   *Plotting components of win odds*

Description

Generic function to create a plot showing the components used in calculating win odds (wins and
ties) separately for each outcome. Implemented for objects of type 'maraca' and 'hce'.

Usage

```
component_plot(x, ...)

## Default S3 method:
component_plot(x, ...)

## S3 method for class 'maraca'
component_plot(x, theme = "maraca", ...)
```

```
## S3 method for class 'adhce'
component_plot(
  x,
  step_outcomes = NULL,
  last_outcome = "C",
  arm_levels = c(active = "A", control = "P"),
  theme = "maraca",
  lowerBetter = FALSE,
  ...
)
```

Arguments

x	an object of S3 class 'maraca' or 'adhce'.
...	not used
theme	Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Plotting win odds".
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot. By default (when set to NULL) this is automatically updated by taking the non-continuous outcomes from the GROUP variable in alphabetical order.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot. Default value "C".
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
lowerBetter	Flag for the final outcome variable, indicating if lower values are considered better/advantageous. This flag is need to make sure the win odds are calculated correctly. Default value is FALSE, meaning higher values are considered advantageous.

Details

Note that for this plot, if applying to a maraca object, in the original maraca() function run the argument "compute_win_odds" has to be set to TRUE.

Check the vignette "Maraca Plots - Plotting win odds" for more details.

Value

Component plot as a ggplot2 object.

Examples

```
data(hce_scenario_a)

maraca_dat <- maraca(data = hce_scenario_a,
                     step_outcomes = c("Outcome I", "Outcome II",
                                       "Outcome III", "Outcome IV"),
                     last_outcome = "Continuous outcome",
                     fixed_followup_days = 3 * 365,
                     column_names = c(outcome = "GROUP",
                                      arm = "TRTP",
                                      value = "AVAL0"),
                     arm_levels = c(active = "Active",
                                    control = "Control"),
                     compute_win_odds = TRUE
                     )

component_plot(maraca_dat)

Rates_A <- c(1.72, 1.74, 0.58, 1.5, 1)
Rates_P <- c(2.47, 2.24, 2.9, 4, 6)
hce_dat <- hce::simHCE(n = 2500, TTE_A = Rates_A, TTE_P = Rates_P,
             CM_A = -3, CM_P = -6, CSD_A = 16, CSD_P = 15, fixedfy = 3,
             seed = 31337)

component_plot(hce_dat)
```

---

cumulative_plot	*Plotting the cumulated components of win odds*

Description

Generic function to create a plot showing the components used in calculating win odds (wins and ties) cumulated for all outcomes for a hierarchical endpoint. Implemented for objects of type 'maraca' and 'adhce'.

Usage

```
cumulative_plot(x, ...)

dustin(x, ...)

dustin_plot(x, ...)

## Default S3 method:
cumulative_plot(x, ...)

## S3 method for class 'maraca'
```

```
cumulative_plot(
  x,
  theme = "maraca",
  include = c("win odds", "win ratio"),
  reverse = FALSE,
  ...
)

## S3 method for class 'adhce'
cumulative_plot(
  x,
  step_outcomes = NULL,
  last_outcome = "C",
  arm_levels = c(active = "A", control = "P"),
  theme = "maraca",
  include = c("win odds", "win ratio"),
  reverse = FALSE,
  lowerBetter = FALSE,
  ...
)
```

Arguments

x	an object of S3 class 'maraca' or 'adhce'.
...	not used
theme	Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Plotting win odds".
include	Vector or single string indicating which statistics to include in the right hand side plot. Acceptable values are "win odds" and/or "win ratio". Default is c("win odds", "win ratio").
reverse	Flag indicating if the cumulated outcomes should be displayed in order from top to bottom (FALSE, the default) or in reverse (TRUE).
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot. By default (when set to NULL) this is automatically updated by taking the non-continuous outcomes from the GROUP variable in alphabetical order.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot. Default value "C".
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
lowerBetter	Flag for the final outcome variable, indicating if lower values are considered better/advantageous. This flag is need to make sure the win odds are calculated correctly. Default value is FALSE, meaning higher values are considered advantageous.

Details

Note that for this plot, if applying to a maraca object, in the original maraca() function run the argument "compute_win_odds" has to be set to TRUE.

Check the vignette "Maraca Plots - Plotting win odds" for more details.

Value

Cumulative plot as a patchwork list. Individual plots can be accessed like list items (plot[[1]] and plot[[2]]).

Examples

```
data(hce_scenario_a)

maraca_dat <- maraca(data = hce_scenario_a,
                     step_outcomes = c("Outcome I", "Outcome II",
                                       "Outcome III", "Outcome IV"),
                     last_outcome = "Continuous outcome",
                     fixed_followup_days = 3 * 365,
                     column_names = c(outcome = "GROUP",
                                      arm = "TRTP",
                                      value = "AVAL0"),
                     arm_levels = c(active = "Active",
                                    control = "Control"),
                     compute_win_odds = TRUE
                     )

cumulative_plot(maraca_dat)

Rates_A <- c(1.72, 1.74, 0.58, 1.5, 1)
Rates_P <- c(2.47, 2.24, 2.9, 4, 6)
hce_dat <- hce::simHCE(n = 2500, TTE_A = Rates_A, TTE_P = Rates_P,
            CM_A = -3, CM_P = -6, CSD_A = 16, CSD_P = 15, fixedfy = 3,
            seed = 31337)

cumulative_plot(hce_dat)
```

---

hce_scenario_a   *Example HCE scenario A.*

Description

This is example data frame containing the example for scenario A.

Usage

```
data(hce_scenario_a)
```

Format

A data frame with 1000 rows.

SUBJID The patient identifier

GROUP Which type of outcome the row belongs to

GROUPN Not required for computation. The group as an arbitrary numerical value

AVAL0 Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

AVAL Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

TRTP Treatment group

---

hce_scenario_b   *Example HCE scenario B.*

Description

This is example data frame containing the example for scenario B.

Usage

```
data(hce_scenario_b)
```

Format

A data frame with 1000 rows.

SUBJID The patient identifier

GROUP Which type of outcome the row belongs to

GROUPN Not required for computation. The group as an arbitrary numerical value

AVAL0 Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

AVAL Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

TRTP Treatment group

---

hce_scenario_c *Example HCE scenario C.*

Description

This is example data frame containing the example for scenario C.

Usage

```
data(hce_scenario_c)
```

Format

A data frame with 1000 rows.

SUBJID The patient identifier

GROUP Which type of outcome the row belongs to

GROUPN Not required for computation. The group as an arbitrary numerical value

AVAL0 Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

AVAL Not required for computation. Create an ordered sequence of values where the AVAL0 value associated with the patient is offset by GROUPN

TRTP Treatment group

---

hce_scenario_d *Example HCE scenario D.*

Description

This is example data frame containing the example for scenario D.

Usage

```
data(hce_scenario_d)
```

Format

A data frame with 1000 rows.

SUBJID The patient identifier

GROUP Which type of outcome the row belongs to

GROUPN Not required for computation. The group as an arbitrary numerical value

AVAL0 Contains both the time-to-event data for hard outcomes and the continuous data for the continuous outcome

AVAL Not required for computation. Create an ordered sequence of values where the AVAL0 value
associated with the patient is offset by GROUPN

TRTP Treatment group

---

hce_scenario_kccq3   *Example HCE scenario KCCQ3.*

Description

This is example data frame containing the example for scenario KCCQ3.

Usage

```
data(hce_scenario_kccq3)
```

Format

A data frame with 5000 rows.

SUBJID The patient identifier

GROUP Which type of outcome the row belongs to

GROUPN Not required for computation. The group as an arbitrary numerical value

AVAL0 Contains both the time-to-event data for hard outcomes and the continuous data for the
continuous outcome

AVAL Not required for computation. Create an ordered sequence of values where the AVAL0 value
associated with the patient is offset by GROUPN

TRTP Treatment group

HFHT Not needed

SEED Not needed

---

maraca   *maraca package.*

Description

_PACKAGE

Creates the maraca analysis object as an S3 object of class 'maraca'.

Usage

```
maraca(
  data,
  step_outcomes,
  last_outcome,
  arm_levels = c(active = "active", control = "control"),
  column_names = c(outcome = "outcome", arm = "arm", value = "value"),
  fixed_followup_days = NULL,
  compute_win_odds = FALSE,
  step_types = "tte",
  last_type = "continuous",
  lowerBetter = FALSE,
  tte_outcomes = lifecycle::deprecated(),
  continuous_outcome = lifecycle::deprecated()
)

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

Arguments

data	A data frame with columns for the following information: - outcome column, containing the time-to-event and continuous labels - arm column, containing the arm a given row belongs to. - value column, containing the values.
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot.
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
column_names	A named vector to map the outcome, arm, value to the associated column names in the data. The vector names must match in order "outcome", "arm", and "value". Note that this parameter only need to be specified if you have column names different from the ones above.
fixed_followup_days	
	A mandatory specification of the fixed follow-up days in the study. Can be a single integer value for all tte-outcomes or a vector with one integer value per tte-outcome.
compute_win_odds	
	If TRUE compute the win odds, otherwise (default) don't compute them.
step_types	The type of each outcome in the step_outcomes vector. Can be a single string (if all outcomes of same type) or a vector of same length as step_outcomes. Possible values in the vector are "tte" (default) or "binary".

last_type   A single string giving the type of the last outcome. Possible values are "contin-
                  uous" (default), "binary" or "multinomial".

lowerBetter   Flag for the final outcome variable, indicating if lower values are considered
                  better/advantageous. This flag is need to make sure the win odds are calcu-
                  lated correctly. Default value is FALSE, meaning higher values are considered
                  advantageous.

tte_outcomes   Deprecated and substituted by the more general 'step_outcomes'. A vector of
                  strings containing the time-to-event outcome labels. The order is kept for the
                  plot.

continuous_outcome
                  Deprecated and substituted by the more general 'last_outcome'. A single string
                  containing the continuous outcome label.

x   an object of class maraca

...   further arguments passed to or from other methods.

Value

An object of class 'maraca'. The object information must be considered private.

Examples

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  step_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  last_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
```

---

  mosaic_plot   *Mosaic plot*

Description

Generic function to create a mosaic plot that compares outcomes between an active treatment group
and a control group, highlighting areas of "Wins", "Losses" and "Ties" based on endpoint hierarchy.

Usage

```
mosaic_plot(x, ...)

## Default S3 method:
mosaic_plot(x, ...)
```

```
## S3 method for class 'maraca'
mosaic_plot(
  x,
  theme = "maraca",
  highlight_ties = FALSE,
  win_prob = FALSE,
  diagonal_line = TRUE,
  ...
)

## S3 method for class 'adhce'
mosaic_plot(
  x,
  step_outcomes = NULL,
  last_outcome = "C",
  arm_levels = c(active = "A", control = "P"),
  theme = "maraca",
  highlight_ties = FALSE,
  win_prob = FALSE,
  diagonal_line = TRUE,
  lowerBetter = FALSE,
  ...
)
```

Arguments

x	an object of S3 class 'maraca' or 'adhce'.
...	not used
theme	Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "color1", "color2" and "none". For more details, check the vignette called "Maraca Plots - Introduction to the Mosaic plot".
highlight_ties	Flag to indicate if component ties should be highlighted using lighter colors. Default value: FALSE
win_prob	Flag to indicate if winning probability should be shown within the plot. Note that in order to display the winning probability, you need to have set the "compute_win_odds" to TRUE when creating the maraca object. Default value: FALSE
diagonal_line	Flag to indicate if diagonal line showing an even Win/Loss split should be displayed. Default value: TRUE
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot. By default (when set to NULL) this is automatically updated by taking the non-continuous outcomes from the GROUP variable in alphabetical order.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot. Default value "C".
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and

"control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".

lowerBetter   Flag for the final outcome variable, indicating if lower values are considered better/advantageous. This flag is need to make sure the win odds are calculated correctly. Default value is FALSE, meaning higher values are considered advantageous.

Details

Implemented for objects of type 'maraca' and 'adhce'.

Check the vignette "Maraca Plots - Introduction to the Mosaic plot" for more details.

Value

Mosaic plot as a ggplot2 object.

Examples

```
data(hce_scenario_a)

maraca_dat <- maraca(data = hce_scenario_a,
                     step_outcomes = c("Outcome I", "Outcome II",
                                       "Outcome III", "Outcome IV"),
                     last_outcome = "Continuous outcome",
                     fixed_followup_days = 3 * 365,
                     column_names = c(outcome = "GROUP",
                                      arm = "TRTP",
                                      value = "AVAL0"),
                     arm_levels = c(active = "Active",
                                    control = "Control"),
                     compute_win_odds = TRUE
                     )

mosaic_plot(maraca_dat)

Rates_A <- c(1.72, 1.74, 0.58, 1.5, 1)
Rates_P <- c(2.47, 2.24, 2.9, 4, 6)
hce_dat <- hce::simHCE(n = 2500, TTE_A = Rates_A, TTE_P = Rates_P,
            CM_A = -3, CM_P = -6, CSD_A = 16, CSD_P = 15, fixedfy = 3,
            seed = 31337)

mosaic_plot(hce_dat)
```

---

plot.adhce   *Generic function to plot the adhce object using plot().*

Description

Generic function to plot the adhce object using plot().

Usage

```
## S3 method for class 'adhce'
plot(
  x,
  step_outcomes = NULL,
  last_outcome = "C",
  arm_levels = c(active = "A", control = "P"),
  continuous_grid_spacing_x = 10,
  trans = c("identity", "log", "log10", "sqrt", "reverse")[1],
  density_plot_type = c("default", "violin", "box", "scatter")[1],
  vline_type = NULL,
  remove_outliers = FALSE,
  compute_win_odds = FALSE,
  step_types = "tte",
  last_type = "continuous",
  theme = "maraca",
  lowerBetter = FALSE,
  tte_outcomes = lifecycle::deprecated(),
  continuous_outcome = lifecycle::deprecated(),
  ...
)
```

Arguments

x	an object of S3 class 'adhce'.
step_outcomes	A vector of strings containing the outcome labels for all outcomes displayed as part of the step function on the left side of the plot. The order is kept for the plot. By default (when set to NULL) this is automatically updated by taking the non-continuous outcomes from the GROUP variable in alphabetical order.
last_outcome	A single string containing the last outcome label displayed on the right side of the plot. Default value "C".
arm_levels	A named vector of exactly two strings, mapping the values used for the active and control arms to the values used in the data. The names must be "active" and "control" in this order. Note that this parameter only need to be specified if you have labels different from "active" and "control".
continuous_grid_spacing_x	
	The spacing of the x grid to use for the continuous section of the plot.
trans	the transformation to apply to the x-axis scale for the last outcome. Possible values are "identity", "log" (only for continuous endpoint), "log10" (only for continuous endpoint), "sqrt" (only for continuous endpoint) and "reverse". The default value is "identity".
density_plot_type	
	The type of plot to use to represent the density. Accepts "default", "violin", "box" and "scatter".
vline_type	what the vertical dashed line should represent. Accepts "median" (only for continuous last endpoint), "mean", "none" and NULL (default). By default

(vline_type = NULL), vline_type will be set to "median" for a continuous last endpoint and to "mean" for a binary last endpoint.

remove_outliers

Flag indicating for last endpoint if outliers are supposed to be displayed. If TRUE, the outliers are removed and only the range not including them is displayed. Only implemented for continuous endpoints. Default value FALSE.

compute_win_odds

If TRUE compute the win odds, otherwise (default) don't compute them.

step_types   The type of each outcome in the step_outcomes vector. Can be a single string (if all outcomes of same type) or a vector of same length as step_outcomes. Possible values in the vector are "tte" (default) or "binary".

last_type   A single string giving the type of the last outcome. Possible values are "continuous" (default), "binary" or "multinomial".

theme   Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "maraca_old", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Themes and Styling". [companion vignette for package users](themes.html)

lowerBetter   Flag for the final outcome variable, indicating if lower values are considered better/advantageous. This flag is need to make sure the win odds are calculated correctly. Default value is FALSE, meaning higher values are considered advantageous.

tte_outcomes   Deprecated and substituted by the more general 'step_outcomes'. A vector of strings containing the time-to-event outcome labels. The order is kept for the plot.

continuous_outcome

Deprecated and substituted by the more general 'last_outcome'. A single string containing the continuous outcome label.

...   not used

Value

Returns ggplot2 plot of the hce object.

Examples

```
Rates_A <- c(1.72, 1.74, 0.58, 1.5, 1)
Rates_P <- c(2.47, 2.24, 2.9, 4, 6)
hce_dat <- hce::simHCE(n = 2500, TTE_A = Rates_A, TTE_P = Rates_P,
            CM_A = -3, CM_P = -6, CSD_A = 16, CSD_P = 15, fixedfy = 3,
            seed = 31337)
plot(hce_dat)
plot(hce_dat, fixed_followup_days = 3 * 365)
```

plot.maraca	*Generic function to plot the maraca object using plot().*

Description

Generic function to plot the maraca object using plot().

Usage

```
## S3 method for class 'maraca'
plot(
  x,
  continuous_grid_spacing_x = 10,
  trans = c("identity", "log", "log10", "sqrt", "reverse")[1],
  density_plot_type = c("default", "violin", "box", "scatter")[1],
  vline_type = NULL,
  remove_outliers = FALSE,
  theme = "maraca",
  ...
)
```

Arguments

x	An object of S3 class 'maraca'.
continuous_grid_spacing_x	
	The spacing of the x grid to use for the continuous section of the plot.
trans	the transformation to apply to the x-axis scale for the last outcome. Possible values are "identity", "log" (only for continuous endpoint), "log10" (only for continuous endpoint), "sqrt" (only for continuous endpoint) and "reverse". The default value is "identity".
density_plot_type	
	The type of plot to use to represent the density. Accepts "default", "violin", "box" and "scatter".
vline_type	what the vertical dashed line should represent. Accepts "median" (only for continuous last endpoint), "mean", "none" and NULL (default). By default (vline_type = NULL), vline_type will be set to "median" for a continuous last endpoint and to "mean" for a binary last endpoint.
remove_outliers	
	Flag indicating for last endpoint if outliers are supposed to be displayed. If TRUE, the outliers are removed and only the range not including them is displayed. Only implemented for continuous endpoints. Default value FALSE.
theme	Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "maraca_old", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Themes and Styling".
...	not used

Value

Returns ggplot2 plot of the maraca object.

Examples

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  step_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  last_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
plot(hce_test)
```

---

plot_maraca   *Creates and returns the plot of the maraca data.*

Description

Creates and returns the plot of the maraca data.

Usage

```
plot_maraca(
  obj,
  continuous_grid_spacing_x = NULL,
  trans = c("identity", "log", "log10", "sqrt", "reverse")[1],
  density_plot_type = c("default", "violin", "box", "scatter")[1],
  vline_type = NULL,
  remove_outliers = FALSE,
  theme = "maraca"
)
```

Arguments

`obj`	an object of S3 class 'maraca'
`continuous_grid_spacing_x`	
	The spacing of the x grid to use for the continuous section of the plot.
`trans`	the transformation to apply to the x-axis scale for the last outcome. Possible values are "identity", "log" (only for continuous endpoint), "log10" (only for continuous endpoint), "sqrt" (only for continuous endpoint) and "reverse". The default value is "identity".

density_plot_type

which type of plot to display in the continuous part of the plot. Options are "default", "violin", "box", "scatter".

vline_type   what the vertical dashed line should represent. Accepts "median" (only for continuous last endpoint), "mean", "none" and NULL (default). By default (vline_type = NULL), vline_type will be set to "median" for a continuous last endpoint and to "mean" for a binary last endpoint.

remove_outliers

Flag indicating for last endpoint if outliers are supposed to be displayed. If TRUE, the outliers are removed and only the range not including them is displayed. Only implemented for continuous endpoints. Default value FALSE.

theme   Choose theme to style the plot. The default theme is "maraca". Options are "maraca", "maraca_old", "color1", "color2" and none". For more details, check the vignette called "Maraca Plots - Themes and Styling".

Value

a ggplot2 object of the data. This function will not render the plot immediately. You have to print() the returned object for it to be displayed.

Examples

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  step_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  last_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
plot <- plot_maraca(hce_test)
```

---

validate_maraca_plot   *Generic function to generate validation data for the maraca plot object.*

Description

This will produce the 4 validation datasets.

Usage

```
validate_maraca_plot(x, ...)
```

Arguments

x   An object of S3 class 'maracaPlot'.

. . .   Not used.

Value

Creates a list of datasets for validation purposes.

Examples

```
data(hce_scenario_a)
hce_test <- maraca(
  data = hce_scenario_a,
  step_outcomes = c("Outcome I", "Outcome II", "Outcome III", "Outcome IV"),
  last_outcome = "Continuous outcome",
  fixed_followup_days = 3 * 365,
  column_names = c(outcome = "GROUP", arm = "TRTP", value = "AVAL0"),
  arm_levels = c(active = "Active", control = "Control"),
  compute_win_odds = TRUE
)
p <- plot(hce_test)
validate_maraca_plot(p)
```

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