

Package ‘wcep’

July 26, 2025

Type Package

Title Survival Analysis for Weighted Composite Endpoints

Version 1.0.3

Maintainer Sarah Rathwell <srathwel@ualberta.ca>

URL <https://github.com/sarah-0k/wcep>

BugReports <https://github.com/sarah-0k/wcep/issues>

Description Analyze given data frame with multiple endpoints and return Kaplan-Meier survival probabilities together with the specified confidence interval. See Nabipoor M, Westerhout CM, Rathwell S, and Bakal JA (2023) <[doi:10.1186/s12874-023-01857-0](https://doi.org/10.1186/s12874-023-01857-0)>.

License MIT + file LICENSE

Encoding UTF-8

LazyData true

Language en-us

Depends R (>= 3.6.0)

Imports coin (>= 1.3-1), dplyr (>= 1.1.0), graphics (>= 3.6.1),
grDevices (>= 3.6.1), progress (>= 1.2.2), stats (>= 3.6.1),
tidyr (>= 1.0.0)

RoxygenNote 7.3.2

Suggests testthat (>= 3.0.0)

Collate 'data.R' 'nam.R' 'plot.R' 'wcep-package.R' 'wcep_core.R'
'wcep.R'

Config/testthat/edition 3

NeedsCompilation no

Author Majid Nabipoor [aut] (ORCID: <<https://orcid.org/0000-0003-2578-8300>>),
Cynthia Westerhout [aut] (ORCID:
<<https://orcid.org/0000-0003-1082-5981>>),
Jeffrey Bakal [aut] (ORCID: <<https://orcid.org/0000-0002-3658-2554>>),
Sarah Rathwell [cre] (ORCID: <<https://orcid.org/0000-0003-3176-994X>>)

Repository CRAN

Date/Publication 2025-07-25 22:40:02 UTC

Contents

plot.wcep	2
toyexample	3
wcep	3

Index	5
--------------	----------

plot.wcep	<i>wcep plot</i>
-----------	------------------

Description

Create a plot of Kaplan-Meier curve with its specified confidence interval

Usage

```
## S3 method for class 'wcep'
plot(
  x,
  main = " ",
  type = "n",
  lty = NULL,
  lwd = NULL,
  xlab = " ",
  ylab = "Survival Probability",
  xlim = NULL,
  ylim = NULL,
  cex = NULL,
  ...
)
```

Arguments

x	is an object of class "wcep"
main	title of plot
type	type of plot
lty	line type
lwd	line width
xlab	first axis label
ylab	second axis label
xlim	first axis limits
ylim	second axis limits
cex	legend font size
...	other parameters of generic "plot" have no use here setOldClass("wcep")

toyexample

Toy example

Description

A data set containing patient IDs, event types, event times, and gender of 100 patients.

Usage

```
toyexample
```

Format

A data frame with 104 rows and 4 columns

PTID ID number of patients

EvTp Event Types: SHK as Shock, CHF as Congestive Heart Failure, REMI as Recurrent Myocardial Infarction, DTH as Death; and N as No event

EvTm Event Time (day)

sex Gender of patients, M as Male, F as Female

References

Armstrong P. W., Westerhout C. M., Van de Werf F., Califf R. M., Welsh R. C., Wilcox R. G., Bakal J. A. (2011) Refining clinical trial composite outcomes: an application to the Assessment of the Safety and Efficacy of a New Thrombolytic-3 (ASSENT-3) trial. *American Heart Journal*. **161**(5) 848-854.

Source

It is a generated example based on ASSENT-3: <https://pubmed.ncbi.nlm.nih.gov/21570513>

wcep

Analysis of weighted composite endpoints

Description

Analyze given data frame and return Kaplan-Meier survival probabilities together with the specified confidence interval. wcep modifies Kaplan-Meier curve by taking into account severity weights of different event. Alternative methods are Anderson Gill model and win ratio of composite outcomes. The function takes event dataset and user-specified severity weights to generate a modified Kaplan-Meier curve and comparison statistics based on the weighted composite endpoint method. The user supplies the event data set, the weights, and the factor to split on . The package will generate the weighted survival curve, confidence interval and test the differences between the two groups.

Usage

```
wcep(x, EW, alpha = 0.05, split = FALSE)
```

Arguments

x	This data frame usually has 3 columns. The first column specifies patient ID, which is a character or numeric vector, the second column is a factor with character values of event types. The third column is a numeric vector of event times. If <code>split = TRUE</code> , then the fourth column is a character vector of split groups of at most two groups, like gender.
EW	This data frame has two columns. The first column specifies a character vector of event types. The second column specifies weights. The naming of event types in <code>x</code> and <code>EW</code> should be exactly similar.
alpha	A numeric value between 0-1 which specifies the confidence level, if it is not specified, by default is 0.05.
split	A logical value of T or F which allows to compare two groups.

References

Bakal J., Westerhout C. M., Armstrong P. W. (2015) Impact of weighted composite compared to traditional composite endpoints for the design of randomized controlled trials. *Statistical Methods in Medicine Research*. **24**(6) 980-988.

Nabipoor M., Westerhout C. M., Rathwell S., Bakal J. (2023) The empirical estimate of the survival and variance using a weighted composite endpoint, *BMC Medical Research Methodology*. **23**(35).

Author(s)

Majid Nabipoor: nabipoor@ualberta.ca, Cynthia Westerhout: cindy.westerhout@ualberta.ca, Jeffrey Bakal: jbakal@ualberta.ca

See Also

[coxph](#) for Anderson Gill model

Examples

```
data(toyexample)
#event weights
EW <- data.frame(event = c('CHF', 'DTH', 'SHK', 'REMI'), weight = c(0.3,1,0.5,0.2))
res1 <- wcep(toyexample, EW)
str(res1)
res1$survival_probabilities
plot(res1)
#comparing two genders
res2 <- wcep(toyexample, EW, split=TRUE)
plot(res2)
#wilcox and t test
res2$Wilcoxon.test
res2$t.test
```

Index

* **datasets**

toyexample, 3

coxph, 4

plot.wcep, 2

toyexample, 3

wcep, 3