# Package 'LTsurv'

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**Type** Package

**Title** Pairwise Pseudo-likelihood Estimation for the Proportional Hazards Model with Left-Truncated Failure Time Data

**Version** 0.1.0

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**Description**

This package provides a general pairwise pseudo-likelihood estimation approach for the proportional hazards model with left-truncated and censored failure time data. In particular, the censoring scheme is right censoring, interval censoring or partial interval censoring.

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**Imports** Rcpp (>= 1.0.8.3)

**LinkingTo** Rcpp, RcppEigen

**NeedsCompilation** yes

## R topics documented:

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LTsurv-package | *Pairwise Pseudo-likelihood Estimation for the Proportional Hazards Model with Left-Truncated Failure Time Data*

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### Description

This package provides a general pairwise pseudo-likelihood estimation approach for the proportional hazards model with left-truncated and censored failure time data. In particular, the censoring scheme is right censoring, interval censoring or partial interval censoring.

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**Author(s)**

Li Shao, Hongxi Li, Shuwei Li

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**References**

Li Shao, Hongxi Li, Shuwei Li and Jianguo Sun (2022+). A Pairwise Pseudo-Likelihood Approach for Regression Analysis of Left-Truncated Failure Time Data with Various Types of Censoring. Submitted.

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| LTsurv | *Pairwise Pseudo-Likelihood Estimation for the Proportional Hazards Model with Left-Truncated Failure Time Data* |
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**Description**

This function provides a general semiparametric estimation approach for the proportional hazards model with left-truncated and censored failure time data. The failure time suffers from right censoring, interval censoring or partial interval censoring.

**Usage**

```
s<-LTsurv(truncation, time, time2 , delta, type="interval2", Z, )
```

**Arguments**

| | |
|---|---|
| truncation | a vector of the left truncation times. |
| time | a vector of the observed time for right-censored data or the left endpoint of the observed interval for interval-censored or partly interval-censored data. For right-censored data, `time` means the observed time, which equals the minimum of the right censoring time and the failure time. For interval-censored data, `time` denotes the left endpoint of the observed interval. If the failure time is left-censored, `time` should be set to be 0. |
| time2 | for interval-censored or partly interval-censored data, `time2` is a vector of the right endpoint of the observed interval. If the interval is right half-open , just set `time2` to be 0. For right-censored data, the argument `time2` is unnecessary. |
| delta | a vector indicating the type of observations. For right-censored data, 0="right-censored", 1="observed". For interval-censored data, 1="left-censored", 2="interval-censored", 3="right-censored". For partly interval-censored data, 0 ="observed", 1="left-censored", 2="interval-censored", 3="right-censored". |
| type | a character string specifying the type of censoring. `type` can not be missing. Possible values are "right", "interval", "partly interval". |
| Z | design matrix of predictor variables (in columns), should be speficied without an intercept term. |
| time_points | a time or a vector of times at which the cumulative baseline hazard function is evaluated. The default value of `time_points` is the (10%, 20%,...,100%) quantiles of unique finite observation times, exactly-observed failure times and truncation times. |
| boot.num | the number of bootstrap to estimate standard deviantion |

## Value

| | |
|---|---|
| Coefficients | the estimated coefficients in the proportional hazards model |
| BaselineHazard | the estimated baseline hazard. |
| Cumulative | the estimated cumulative baseline hazard value at time_points. |
| sdCoefficients | the standard deviantion of Coefficients estimated by bootstrap. |
| sdCumulative | the standard deviantion of cumulative baseline hazard value at time_points, estimated by bootstrap. |
| sumstats | the proportions of each type |

## Author(s)

Li Shao, Hongxi Li, Shuwei Li

## References

Li Shao, Hongxi Li, Shuwei Li and Jianguo Sun (2022+). A Pairwise Pseudo-Likelihood Approach for Regression Analysis of Left-Truncated Failure Time Data with Various Types of Censoring. Submitted.

## See Also

summary.LTsurv, plot.LTsurv

## Examples

```
##=====Right Censored =====#
rm(list=ls())

library("LTsurv")
data("dat.right")
truncation=dat.right$truncation
time=dat.right$time
delta=dat.right$delta
Z=cbind(dat.right$gender,dat.right$preference)

sr<-LTsurv(truncation, time, , delta, type="right", Z,
        time_points = quantile(unique(sort(c(truncation,time)))[-1],seq(0.1,1,0.1)),boot.num=10)

summary.LTsurv(sr)



#====== Partly Interval Censored data ======#

rm(list=ls())

library("LTsurv")
data("dat.partintvl")
truncation=dat.partintvl$truncation
time=dat.partintvl$time
time2=dat.partintvl$time2
delta=dat.partintvl$delta
Z=cbind(dat.partintvl$Z1,dat.partintvl$Z2)
```

```
si<-LTsurv( truncation, time, time2, delta, type="partly interval", Z,
            time_points = quantile(unique(sort(c(truncation,time,time2)))[-1],seq(0.1,1,0.1)),
            boot.num=2)

summary.LTsurv(si)
```

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plot.LTsurv                    *Plot method for LTsurv objects*

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### Description

Plot the estimated cumulative baseline hazard function or survival funciton.

### Usage

```
plot.LTsurv(x)
```

### Arguments

x            An object of class LTsurv, returned by the LTsurv function.

type         Character string specifying the type of plot. Default value type="hazard" means
             to plot the baseline cumulative hazard funciton. Type="survival" means to plot
             the baseline survival funciton

### See Also

LTsurv, summary.LTsurv

### Examples

```
#=== see example for LTsurv ===#
```

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summary.LTsurv                 *summary.LTsurv*

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### Description

The summary information of the parameter estimates and their estimated standard error.

### Usage

```
summary.LTsurv(x)
```

### Arguments

x                An object of class LTsurv, returned by the LTsurv function.

## See Also

LTsurv, plot.LTsurv

## Examples

```
#=== see example for LTsurv ===#
```

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