

Package ‘winRatioAnalysis’

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Type Package

Title Estimates the Win-Ratio as a Function of Time

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Description Fits a model to data separately for each treatment group and then calculates the win-Ratio as a function of follow-up time.

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Encoding UTF-8

LazyData true

Depends survival,nlme,plyr,Matrix,R (>= 2.10)

Imports pssm,MLEcens,stats,utils,graphics,data.table,JM,mvtnorm

RoxygenNote 6.0.1

NeedsCompilation no

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als

Example data set with a longitudinal variable

Description

A simulated data set with a longitudinal variable and a survival variable

Usage

```
data("als")
```

Format

A data frame with 312 observations on the following 6 variables.

subjects A subject indicator

trt A treatment indicator

surv The patient's survival time or last follow up time

csurv An indicator that the patient died

times The time that the longitudinal variable is observed

ALSFRS The longitudinal variable

dat

Example dataset with progression and survival

Description

This dataset provides a simulated example for the pssm and NP method of calculating the winRatio and its components over time

Usage

```
data("dat")
```

Format

A data frame with 200 observations on the following 7 variables.

tprog0 Last time the patient was observed to be free of progression

tprog1 The first time the patient was observed to have progressed

cdeath An indicator that the patient has died 1=death

tdeath The time of death or last follow up time

rx Treatment indicator(0 or 1)

cprog An indicator of progression

tprogression Exact time of progression or last follow up time

winRatio	<i>Analyze the winRatio as a function of time</i>
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Description

Calculates the win ratio of the data and additionally fits a model to data separately for each treatment group and then calculates the win-Ratio as a function of follow-up time. The data must be one of three types, progression and survival data where progression is interval censored and progression always proceeds survival, dual time to event data where both events have a common censoring time, and longitudinal and survival data where the longitudinal variable follows a random slopes model and the survival data has a frailty that is equal to the value of $\$u+b t\$$ where $\$u\$$ is the random intercept and $\$b\$$ is the random slope.

Usage

```
winRatio(survivalObject, treatmentVariable, treatmentCodes, data,
         method=c('pssm', 'NP'),
         plotTimeUnit=NULL,
         secondSurvivalObject=NULL,
         longitudinalVariable=NULL,
         timeVar=NULL,
         subjectId=NULL,
         plotPoints=NULL,
         nominalTimes=NULL,
         pssmIntervals=3,
         integrationIntervals=1,
         type='l',
         mult=100,
         findValue=function(times, values, c)
           stats::approx(times, values, xout=c, method="constant",
                        rule=2, f=0)$y)
```

Arguments

survivalObject	An survival object for the primary survival variable of the form <code>Surv(time, indicator)</code>
treatmentVariable	A character variable containing the name of the treatment variable
treatmentCodes	A vector containing the treatment codes, control followed by active
data	A data frame that the variable names refer to
method	Method of model fitting one of 'pssm', 'NP', if the data is longitudinal this is ignored and a simulation is used
plotTimeUnit	If plots are desired enter the plot time unit eg. 'days', 'months', 'years', if not present no plots will be produced
secondSurvivalObject	A survival object for the secondary time to event variable of the form <code>Surv(time, indicator)</code> , or <code>Surv(time0, time1, type='interval')</code>

longitudinalVariable	A character variable containing the name of the longitudinal variable if present
timeVar	A character variable containing the name of the time variable in the longitudinal model
subjectId	A character variable containing the name of the subject identifier
plotPoints	A numeric vector of follow up times to calculate the Win Ratio estimator and related statistics, if NULL the follow up in the data is used
nominalTimes	The times that the longitudinal variable is measured. Note the data may not contain these exact times but the simulation used to calculate the win ratio over time will generate data for these times
pssmIntervals	How many intervals to used if pssm is used to calculate the joint model
integrationIntervals	Interval to use for trapezoidal rule
type	If NP is used whether to use the upper or lower probability
mult	The sample size multiplier for the simulation when their is longitudinal data. mult=100 would produce a sample size that was 100 times that of the orginal sample.
findValue	A function of a numeric vector of times, a numeric vector of corresponding values of the longitudinal variable at those times and a scalar c, considered a time. The function interpolates the values to give a value at time c. The default is last value carried forward.

Value

A winratio object which is implemented as a data frame with columns:

time	The follow-up times, The first row it is the median follow up in the data, subsequent rows are the times in plotPoints
firstP10	The probability that the treatment group survival is better than the control group survival
firstP10	The probability that the control group survival is better than the treatment group survival
secondP10	The probability that the treatment group secondary endpoint is better than the control group secondary endpoint
secondP01	The probability that the control group secondary endpoint is better than the treatment group secondary endpoint
winRatio	The win ratio or probability that a treatment group does better than then a control group patient divided by the converse
winRatioSE	Standard Error of the Win Ratio

Note

Code for calculating the standard error of the win ratio was contributed by Ionut Bebu, Ph.D. and Lohn Lachin Ph.D.

Author(s)

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References

Bebu I, Lachin JM. Large sample inference for a win ratio analysis of a composite outcome based on prioritized components. *Biostatistics*. 2015 Sep 8;17(1):178-87.

Examples

```
winRatio(Surv(tdeath,cdeath),
  treatmentVariable='rx', treatmentCodes = c(1, 0),data=dat,
  secondSurvivalObject=Surv(tprog0,tprog1,type='interval'),pssmIntervals=1,
  method = "pssm", plotPoints =3, integrationIntervals=1)

winRatio(Surv(tdeath,cdeath),
  treatmentVariable='rx', treatmentCodes = c(1, 0),data=dat,
  secondSurvivalObject=Surv(tprog0,tprog1,type='interval'),pssmIntervals=1,
  method = "NP", plotPoints =3)

## Not run:
winRatio(Surv(surv,csurv),
  longitudinalVariable = "ALSFRS",
  timeVar="times",subject="subjects",
  treatmentVariable='trt',
  treatmentCodes = c(0, 1),data=als,method = "NP",
  nominalTimes=c(0,6,12),
  plotPoints =6,mult=1)
#           time firstP10 firstP01 secondP10 secondP01 winRatio WinRatioSE
#Value 11.93747  0.24500 0.313125  0.199375  0.242500 1.250352  0.3007245
#plots  6.00100  0.49375 0.468750  0.160625  0.200625 1.022923      NA

## End(Not run)
```

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