

Package ‘simIC’

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Title Simulate and Analyze Interval- and Mixed-Censored Survival Data

Version 0.1.0

Description Provides tools to simulate and analyze survival data with interval-, left-, right-, and uncensored observations under common parametric distributions, including ``Weibull'', ``Exponential'', ``Log-Normal'', ``Log-Logistic'', ``Gamma'', ``Gompertz'', ``Normal'', ``Logistic'', and ``EMV''. The package supports both direct maximum likelihood estimation and imputation-based methods, making it suitable for methodological research, simulation benchmarking, and teaching. A web-based companion app is also available for demonstration purposes.

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Encoding UTF-8

RoxygenNote 7.3.2

URL <https://github.com/jayarasan/simIC>

BugReports <https://github.com/jayarasan/simIC/issues>

NeedsCompilation no

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Description

Estimates distribution parameters using imputed event times.

Usage

```
mle_imp(  
  left,  
  right,  
  dist = "weibull",  
  impute = c("midpoint", "random", "median", "harmonic_median", "geometric_median",  
             "random_survival")  
)
```

Arguments

left	Left bounds of censoring intervals
right	Right bounds of censoring intervals
dist	Distribution name (e.g. "weibull", "loglogistic", "EMV")
impute	Imputation method: "midpoint", "random", "median", "harmonic_median", "geometric_median", "random_survival"

Value

A list containing estimates, standard errors, and log-likelihood

Examples

```
# Simulate interval-censored data from a Weibull distribution  
set.seed(123)  
dat <- simIC(n = 100, dist = "weibull", shape = 1.5, scale = 5, width = 2,  
             study_start = 1, study_end = 8, uncensored_tol = 0.1)  
  
# Fit model using harmonic median imputation  
fit <- mle_imp(left = dat$left, right = dat$right, dist = "weibull", impute = "harmonic_median")  
  
# Inspect results  
print(fit$estimates)  
print(fit$logLik)  
print(fit$converged)
```

mle_int	<i>Interval-Censored Maximum Likelihood Estimation</i>
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Description

Estimates distribution parameters by maximizing the interval-censored likelihood.

Usage

```
mle_int(left, right, dist)
```

Arguments

left	Left bounds of censoring intervals
right	Right bounds of censoring intervals
dist	Distribution name (e.g. "weibull", "loglogistic", "EMV")

Value

A list containing estimates, standard errors, log-likelihood, and convergence status

Examples

```
# Simulate data from a log-logistic distribution
set.seed(123)
data <- simIC(n = 100, dist = "loglogistic", shape = 1.5, scale = 5, width = 2,
              study_start = 1, study_end = 8, uncensored_tol = 0.1)
# Fit the model
fit <- mle_int(left = data$left, right = data$right, dist = "loglogistic")
print(fit$estimates)
print(fit$logLik)
print(fit$converged)
```

simIC	<i>Simulate Interval-, Left-, Right-, and Uncensored Survival Data</i>
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Description

Simulates survival data with optional left-censoring, right-censoring, and uncensoring thresholds.

Usage

```
simIC(
  n = 100,
  dist = "weibull",
  shape = 2,
  scale = 1,
  meanlog = 0,
  sdlog = 1,
  location = 0,
  width = 1,
  visit_start = 0,
  study_start = NULL,
  study_end = NULL,
  uncensored_tol = 0.1
)
```

Arguments

<code>n</code>	Number of samples.
<code>dist</code>	Distribution name ("weibull", "exp", "lognormal", "loglogistic", "normal", "logistic", "EMV", "gamma", "gompertz").
<code>shape, scale</code>	Distribution parameters for applicable distributions.
<code>meanlog, sdlog</code>	For lognormal.
<code>location</code>	For normal, logistic, and EMV.
<code>width</code>	Visit interval width.
<code>visit_start</code>	First visit time.
<code>study_start</code>	Optional: left-censoring cutoff.
<code>study_end</code>	Optional: right-censoring cutoff.
<code>uncensored_tol</code>	Tolerance to treat (left, right) as exact event.

Value

A data frame with columns: id, left, right, true_time, censoring

Examples

```
# Simulate 100 survival times from a log-normal distribution
set.seed(123)
data <- simIC(n = 100, dist = "lognormal", meanlog = 1.5, sdlog = 0.5, width = 2,
              study_start = 1, study_end = 8, uncensored_tol = 0.1)
head(data)
```

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