Package 'ReliaPlotR'

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Type Package

Title Interactive Reliability Probability Plots

Version 0.6

Description
Build interactive Reliability Probability Plots with 'plotly' by Carson Sievert (2020) <https://plotly.com/r/>, an interactive web-based graphing library.

URL https://paulgovan.github.io/ReliaPlotR/, https://github.com/paulgovan/ReliaPlotR

BugReports https://github.com/paulgovan/ReliaPlotR/issues

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Contents

`plotly_alt` *Interactive ALT Probability Plot.*

Description

Creates an interactive probability plot for an ‘alt‘ object, overlaying one Weibull or lognormal fit line per stress level on a shared probability paper. The ‘alt‘ object must have been processed through [WeibullR.ALT::alt.parallel()] before passing to this function.

Usage

```
plotly_alt(
  alt_obj,
  showConf = TRUE,
  showGrid = TRUE,
  main = "ALT Probability Plot",
  xlab = "Time to Failure",
  ylab = "Probability",
  gridCol = "lightgray",
  signif = 3,
  cols = NULL
)
```

Arguments

`alt_obj`	An object of class ‘’alt’‘ created by the ‘WeibullR.ALT‘ package and fitted with ‘alt.parallel()‘.
`showConf`	Show Fisher-matrix confidence bounds (TRUE) or not (FALSE). Default is TRUE.
`showGrid`	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
`main`	Main title. Default is "ALT Probability Plot".
`xlab`	X-axis label. Default is "Time to Failure".
`ylab`	Y-axis label. Default is "Probability".
`gridCol`	Color of the grid. Default is "lightgray".
`signif`	Significant digits for hover text. Default is 3.
`cols`	Optional character vector of colors, one per stress level. Recycled to match the number of stress levels. When NULL a 10-color default palette is used.

Value

A ‘plotly‘ object representing the interactive ALT probability plot.

Examples

```
library(WeibullR.ALT)
d1 <- alt.data(c(248, 456, 528, 731, 813, 537), stress = 300)
d2 <- alt.data(c(164, 176, 289), stress = 350)
d3 <- alt.data(c(88, 112, 152), stress = 400)
obj <- alt.fit(
  alt.parallel(
   alt.make(list(d1, d2, d3), dist = "weibull", alt.model = "arrhenius", view_dist_fits = FALSE),
    view_parallel_fits = FALSE
  )
)
plotly_alt(obj)
```

---

plotly_contour *Interactive Contour Plot*

Description

This function creates an interactive contour plot for one or more ‘wblr‘ objects, each assumed to have confidence contours generated via ‘method.conf = ’lrb’‘. The function overlays all contours in a single plot and displays their respective MLE point estimates.

Usage

```
plotly_contour(
  wblr_obj,
  main = "Contour Plot",
  xlab = "Eta",
  ylab = "Beta",
  showGrid = TRUE,
  cols = NULL,
  gridCol = "lightgray",
  signif = 3
)
```

Arguments

wblr_obj	A single ‘wblr‘ object or a list of ‘wblr‘ objects. Each object must have contours generated using ‘method.conf = ’lrb’‘.
main	Main title for the plot.
xlab	X-axis label (typically Eta or Sigmalog).
ylab	Y-axis label (typically Beta or Mulog).
showGrid	Logical; whether to show grid lines (default TRUE).

cols	Optional vector of colors for each contour/estimate pair. If not provided, colors are chosen from a default palette.
gridCol	Color of the grid lines (default 'lightgray').
signif	Number of significant digits to display for estimates and contour coordinates. Defaults to 3.

Value

A 'plotly' object representing the interactive contour plot.

Examples

```
library(WeibullR)
library(ReliaPlotR)

failures1 <- c(30, 49, 82, 90, 96)
failures2 <- c(20, 40, 60, 80, 100)
obj1 <- wblr.conf(wblr.fit(wblr(failures1), method.fit = "mle"), method.conf = "lrb")
obj2 <- wblr.conf(wblr.fit(wblr(failures2), method.fit = "mle"), method.conf = "lrb")
plotly_contour(list(obj1, obj2), main = "Overlayed Contours")
```

---

plotly_duane *Interactive Duane Plot.*

Description

This function creates an interactive Duane plot for a duane object. The plot includes options to customize the appearance, such as colors and grid visibility.

Usage

```
plotly_duane(
  duane_obj,
  showConf = TRUE,
  showGrid = TRUE,
  main = "Duane Plot",
  xlab = "Cumulative Time",
  ylab = "Cumulative MTBF",
  pointCol = "black",
  fitCol = "black",
  confCol = "black",
  gridCol = "lightgray",
  signif = 3
)
```

Arguments

duane_obj	An object of class 'duane'. This object is created using the 'duane' function from the ReliaGrowR package.
showConf	Show the confidence bounds (TRUE) or not (FALSE). Default is TRUE.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "Duane Plot".
xlab	X-axis label. Default is "Cumulative Time".
ylab	Y-axis label. Default is "Cumulative MTBF".
pointCol	Color of the point values. Default is "black".
fitCol	Color of the model fit. Default is "black".
confCol	Color of the confidence bounds. Default is "black".
gridCol	Color of the grid. Default is "lightgray".
signif	Significant digits of results. Default is 3. Must be a positive integer.

Value

A 'plotly' object representing the interactive Duane plot.

Examples

```
library(ReliaGrowR)
times <- c(100, 200, 300, 400, 500)
failures <- c(1, 2, 1, 3, 2)
fit <- duane(times, failures)
plotly_duane(fit)
```

---

plotly_exposure *Interactive Exposure Plot.*

Description

The function creates an interactive exposure plot for one or more 'exposure' objects. When a list of objects is provided the estimates are overlaid on the same plot, each rendered in a distinct color. The plot shows the cumulative event rate over time as a step function.

Usage

```
plotly_exposure(
  exposure_obj,
  showGrid = TRUE,
  main = "Exposure Plot",
  xlab = "Time",
  ylab = "Event Rate",
  fitCol = "black",
```

```
  gridCol = "lightgray",
  signif = 3,
  cols = NULL
)
```

Arguments

exposure_obj	An object of class 'exposure', or a list of such objects. Each object is created using the 'exposure()' function from the 'ReliaGrowR' package.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "Exposure Plot".
xlab	X-axis label. Default is "Time".
ylab	Y-axis label. Default is "Event Rate".
fitCol	Color of the event rate step function. Default is "black". Used only for a single exposure object; ignored when 'cols' is provided or multiple objects are supplied.
gridCol	Color of the grid. Default is "lightgray".
signif	Significant digits of results. Default is 3. Must be a positive integer.
cols	Optional character vector of colors, one per exposure object. When provided, each object's step function is drawn in the corresponding color. Recycled if shorter than the number of objects.

Value

A 'plotly' object representing the interactive exposure plot.

Examples

```
## Not run:
library(ReliaGrowR)
ids <- c("A", "A", "A", "B", "B", "C", "C", "C", "C")
times <- c(50, 150, 350, 100, 300, 80, 200, 320, 450)
fit <- exposure(id = ids, time = times)
plotly_exposure(fit)

# Overlay two exposure objects
fit2 <- exposure(id = c("X", "X", "Y"), time = c(60, 220, 180))
plotly_exposure(list(fit, fit2), cols = c("steelblue", "tomato"))

## End(Not run)
```

plotly_mcf *Interactive Mean Cumulative Function Plot.*

Description

The function creates an interactive Mean Cumulative Function (MCF) plot for one or more ‘mcf‘ objects. When a list of objects is provided the models are overlaid on the same plot, each rendered in a distinct color. The MCF is rendered as a step function. Optional confidence bounds are shown as a shaded band around the estimate.

Usage

```
plotly_mcf(
  mcf_obj,
  showConf = TRUE,
  showGrid = TRUE,
  main = "Mean Cumulative Function Plot",
  xlab = "Time",
  ylab = "Mean Cumulative Function",
  fitCol = "black",
  confCol = "black",
  gridCol = "lightgray",
  signif = 3,
  cols = NULL
)
```

Arguments

mcf_obj	An object of class 'mcf', or a list of such objects. Each object is created using the ‘mcf()‘ function from the ‘ReliaGrowR‘ package.
showConf	Show the confidence bounds (TRUE) or not (FALSE). Default is TRUE.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "Mean Cumulative Function Plot".
xlab	X-axis label. Default is "Time".
ylab	Y-axis label. Default is "Mean Cumulative Function".
fitCol	Color of the MCF step function. Default is "black". Used only for a single mcf object; ignored when ‘cols‘ is provided or multiple objects are supplied.
confCol	Color of the confidence bounds. Default is "black". Used only for a single mcf object; ignored when ‘cols‘ is provided or multiple objects are supplied.
gridCol	Color of the grid. Default is "lightgray".
signif	Significant digits of results. Default is 3. Must be a positive integer.
cols	Optional character vector of colors, one per mcf object. When provided, each object's step function and confidence bounds are drawn in the corresponding color. Recycled if shorter than the number of objects.

Value

A ‘plotly‘ object representing the interactive MCF plot.

Examples

```
## Not run:
library(ReliaGrowR)
ids <- c("A", "A", "A", "B", "B", "C", "C", "C", "C")
times <- c(50, 150, 350, 100, 300, 80, 200, 320, 450)
fit <- mcf(id = ids, time = times)
plotly_mcf(fit)

# Overlay two MCF objects
fit2 <- mcf(id = c("X", "X", "Y"), time = c(60, 220, 180))
plotly_mcf(list(fit, fit2), cols = c("steelblue", "tomato"))

## End(Not run)
```

---

plotly_nhpp *Interactive NHPP Plot.*

Description

The function creates an interactive Non-Homogeneous Poisson Process (NHPP) plot for one or more ‘nhpp‘ objects. When a list of objects is provided the models are overlaid on the same plot, each rendered in a distinct color. The plot shows the nonparametric Mean Cumulative Function (MCF) alongside the parametric model fit and optional confidence bounds. Vertical lines indicate change points if breakpoints are specified in the nhpp object.

Usage

```
plotly_nhpp(
  nhpp_obj,
  showConf = TRUE,
  showGrid = TRUE,
  main = "NHPP Plot",
  xlab = "Cumulative Time",
  ylab = "Mean Cumulative Function",
  pointCol = "black",
  fitCol = "black",
  confCol = "black",
  gridCol = "lightgray",
  breakCol = "black",
  signif = 3,
  cols = NULL
)
```

Arguments

nhpp_obj	An object of class 'nhpp', or a list of such objects. Each object is created using the 'nhpp()' function from the 'ReliaGrowR' package.
showConf	Show the confidence bounds (TRUE) or not (FALSE). Default is TRUE.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "NHPP Plot".
xlab	X-axis label. Default is "Cumulative Time".
ylab	Y-axis label. Default is "Mean Cumulative Function".
pointCol	Color of the MCF data points. Default is "black". Used only for a single nhpp object; ignored when 'cols' is provided or multiple objects are supplied.
fitCol	Color of the model fit. Default is "black". Used only for a single nhpp object; ignored when 'cols' is provided or multiple objects are supplied.
confCol	Color of the confidence bounds. Default is "black". Used only for a single nhpp object; ignored when 'cols' is provided or multiple objects are supplied.
gridCol	Color of the grid. Default is "lightgray".
breakCol	Color of the breakpoints. Default is "black". Used only for a single nhpp object; ignored when 'cols' is provided or multiple objects are supplied.
signif	Significant digits of results. Default is 3. Must be a positive integer.
cols	Optional character vector of colors, one per nhpp object. When provided, each object's points, fit line, confidence bounds, and breakpoints are all drawn in the corresponding color. Recycled if shorter than the number of objects.

Value

A 'plotly' object representing the interactive NHPP plot.

Examples

```
## Not run:
library(ReliaGrowR)
times <- c(100, 200, 300, 400, 500)
events <- c(1, 2, 1, 3, 2)
fit <- nhpp(time = times, event = events)
plotly_nhpp(fit)

# Piecewise model with a breakpoint
times2 <- c(100, 200, 300, 400, 500, 600, 700, 800, 900, 1000)
events2 <- c(1, 2, 1, 1, 1, 2, 3, 1, 2, 4)
fit2 <- nhpp(time = times2, event = events2, breaks = 500)
plotly_nhpp(fit2, breakCol = "red")

# Overlay two models
plotly_nhpp(list(fit, fit2))

## End(Not run)
```

plotly_rel *Interactive ALT Life-Stress Relationship Plot.*

Description

Creates an interactive life-stress relationship (Arrhenius or Power Law) plot for an ‘alt‘ object. Displays the characteristic-life estimates per stress level, the fitted relationship line, optional percentile bands with shading, and an optional goal-condition marker. The ‘alt‘ object must have been processed through [WeibullR.ALT::alt.fit()] before passing to this function.

Usage

```
plotly_rel(
  alt_obj,
  showPerc = TRUE,
  showGoal = TRUE,
  showGrid = TRUE,
  main = "Life-Stress Relationship",
  xlab = "Stress",
  ylab = "Time to Failure",
  fitCol = "red",
  ptCol = "black",
  percCol = "blue",
  goalCol = "orange",
  gridCol = "lightgray",
  signif = 3,
  percentiles = c(10, 90)
)
```

Arguments

alt_obj	An object of class ‘’alt’‘ created by the ‘WeibullR.ALT‘ package and fitted with ‘alt.fit()‘.
showPerc	Show percentile lines with shading (TRUE) or not (FALSE). Default is TRUE.
showGoal	Show the goal-condition marker when one is present in ‘alt_obj‘ (TRUE) or not (FALSE). Default is TRUE.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "Life-Stress Relationship".
xlab	X-axis label. Default is "Stress".
ylab	Y-axis label. Default is "Time to Failure".
fitCol	Color of the fitted relationship line. Default is "red".
ptCol	Color of the characteristic-life scatter points. Default is "black".
percCol	Color of the percentile lines and fill. Default is "blue".
goalCol	Color of the goal-condition marker. Default is "orange".

gridCol	Color of the grid. Default is "lightgray".
signif	Significant digits for hover text. Default is 3.
percentiles	Numeric vector of percentiles to draw as reference lines with shading. Sorted internally; shading is filled between adjacent lines. Default is ‘c(10, 90)‘.

Value

A ‘plotly‘ object representing the interactive life-stress plot.

Examples

```
library(WeibullR.ALT)
d1 <- alt.data(c(248, 456, 528, 731, 813, 537), stress = 300)
d2 <- alt.data(c(164, 176, 289), stress = 350)
d3 <- alt.data(c(88, 112, 152), stress = 400)
obj <- alt.fit(
  alt.parallel(
   alt.make(list(d1, d2, d3), dist = "weibull", alt.model = "arrhenius", view_dist_fits = FALSE),
    view_parallel_fits = FALSE
  )
)
plotly_rel(obj)
```

---

plotly_rga *Interactive Reliability Growth Plot.*

Description

The function creates an interactive reliability growth plot for one or more ‘rga‘ objects. When a list of objects is provided the models are overlaid on the same plot, each rendered in a distinct color. The plot includes cumulative failures over time, the model fit, and optional confidence bounds. Vertical lines indicate change points if breakpoints are specified in the rga object.

Usage

```
plotly_rga(
  rga_obj,
  showConf = TRUE,
  showGrid = TRUE,
  main = "Reliability Growth Plot",
  xlab = "Cumulative Time",
  ylab = "Cumulative Failures",
  pointCol = "black",
  fitCol = "black",
  confCol = "black",
  gridCol = "lightgray",
  breakCol = "black",
  signif = 3,
```

```
  cols = NULL
)
```

Arguments

rga_obj	An object of class 'rga', or a list of such objects. Each object is created using the 'rga()' function from the 'ReliaGrowR' package.
showConf	Show the confidence bounds (TRUE) or not (FALSE). Default is TRUE.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is "Reliability Growth Plot".
xlab	X-axis label. Default is "Cumulative Time".
ylab	Y-axis label. Default is "Cumulative Failures".
pointCol	Color of the point values. Default is "black". Used only for a single rga object; ignored when 'cols' is provided or multiple objects are supplied.
fitCol	Color of the model fit. Default is "black". Used only for a single rga object; ignored when 'cols' is provided or multiple objects are supplied.
confCol	Color of the confidence bounds. Default is "black". Used only for a single rga object; ignored when 'cols' is provided or multiple objects are supplied.
gridCol	Color of the grid. Default is "lightgray".
breakCol	Color of the breakpoints. Default is "black". Used only for a single rga object; ignored when 'cols' is provided or multiple objects are supplied.
signif	Significant digits of results. Default is 3. Must be a positive integer.
cols	Optional character vector of colors, one per rga object. When provided, each object's points, fit line, confidence bounds, and breakpoints are all drawn in the corresponding color. Recycled if shorter than the number of objects.

Value

A 'plotly' object representing the interactive reliability growth plot.

Examples

```
library(ReliaGrowR)
times <- c(100, 200, 300, 400, 500)
failures <- c(1, 2, 1, 3, 2)
rga <- rga(times, failures)
plotly_rga(rga)

times <- c(100, 200, 300, 400, 500, 600, 700, 800, 900, 1000)
failures <- c(1, 2, 1, 1, 1, 2, 3, 1, 2, 4)
breakpoints <- 400
rga2 <- rga(times, failures, model_type = "Piecewise NHPP", breaks = breakpoints)
plotly_rga(rga2, fitCol = "blue", confCol = "blue", breakCol = "red")

# Overlay two models
rga3 <- rga(c(50, 150, 250, 350, 450), c(2, 1, 3, 1, 2))
plotly_rga(list(rga, rga3))
```

plotly_wblr *Interactive Probability Plot.*

Description

This function creates an interactive probability plot for one or more wblr objects. When a list of objects is provided the models are overlaid on the same plot, each rendered in a distinct color. All objects must use the same distribution family. It can include confidence bounds, suspension data (single object only), and a results table.

Usage

```
plotly_wblr(
  wblr_obj,
  susp = NULL,
  showConf = TRUE,
  showSusp = TRUE,
  showGrid = TRUE,
  main = "Probability Plot",
  xlab = "Time to Failure",
  ylab = "Probability",
  probCol = "black",
  fitCol = "black",
  confCol = "black",
  intCol = "black",
  gridCol = "lightgray",
  signif = 3,
  cols = NULL
)
```

Arguments

wblr_obj	A single object of class 'wblr', or a list of such objects. This is a required argument. Each object must use the same distribution (e.g. all Weibull or all lognormal). Suspension subplots are only shown when a single object is provided.
susp	An optional numeric vector of suspension data. Default is NULL. Ignored when multiple wblr objects are provided.
showConf	Show the confidence bounds (TRUE) or not (FALSE). Default is TRUE if confidence bounds are available in the wblr object.
showSusp	Show the suspensions plot (TRUE) or not (FALSE). Default is TRUE if susp is provided.
showGrid	Show grid (TRUE) or hide grid (FALSE). Default is TRUE.
main	Main title. Default is 'Probability Plot'.
xlab	X-axis label. Default is 'Time to Failure'.

ylab	Y-axis label. Default is 'Probability'.
probCol	Color of the probability values. Default is 'black'. Used only for a single wblr object; ignored when 'cols' is provided or multiple objects are supplied.
fitCol	Color of the model fit. Default is 'black'. Used only for a single wblr object; ignored when 'cols' is provided or multiple objects are supplied.
confCol	Color of the confidence bounds. Default is 'black'. Used only for a single wblr object; ignored when 'cols' is provided or multiple objects are supplied.
intCol	Color of the intervals for interval censored models. Default is 'black'.
gridCol	Color of the grid. Default is 'lightgray'.
signif	Significant digits of results. Default is 3. Must be a positive integer.
cols	Optional character vector of colors, one per wblr object. When provided, each object's data points, fit line, and confidence bounds are all drawn in the corresponding color. Recycled if shorter than the number of objects.

Value

A 'plotly' object representing the interactive probability plot.

Examples

```
library(WeibullR)
library(ReliaPlotR)
failures <- c(30, 49, 82, 90, 96)
obj <- wblr.conf(wblr.fit(wblr(failures)))
plotly_wblr(obj)

suspensions <- c(100, 45, 10)
obj <- wblr.conf(wblr.fit(wblr(failures, suspensions)))
plotly_wblr(obj, suspensions,
  fitCol = "blue",
  confCol = "blue"
)
inspection_data <- data.frame(
  left = c(0, 6.12, 19.92, 29.64, 35.4, 39.72, 45.32, 52.32),
  right = c(6.12, 19.92, 29.64, 35.4, 39.72, 45.32, 52.32, 63.48),
  qty = c(5, 16, 12, 18, 18, 2, 6, 17)
)
suspensions <- data.frame(time = 63.48, event = 0, qty = 73)
obj <- wblr(suspensions, interval = inspection_data)
obj <- wblr.fit(obj, method.fit = "mle")
obj <- wblr.conf(obj, method.conf = "fm", lty = 2)
suspensions <- as.vector(suspensions$time)
plotly_wblr(obj,
  susp = suspensions, fitCol = "red", confCol = "red", intCol = "blue",
  main = "Parts Cracking Inspection Interval Analysis",
  ylab = "Cumulative % Cracked", xlab = "Inspection Time"
)
failures <- c(25, 30, 42, 49, 55, 67, 73, 82, 90, 96, 101, 110, 120, 132, 145)
fit <- wblr.conf(wblr.fit(wblr(failures), dist = "weibull3p"))
```

```
plotly_wblr(fit, fitCol = "darkgreen", confCol = "darkgreen")

# Overlay two Weibull models
obj2 <- wblr.conf(wblr.fit(wblr(c(20, 40, 60, 80, 100)), method.fit = "mle"),
                  method.conf = "lrb")
obj3 <- wblr.conf(wblr.fit(wblr(c(10, 30, 50, 70, 90)), method.fit = "mle"),
                  method.conf = "lrb")
plotly_wblr(list(obj2, obj3))
```

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