

# Package: km.ci (via r-universe)

August 26, 2024

**Type** Package

**Title** Confidence Intervals for the Kaplan-Meier Estimator

**Version** 0.5-6

**Date** 2022-04-04

**Author** Ralf Strobl <rstrobl@ibe.med.uni-muenchen.de>

**Maintainer** Tobias Verbeke <tobias.verbeke@openanalytics.eu>

**Depends** R (>= 3.5.0)

**Imports** stats, survival

**Description** Computes various confidence intervals for the Kaplan-Meier estimator, namely: Peto's CI, Rothman CI, CI's based on Greenwood's variance, Thomas and Grunkemeier CI and the simultaneous confidence bands by Nair and Hall and Wellner.

**License** GPL (>= 2)

**Encoding** UTF-8

**RoxygenNote** 7.1.2

**NeedsCompilation** no

**Date/Publication** 2022-04-06 11:52:42 UTC

**Repository** <https://tverbeke.r-universe.dev>

**RemoteUrl** <https://github.com/cran/km.ci>

**RemoteRef** HEAD

**RemoteSha** b4c5a9c77b270c819d8e554e0254d865f2095e87

## Contents

critical.value.hall.90 . . . . .	2
critical.value.hall.95 . . . . .	2
critical.value.hall.99 . . . . .	2
critical.value.nair.90 . . . . .	3
critical.value.nair.95 . . . . .	3
critical.value.nair.99 . . . . .	3
km.ci . . . . .	4
rectum.dat . . . . .	5

**Index****7**

---

critical.value.hall.90

*Critical Values*

---

**Description**

Critical values for the 90 % Hall-Wellner band.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer.

---

critical.value.hall.95

*Critical Values*

---

**Description**

Critical values for the 95 % Hall-Wellner band.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer

---

critical.value.hall.99

*Critical Values*

---

**Description**

Critical values for the 99 % Hall-Wellner band.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer.

---

critical.value.nair.90

*Critical Values*

---

**Description**

Critical values for the 90 % equal precision band by Nair.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer.

---

critical.value.nair.95

*Critical Values*

---

**Description**

Critical values for the 95 % equal precision band by Nair.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer.

---

critical.value.nair.99

*Critical Values*

---

**Description**

Critical values for the 99 % equal precision band by Nair.

**Details**

These values are taken from the book by Klein & Moeschberger.

**Source**

Klein, Moeschberger (2002): Survival Analysis, Springer.

---

 km.ci

*Confidence Intervals for the Kaplan-Meier Estimator.*


---

### Description

Computes pointwise and simultaneous confidence intervals for the Kaplan-Meier estimator.

### Usage

```
km.ci(survi, conf.level = 0.95, tl = NA, tu = NA, method = "rothman")
```

### Arguments

survi	A survival object for which the new confidence limits should be computed. This can be built using the "Surv" and the "survfit" function in the R package "survival". "km.ci" modifies the confidence limits in this object.
conf.level	The level for a two-sided confidence interval on the survival curve. Default is 0.95.
tl	The lower time boundary for the simultaneous confidence limits. If it is missing the smallest event time is used.
tu	The upper time boundary for the simultaneous confidence limits. If it is missing the largest event time is used.
method	One of "peto", "linear", "log", "loglog", "rothman", "grunkemeier", "hallwellner", "loghall", "epband", "logep"

### Details

A simulation study showed, that three confidence intervals produce satisfying confidence limits. One is the "loglog" confidence interval, an interval which is based on the log of the hazard. The other competitive confidence concept was introduced by Rothman (1978) and is using the assumption that the survival estimator follows a binomial distribution. Another good confidence concept was invented by Thomas and Grunkemeier (1975) and is derived by minimizing the likelihood function under certain constraints. Special thanks goes to Robert Gentleman for providing code for the confidence interval by Thomas and Grunkemeier.

The confidence interval using Peto's variance can not be recommended since it yields confidence limits outside the admissible range [0;1] as well as the "linear" and the "log" (which is based on the logarithm of  $S(t)$ ).

The function can produce simultaneous confidence bands, too. The Hall-Wellner band (1980) and the Equal Precision band by Nair (1984) together with their log-transformed counterpart. From all simultaneous confidence intervals only the log-transformed Equal Precision "logep" band can be recommended. The limits are computed according to the statistical tables in Klein and Moeschberger (2002).

**Value**

a 'survfit' object;  
see the help on 'survfit.object' for details.

**Author(s)**

Strobl, R.

**References**

Strobl, R., Dirschedl, P. and Mansmann, U.. Comparison of simultaneous and pointwise confidence intervals for survival functions. (2005, submitted to Biom. J.).

**See Also**

[survfit](#), [print.survfit](#), [plot.survfit](#), [lines.survfit](#), [summary.survfit](#), [survfit.object](#), [coxph](#), [Surv](#), [strata](#).

**Examples**

```
require(survival)
data(rectum.dat)

# fit a Kaplan-Meier and plot it
fit <- survfit(Surv(time, status) ~ 1, data=rectum.dat)
plot(fit)
fit2 <- km.ci(fit)
plot(fit2)
```

---

rectum.dat

*Rectum carcinoma data set.*

---

**Description**

The rectum data contains 205 persons from a study about the survival of patients with rectum carcinoma. Due to the severe course of disease the follow-up was almost perfect in these data and involves hardly any censoring and survivors. The data was used to analyze the behavior of the confidence intervals in data sets with low censoring rate.

**Format**

A data frame with 205 observations on the following 2 variables.

**time** Time in months

**status** Status at dropout

**Source**

Merkel, Mansmann et al.(2001).The prognostic inhomogeneity in pT3 rectal carcinomas. Int J Colorectal Dis.16, 305–306.

# Index

## \* datasets

- critical.value.hall.90, 2
- critical.value.hall.95, 2
- critical.value.hall.99, 2
- critical.value.nair.90, 3
- critical.value.nair.95, 3
- critical.value.nair.99, 3
- rectum.dat, 5

## \* survival

- km.ci, 4

coxph, 5

- critical.value.hall.90, 2
- critical.value.hall.95, 2
- critical.value.hall.99, 2
- critical.value.nair.90, 3
- critical.value.nair.95, 3
- critical.value.nair.99, 3

km.ci, 4

lines.survfit, 5

plot.survfit, 5

print.survfit, 5

rectum.dat, 5

strata, 5

summary.survfit, 5

Surv, 5

survfit, 5

survfit.object, 5