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**

```r
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 it’s components over time

**Usage**

```r
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
Analyze the winRatio as a function of time

Description
Calculates the win ratio of the data and additional 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
```r
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 `Surv(time, indicator)`
- **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 `Surv(time, indicator)`, or `Surv(time0, time1, type='interval')`
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 trapozoidal rule

type
If NP is used whether to use the upper or lower probability

mult
The sample size multiplier for the simulation when there is longitudinal data. mult=100 would produce a sample size that was 100 times that of the original 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

firstP01
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)**

David A. Schoenfeld

**References**


**Examples**

```r
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(tprogression, cprog),
  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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