

Package ‘ReliaGrowR’

May 16, 2025

Title Reliability Growth Analysis

Version 0.1.4

Description Modeling and plotting functions for Reliability Growth Analysis (RGA). Models include the Duane (1962) <[doi:10.1109/TA.1964.4319640](https://doi.org/10.1109/TA.1964.4319640)>, Non-Homogeneous Poisson Process (NHPP) by Crow (1975) <<https://apps.dtic.mil/sti/citations/ADA020296>>, Piece-wise Weibull NHPP by Guo et al. (2010) <[doi:10.1109/RAMS.2010.5448029](https://doi.org/10.1109/RAMS.2010.5448029)>, and Piece-wise Weibull NHPP with Change Point Detection based on the 'segmented' package by Muggeo (2024) <<https://cran.r-project.org/package=segmented>>.

Imports stats, graphics, segmented

License CC BY 4.0

Encoding UTF-8

RoxygenNote 7.3.2

Suggests knitr, rmarkdown, spelling, testthat (>= 3.0.0)

Language en-US

URL <https://paulgovan.github.io/ReliaGrowR/>,
<https://github.com/paulgovan/ReliaGrowR>

Config/testthat/edition 3

VignetteBuilder knitr

BugReports <https://github.com/paulgovan/ReliaGrowR/issues>

NeedsCompilation no

Author Paul Govan [aut, cre, cph] (ORCID:
<<https://orcid.org/0000-0002-1821-8492>>)

Maintainer Paul Govan <paul.govan2@gmail.com>

Repository CRAN

Date/Publication 2025-05-16 19:10:02 UTC

Contents

duane_plot	2
plot_rga	3
print.duane	4
print.rga	4
rga	5
weibull_to_rga	6
Index	7

duane_plot	<i>Duane Analysis.</i>
------------	------------------------

Description

This function performs a Duane analysis (1962) [doi:10.1109/TA.1964.4319640](#) on the provided failure data.

Usage

```
duane_plot(  
  times,  
  failures,  
  plot = TRUE,  
  log = TRUE,  
  point_col = "black",  
  line_col = "black",  
  xlab = "Cumulative Time",  
  ylab = "Cumulative MTBF",  
  main = "Duane Plot with Cumulative MTBF"  
)
```

Arguments

times	A vector of cumulative times at which failures occurred.
failures	A vector of the number of failures at each corresponding time in times.
plot	Show Duane plot (TRUE) or hide plot (FALSE).
log	Logical indicating whether to use logarithmic scale for the plot (default: TRUE).
point_col	Color for the data points (default: "black").
line_col	Color for the fitted line (default: "black").
xlab	Label for the x-axis (default: "Cumulative Time").
ylab	Label for the y-axis (default: "Cumulative MTBF").
main	Title for the plot (default: "Duane Plot with Cumulative MTBF").

Value

A list containing the fitted model, AIC, and BIC.

Examples

```
times <- c(100, 200, 300, 400, 500)
failures <- c(1, 2, 1, 3, 2)
fit <- duane_plot(times, failures)
print(fit)
```

plot_rga

*Plot Reliability Growth Analysis Results***Description**

This function generates a plot for the results of a Reliability Growth Analysis (RGA).

Usage

```
plot_rga(
  rga_obj,
  point_col = "black",
  line_col = "black",
  xlab = "Cumulative Time",
  ylab = "Cumulative Failures",
  main = "Reliability Growth Analysis",
  conf_bounds = TRUE,
  legend = TRUE,
  log = FALSE
)
```

Arguments

rga_obj	An object of class <i>rga</i> , which contains the results from the RGA model.
point_col	Color for the data points (default: "black").
line_col	Color for the fitted line (default: "black").
xlab	Label for the x-axis (default: "Cumulative Time").
ylab	Label for the y-axis (default: "Cumulative Failures").
main	Title for the plot (default: "Reliability Growth Analysis").
conf_bounds	Logical indicating whether to include confidence bounds (default: TRUE).
legend	Logical indicating whether to show the legend (default: TRUE).
log	Logical indicating whether to use a log-log scale (default: FALSE).

Value

The function does not return a value.

Examples

```
times <- c(100, 200, 300, 400, 500)
failures <- c(1, 2, 1, 3, 2)
result <- rga(times, failures)
plot_rga(result)
```

print.duane	<i>Print method for duane objects.</i>
-------------	--

Description

This function prints a summary of the Duane analysis result.

Usage

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

Arguments

x	An object of class "duane" returned by the duane_plot function.
...	Additional arguments (not used).

print.rga	<i>Print method for rga objects.</i>
-----------	--------------------------------------

Description

This function prints a summary of the RGA analysis result.

Usage

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

Arguments

x	An object of class rga.
...	Additional arguments (not used).

rga	<i>Reliability Growth Analysis.</i>
-----	-------------------------------------

Description

This function performs reliability growth analysis using the Crow-AMSAA model by Crow (1975) <https://apps.dtic.mil/sti/citations/ADA020296> or piecewise Weibull NHPP model by Guo et al. (2010) [doi:10.1109/RAMS.2010.5448029](https://doi.org/10.1109/RAMS.2010.5448029).

Usage

```
rga(  
  times,  
  failures,  
  model_type = "Crow-AMSAA",  
  breakpoints = NULL,  
  conf_level = 0.95  
)
```

Arguments

times	A vector of cumulative times at which failures occurred.
failures	A vector of the number of failures at each corresponding time in times.
model_type	The model type. Either Crow-AMSAA (default) or Piecewise Weibull NHPP with change point detection.
breakpoints	An optional vector of breakpoints for the Piecewise Weibull NHPP model.
conf_level	The desired confidence level, which defaults to 95%.

Value

The function returns an object of class `rga` that contains the results for the model.

Examples

```
times <- c(100, 200, 300, 400, 500)  
failures <- c(1, 2, 1, 3, 2)  
result <- rga(times, failures)  
print(result)
```

weibull_to_rga	<i>Weibull to RGA</i>
----------------	-----------------------

Description

This function converts Weibull data (failure and suspension times) into a format suitable for reliability growth analysis (RGA).

Usage

```
weibull_to_rga(failures, suspensions = NULL)
```

Arguments

failures	A vector of failure times.
suspensions	A vector of suspension (censoring) times.

Value

A data frame with times and failure counts suitable for reliability growth analysis.

Examples

```
failures <- c(100, 200, 200, 400)
suspensions <- c(250, 350, 450)
result <- weibull_to_rga(failures, suspensions)
print(result)
```

Index

duane_plot, [2](#)

plot_rga, [3](#)

print.duane, [4](#)

print.rga, [4](#)

rga, [5](#)

weibull_to_rga, [6](#)