

Package ‘relsurv’

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Title Relative survival regression

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Description Various functions for regression in relative survival.

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invtime	<i>Inverse transforming of time in Relative Survival</i>
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Description

This function can be used when predicting in Relative Survival using the transformed time regression model (using `rstrans` function). It inverts the time from Y to T in relative survival using the given `ratetable`. The times Y can be produced with the `rstrans` function, in which case, this is the reverse function. This function does the transformation for one person at a time.

Usage

```
invtime(y, age, sex, year, scale, ratetable, lower, upper)
```

Arguments

y	time in Y.
age	age of the individual. Must be in days.
sex	sex of the individual. Must be coded in the same way as in the <code>ratetable</code> .
year	date of diagnosis. Must be in date format
scale	numeric value to scale the results. If <code>ratetable</code> is in units/day, <code>scale = 365.25</code> causes the output to be reported in years.
ratetable	a table of event rates, such as <code>survexp.us</code> .
lower	the lower bound of interval where the result is expected. This argument is optional, but, if given, can shorten the time the function needs to calculate the result.
upper	the upper bound of interval where the result is expected. See <code>lower</code>

Details

Works only with `ratetables` that are split by age, sex and year. Transforming can be computationally intensive, use `lower` and/or `upper` to guess the interval of the result and thus speed up the function.

Value

A list of values

T	the original time
Y	the transformed time

References

Package: Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272-278.

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741-1749.

See Also[rstrans](#)**Examples**

```
data(slopop)
invtime(y = 0.1, age = 23011, sex = "male", year = 9497, ratetable = slopop)
```

joinrate	<i>Join ratetables</i>
----------	------------------------

Description

The function joins two or more objects organized as `ratetable` by adding a new dimension.

Usage

```
joinrate(tables, dim.name="country")
```

Arguments

<code>tables</code>	a list of <code>ratetables</code> . If names are given, they are included as <code>dimnames</code> .
<code>dim.name</code>	the name of the added dimension.

Details

This function joins two or more `ratetable` objects by adding a new dimension. The cutpoints of all the rate tables are compared and only the common intervals kept. If the intervals defined by the cutpoints are not of the same length, a warning message is displayed. Each rate table must have 3 dimensions, i.e. age, sex and year (the order is not important).

Value

An object of class `ratetable`.

References

Package: Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272-278.

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741-1749.

See Also

[ratetable](#), [transrate.hld](#), [transrate.hmd](#), [transrate](#).

Examples

```
#newpop <- joinrate(list(Arizona=survexp.az, Florida=survexp.fl, Minnesota=survexp.mn), dim.name="country")
```

plot.rs.zph

Graphical Inspection of Proportional Hazards Assumption in Relative Survival Models

Description

Displays a graph of the scaled partial residuals, along with a smooth curve.

Usage

```
## S3 method for class 'rs.zph':
plot(x, resid=TRUE, df = 4, nsmo = 40, var, cex=1, add=FALSE, col=1,
      lty=1, xlab, ylab, scale=1, ...)
```

Arguments

x	result of the rs.zph function.
resid	a logical value, if TRUE the residuals are included on the plot, as well as the smooth fit.
df	the degrees of freedom for the fitted natural spline, df=2 leads to a linear fit.
nsmo	number of points used to plot the fitted spline.
var	the set of variables for which plots are desired. By default, plots are produced in turn for each variable of a model. Selection of a single variable allows other features to be added to the plot, e.g., a horizontal line at zero or a main title.
cex	a numerical value giving the amount by which plotting text and symbols should be scaled relative to the default.
add	logical, if TRUE the plot is added to an existing plot
col	a specification for the default plotting color.
lty	the line type.
xlab	x axis label.
ylab	y axis label.
scale	units for x axis, default is 1, i.e. days.
...	Additional arguments passed to the plot function.

References

Goodness of fit: Stare J., Pohar Perme M., Henderson R. (2005) "Goodness of fit of relative survival models." *Statistics in Medicine*, **24**: 3911-3925.

Package: Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272-278.

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741-1749, 2007.

See Also

[rs.zph](#), [plot.cox.zph](#).

Examples

```
data(slopop)
data(rdata)
fit <- rsadd(Surv(time, cens) ~ sex + as.factor(agegr) + ratetable(age = age * 365,
  sex = sex, year = year), ratetable = slopop, data = rdata, int = 5)
rszph <- rs.zph(fit)
plot(rszph)
```

rdata

Survival Data

Description

Survival data.

Usage

```
data(rdata)
```

Format

A data frame with 1040 observations on the following 6 variables:

time survival time (in days).

cens censoring indicator (0=censoring, 1=death).

age age (in years).

sex sex (1=male, 2=female).

year date of diagnosis (in date format).

agegr age group.

References

Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272-278.

residuals.rsadd *Calculate Residuals for a "rsadd" Fit*

Description

Calculates partial residuals for an additive relative survival model.

Usage

```
## S3 method for class 'rsadd':
residuals(object, type="schoenfeld", ...)
```

Arguments

object	an object inheriting from class <code>rsadd</code> , representing a fitted additive relative survival model. Typically this is the output from the <code>rsadd</code> function.
type	character string indicating the type of residual desired. Currently only Schoenfeld residuals are implemented.
...	other arguments.

Value

A list of the following values is returned:

res	a matrix containing the residuals for each variable.
varr	the variance for each residual
varr1	the sum of <code>varr</code> .
kvarr	the derivative of each residual, to be used in <code>rs.zph</code> function.
kvarr1	the sum of <code>kvarr</code> .

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

Goodness of fit: Stare J., Pohar Perme M., Henderson R. (2005) "Goodness of fit of relative survival models." *Statistics in Medicine*, **24**: 3911–3925.

See Also

[rsadd](#).

Examples

```
data(slopop)
data(rdata)
fit <- rsadd(Surv(time,cens)~sex+ratetable(age=age*365,sex=sex,year=year),
             ratetable=slopop,data=rdata,int=5)
sresid <- residuals.rsadd(fit)
```

rs.br	<i>Test the Proportional Hazards Assumption for Relative Survival Regression Models</i>
-------	---

Description

Test the proportional hazards assumption for relative survival models (`rsadd`, `rsmul` or `rstrans`) by forming a Brownian Bridge.

Usage

```
rs.br(fit,sc,rho=0,test="max",global=TRUE)
```

Arguments

fit	the result of fitting a relative survival model, using the <code>rsadd</code> , <code>rsmul</code> or <code>rstrans</code> function.
sc	partial residuals calculated by the <code>resid</code> function. This is used to save time if several tests are to be calculated on these residuals and can otherwise be omitted.
rho	a number controlling the weights of residuals. The weights are the number of individuals at risk at each event time to the power <code>rho</code> . The default is <code>rho=0</code> , which sets all weights to 1.
test	a character string specifying the test to be performed on Brownian bridge. Possible values are "max" (default), which tests the maximum absolute value of the bridge, and <code>cvm</code> , which calculates the Cramer Von Mises statistic.
global	should a global Brownian bridge test be performed, in addition to the per-variable tests

Value

an object of class `rs.br`. This function would usually be followed by both a print and a plot of the result. The plot gives a Brownian bridge for each of the variables. The horizontal lines are the 95 of the Brownian bridge

References

Goodness of fit: Stare J., Pohar Perme M., Henderson R. (2005) "Goodness of fit of relative survival models." *Statistics in Medicine*, **24**: 3911–3925.

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[rsadd](#), [rsmul](#), [rstrans](#), [resid](#).

Examples

```
data(slopop)
data(rdata)
fit <- rsadd(Surv(time, cens) ~ sex + ratetable(age=age*365, sex=sex,
      year=year), ratetable=slopop, data=rdata, int=5)
rsbr <- rs.br(fit)
print(rsbr)
plot(rsbr)
```

rs.surv

Compute a Relative Survival Curve

Description

Computes an estimate of the relative survival curve using the Kaplan-Meier method for the observed and the Hakulinen method for the expected survival.

Usage

```
rs.surv(formula, data, ratetable=survexp.us, fin.date, method="hakulinen", ...)
```

Arguments

formula	a formula object, with the response as a <code>Surv</code> object on the left of a <code>~</code> operator, and, if desired, terms separated by the <code>+</code> operator on the right. If the variables are not organized and named in the same way as in the population tables, a <code>ratetable</code> term must be added to match each subject to his/her expected cohort. For a single survival curve the <code>~ 1</code> part of the formula is not required. NOTE: The time must be in days, and the same is required for the <code>ratetable</code> variables (the variables used in the population tables), for example <code>age</code> and <code>year</code> (<code>year</code> must be given in the <code>date</code> format, i.e. in number of days since 01.01.1960).
data	a <code>data.frame</code> in which to interpret the variables named in the <code>formula</code> .

<code>ratetable</code>	a table of event rates, organized as a <code>ratetable</code> object, such as <code>survexp.us</code> .
<code>fin.date</code>	The date of the study ending, used for calculating the potential follow-up times in the Hakulinen method. If missing, it is calculated as <code>max(year+time)</code> .
<code>method</code>	The method for calculating the expected survival. The options are <code>hakulinen</code> (default) and <code>conditional</code> , see <code>survexp</code> for details.
<code>...</code>	other arguments will be passed to the <code>survfit</code> function that calculates the observed survival.

Details

NOTE: All times used in the formula argument must be specified in days. This is true for the follow-up time as well as for any variables needed `ratetable` object, like `age` and `year`. On the contrary, the `int` argument requires interval specification in years.

The potential censoring times needed for the calculation of the expected survival by the Hakulinen method are calculated automatically. The times of censoring are left as they are, the times of events are replaced with `fin.date - year`.

Value

a `survfit` object; see the help on `survfit.object` for details. The `survfit` methods are used for `print`, `plot`, `lines`, and `points`.

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

`survfit`, `survexp`

Examples

```
data(slopop)
data(rdata)
#calculate the relative survival curve
#note that the variable year is given in days since 01.01.1960 and that
#age must be multiplied by 365 in order to be expressed in days.
rs.surv(Surv(time,cens)~sex+ratetable(age=age*365,sex=sex,
  year=year),ratetable=slopop,data=rdata)
```

rs.zph *Behaviour of Covariates in Time for Relative Survival Regression Models*

Description

Calculates the scaled partial residuals of a relative survival model (`rsadd`, `rsmul` or `rstrans`)

Usage

```
rs.zph(fit, sc, transform="identity", var.type="sum")
```

Arguments

<code>fit</code>	the result of fitting an additive relative survival model, using the <code>rsadd</code> , <code>rsmul</code> or <code>rstrans</code> function. In the case of multiplicative and transformation models the output is identical to <code>cox.zph</code> function, except no test is performed.
<code>sc</code>	partial residuals calculated by the <code>resid</code> function. This is used to save time if several tests are to be calculated on these residuals and can otherwise be omitted.
<code>transform</code>	a character string specifying how the survival times should be transformed. Possible values are "km", "rank", "identity" and log. The default is "identity".
<code>var.type</code>	a character string specifying the variance used to scale the residuals. Possible values are "each", which estimates the variance for each residual separately, and <code>sum</code> (default), which assumes the same variance for all the residuals.

Value

an object of class `rs.zph`. This function would usually be followed by a plot of the result. The plot gives an estimate of the time-dependent coefficient $\beta(t)$. If the proportional hazards assumption is true, $\beta(t)$ will be a horizontal line.

References

Goodness of fit: Stare J., Pohar Perme M., Henderson R. (2005) "Goodness of fit of relative survival models." *Statistics in Medicine*, **24**: 3911–3925.

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[rsadd](#), [rsmul](#), [rstrans](#), [resid](#), [cox.zph](#).

Examples

```

data(slopop)
data(rdata)
fit <- rsadd(Surv(time,cens)~sex+ratetable(age=age*365,sex=sex,
      year=year),ratetable=slopop,data=rdata,int=5)
rszph <- rs.zph(fit)

```

rsadd

*Fit an Additive model for Relative Survival***Description**

The function fits an additive model to the data. The methods implemented are the maximum likelihood method, the semiparametric method, a glm model with a binomial error and a glm model with a poisson error.

Usage

```

rsadd(formula, data=parent.frame(), ratetable = survexp.us,
      int, na.action, method, init,bwin,centered,cause,control,...)

```

Arguments

formula	a formula object, with the response on the left of a ~ operator, and the terms on the right. The terms consist of predictor variables separated by the + operator, along with a ratetable term. The ratetable term matches each subject to his/her expected cohort. If the variables are organized and named in the same way as in the population tables, the ratetable term can be omitted. The response must be a survival object as returned by the Surv function. NOTE: The time must be in days, and the same is required for the ratetable variables (the variables used in the population tables), for example age and year (year must be given in the date format, i.e. in number of days since 01.01.1960).
data	a data.frame in which to interpret the variables named in the formula.
ratetable	a table of event rates, organized as a ratetable object, such as survexp.us.
int	either a single value denoting the number of follow-up years or a vector specifying the intervals (in years) in which the hazard is constant (the times that are bigger than max(int) are censored. If missing, only one interval (from time 0 to maximum observation time) is assumed. The EM method does not need the intervals, only the maximum time can be specified (all times are censored after this time point).
na.action	a missing-data filter function, applied to the model.frame, after any subset argument has been used. Default is options()\$na.action.
method	glm.bin or glm.poi for a glm model, EM for the EM algorithm and max.lik for the maximum likelihood model (default).

<code>init</code>	vector of initial values of the iteration. Default initial value is zero for all variables.
<code>bwin</code>	controls the bandwidth used for smoothing in the EM algorithm. The follow-up time is divided into quartiles and <code>bwin</code> specifies a factor by which the maximum between events time length on each interval is multiplied. The default <code>bwin=-1</code> lets the function find an appropriate value. If <code>bwin=0</code> , no smoothing is applied.
<code>centered</code>	if <code>TRUE</code> , all the variables are centered before fitting and the baseline excess hazard is calculated accordingly. Default is <code>FALSE</code> .
<code>cause</code>	A vector of the same length as the number of cases. 0 for population deaths, 1 for disease specific deaths, 2 (default) for unknown. Can only be used with the EM method.
<code>control</code>	a list of parameters for controlling the fitting process. See the documentation for <code>glm.control</code> for details.
<code>...</code>	other arguments will be passed to <code>glm.control</code> .

Details

NOTE: All times used in the formula argument must be specified in days. This is true for the follow-up time as well as for any variables needed `ratetable` object, like `age` and `year`. On the contrary, the `int` argument requires interval specification in years.

The maximum likelihood method and both `glm` methods assume a fully parametric model with a piecewise constant baseline excess hazard function. The intervals on which the baseline is assumed constant should be passed via argument `int`. The EM method is semiparametric, i.e. no assumptions are made for the baseline hazard and therefore no intervals need to be specified.

The methods using `glm` are methods for grouped data. The groups are formed according to the covariate values. This should be taken into account when fitting a model. The `glm` method returns life tables for groups specified by the covariates in `groups`.

The EM method output includes the smoothed baseline excess hazard `lambda0`, the cumulative baseline excess hazard `Lambda0` and `times` at which they are estimated. The individual probabilities of dying due to the excess risk are returned as `Nie`. The EM method fitting procedure requires some local smoothing of the baseline excess hazard. The default `bwin=-1` value lets the function find an appropriate value for the smoothing band width. While this ensures an unbiased estimate, the procedure time is much longer. As the value found by the function is independent of the covariates in the model, the value can be read from the output (`bwinfac`) and used for refitting different models to the same data to save time.

Value

An object of class `rsadd`. In the case of `method="glm.bin"` and `method="glm.poi"` the class also inherits from `glm` which inherits from the class `lm`. Objects of this class have methods for the functions `print` and `summary`. An object of class `rsadd` is a list containing at least the following components:

<code>data</code>	the data as used in the model, along with the variables defined in the rate table
<code>ratetable</code>	the <code>ratetable</code> used.
<code>int</code>	the maximum time (in years) used. All the events at and after this value are censored.

method the fitting method that was used.
 linear.predictors
 the vector of linear predictors, one per subject.

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

EM algorithm: Pohar Perme M., Henderson R., Stare, J. (2009) "An approach to estimation in relative survival regression." *Biostatistics*, **10**: 136–146.

See Also

[rstrans](#), [rsmul](#)

Examples

```
data(slopop)
data(rdata)
#fit an additive model
#note that the variable year is given in days since 01.01.1960 and that
#age must be multiplied by 365 in order to be expressed in days.
fit <- rsadd(Surv(time,cens)~sex+as.factor(agegr)+ratetable(age=age*365,
sex=sex,year=year), ratetable=slopop,data=rdata,int=5)

#check the goodness of fit
rs.br(fit)

#use the EM method and plot the smoothed baseline excess hazard
fit <- rsadd(Surv(time,cens)~sex+age+ratetable(age=age*365,
sex=sex,year=year), ratetable=slopop,data=rdata,int=5,method="EM")
plot(lowess(fit$times,fit$lambda0,f=.2),type="l")
```

rsmul	<i>Fit Andersen et al Multiplicative Regression Model for Relative Survival</i>
-------	---

Description

Fits the Andersen et al multiplicative regression model in relative survival. An extension of the coxph function using relative survival.

Usage

```
rsmul(formula, data, ratetable = survexp.us, int, na.action, init,
method, control, ...)
```

Arguments

<code>formula</code>	a formula object, with the response on the left of a <code>~</code> operator, and the terms on the right. The terms consist of predictor variables separated by the <code>+</code> operator, along with a <code>ratetable</code> term. The <code>ratetable</code> term matches each subject to his/her expected cohort. If the variables are organized and named in the same way as in the population tables, the <code>ratetable</code> term can be omitted. The response must be a survival object as returned by the <code>Surv</code> function. NOTE: The time must be in days, and the same is required for the <code>ratetable</code> variables (the variables used in the population tables), for example <code>age</code> and <code>year</code> (<code>year</code> must be given in the <code>date</code> format, i.e. in number of days since 01.01.1960).
<code>data</code>	a <code>data.frame</code> in which to interpret the variables named in the <code>formula</code> .
<code>ratetable</code>	a table of event rates, such as <code>survexp.us</code> .
<code>int</code>	the number of follow-up years used for calculating survival (the data are censored after this time-point). If missing, it is set to the maximum observed follow-up time.
<code>na.action</code>	a missing-data filter function, applied to the <code>model.frame</code> , after any subset argument has been used. Default is <code>options()\$na.action</code> .
<code>init</code>	vector of initial values of the iteration. Default initial value is zero for all variables.
<code>method</code>	the default method <code>mul</code> assumes hazard to be constant on yearly intervals. Method <code>mul1</code> uses the <code>ratetable</code> to determine the time points when hazard changes. The <code>mul1</code> method is therefore more accurate, but at the same time can be more computationally intensive.
<code>control</code>	a list of parameters for controlling the fitting process. See the documentation for <code>coxph.control</code> for details.
<code>...</code>	Other arguments will be passed to <code>coxph.control</code> .

Details

NOTE: All times used in the `formula` argument must be specified in days. This is true for the follow-up time as well as for any variables needed `ratetable` object, like `age` and `year`. On the contrary, the `int` argument requires interval specification in years.

Value

an object of class `coxph`.

References

- Method: Andersen, P.K., Borch-Johnsen, K., Deckert, T., Green, A., Hougaard, P., Keiding, N. and Kreiner, S. (1985) "A Cox regression model for relative mortality and its application to diabetes mellitus survival data.", *Biometrics*, **41**: 921–932.
- Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278
- Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[rsadd](#), [rstrans](#).

Examples

```
data(slopop)
data(rdata)
#fit a multiplicative model
#note that the variable year is given in days since 01.01.1960 and that
#age must be multiplied by 365 in order to be expressed in days.
fit <- rsmul(Surv(time,cens)~sex+as.factor(agegr)+ratetable(age=age*365,
  sex=sex,year=year),ratetable=slopop,data=rdata)

#check the goodness of fit
rs.br(fit)
```

rstrans

Fit Cox Proportional Hazards Model in Transformed Time

Description

The function transforms each person's time to his/her probability of dying at that time according to the ratetable. It then fits the Cox proportional hazards model with the transformed times as a response. It can also be used for calculating the transformed times (no covariates are needed in the formula for that purpose).

Usage

```
rstrans(formula, data, ratetable, int,na.action,init,control,...)
```

Arguments

formula	a formula object, with the response on the left of a ~ operator, and the terms on the right. The terms consist of predictor variables separated by the + operator, along with a ratetable term. The ratetable term matches each subject to his/her expected cohort.If the variables are organized and named in the same way as in the population tables, the ratetable term can be omitted. The response must be a survival object as returned by the Surv function. NOTE: The time must be in days, and the same is required for the ratetable variables (the variables used in the population tables), for example age and year (year must be given in the date format, i.e. in number of days since 01.01.1960).
data	a data.frame in which to interpret the variables named in the formula.
ratetable	a table of event rates, such as survexp.us.
int	the number of follow-up years used for calculating survival(the rest is censored). If missing, it is set the the maximum observed follow-up time.

<code>na.action</code>	a missing-data filter function, applied to the <code>model.frame</code> , after any subset argument has been used. Default is <code>options()\$na.action</code> .
<code>init</code>	vector of initial values of the iteration. Default initial value is zero for all variables.
<code>control</code>	a list of parameters for controlling the fitting process. See the documentation for <code>coxph.control</code> for details.
<code>...</code>	other arguments will be passed to <code>coxph.control</code> .

Details

NOTE: All times used in the formula argument must be specified in days. This is true for the follow-up time as well as for any variables needed `ratetable` object, like `age` and `year`. On the contrary, the `int` argument requires interval specification in years.

Value

an object of class `coxph`. See `coxph.object` and `coxph.detail` for details.

`y` an object of class `Surv` containing the transformed times (these times do not depend on covariates).

References

Method: Stare J., Henderson R., Pohar M. (2005) "An individual measure for relative survival." *Journal of the Royal Statistical Society: Series C*, **54** 115–126.

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[rsmul](#), [invtime](#), [rsadd](#), [survexp](#).

Examples

```
data(slopop)
data(rdata)

#fit a Cox model using the transformed times
#note that the variable year is given in days since 01.01.1960 and that
#age must be multiplied by 365 in order to be expressed in days.
fit <- rstrans(Surv(time,cens)~sex+as.factor(agegr)+ratetable(age=age*365,
  sex=sex,year=year),ratetable=slopop,data=rdata)

#check the goodness of fit
rs.br(fit)
```

rsurvaux	<i>Auxiliary Function for relsurv</i>
----------	---------------------------------------

Description

This function is not called by the user.

slopop	<i>Census Data Set for the Slovene Population</i>
--------	---

Description

Census data set for the Slovene population.

Usage

```
data(slopop)
```

Examples

```
data(slopop)
```

srvxp.fit	<i>Work Function to Compute Expected Survival</i>
-----------	---

Description

Compute expected survival for a group of people. This function is not to be called by the user.

Usage

```
srvxp.fit(x, y, ratetable)
```

Arguments

x	a data.frame or a matrix. Each row represents one person. The columns must match the dimensions of the <code>ratetable</code> , in the correct order.
y	a vector of survival times of the same length as the number of rows of x.
ratetable	a table of event rates, organized as a <code>ratetable</code> object, such as <code>survexp.us</code> .

Value

A vector of survival times.

survfit.rsadd

Compute a Predicted Survival Curve

Description

Computes a predicted survival curve based on the additive model estimated by rsadd function.

Usage

```
## S3 method for class 'rsadd':
survfit(formula, newdata, se.fit = TRUE, conf.int = 0.95, individual = FALSE,
        conf.type = c("log", "log-log", "plain", "none"), ...)
```

Arguments

formula	a rsadd object
newdata	a data frame with the same variable names as those that appear in the rsadd formula. The curve(s) produced will be representative of a cohort who's covariates correspond to the values in newdata.
se.fit	a logical value indicating whether standard errors should be computed. Default is TRUE.
conf.int	the level for a two-sided confidence interval on the survival curve(s). Default is 0.95.
individual	a logical value indicating whether the data frame represents different time epochs for only one individual (T), or whether multiple rows indicate multiple individuals (F, the default). If the former only one curve will be produced; if the latter there will be one curve per row in newdata.
conf.type	One of none, plain, log (the default), or log-log. The first option causes confidence intervals not to be generated. The second causes the standard intervals curve $\pm k * se(\text{curve})$, where k is determined from conf.int. The log option calculates intervals based on the cumulative hazard or log(survival). The last option bases intervals on the log hazard or log(-log(survival)).
...	Currently not implemented

Details

When predicting the survival curve, the ratetable values for future years will be equal to those of the last given year. The same ratetables will be used for fitting and predicting. To predict a relative survival curve, use `rs.surv.rsadd`.

Value

a survfit object; see the help on `survfit.object` for details. The survfit methods are used for print, plot, lines, and points.

References

Package: Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278.

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

survfit, survexp, [rs.surv](#)

Examples

```
data(slopop)
data(rdata)
fit <- rsadd(Surv(time, cens)~sex+ratetable(age=age*365, sex=sex,
      year=year), ratetable=slopop, data=rdata, method="EM")
survfit.rsadd(fit, newdata=data.frame(sex=1, age=60, year=17000))
```

survsplit

Split a Survival Data Set at Specified Times

Description

Given a survival data set and a set of specified cut times, the function splits each record into multiple records at each cut time. The new data set is in counting process format, with a start time, stop time, and event status for each record. More general than `survSplit` as it also works with the data already in the counting process format.

Usage

```
survsplit(data, cut, end, event, start, id = NULL, zero = 0,
  episode = NULL, interval=NULL)
```

Arguments

<code>data</code>	data frame.
<code>cut</code>	vector of timepoints to cut at.
<code>end</code>	character string with name of event time variable.
<code>event</code>	character string with name of censoring indicator.
<code>start</code>	character string with name of start variable (will be created if it does not exist).
<code>id</code>	character string with name of new id variable to create (optional).
<code>zero</code>	If <code>start</code> doesn't already exist, this is the time that the original records start. May be a vector or single value.
<code>episode</code>	character string with name of new episode variable (optional).
<code>interval</code>	this argument is used by <code>max.lik</code> function

Value

New, longer, data frame.

See Also

[survSplit](#).

transrate	<i>Reorganize Data into a Ratetable Object</i>
-----------	--

Description

The function assists in reorganizing certain types of data into a ratetable object.

Usage

```
transrate(men, women, yearlim, int.length=1)
```

Arguments

men	a matrix containing the yearly (conditional) probabilities of one year survival for men. Rows represent age (increasing 1 year per line, starting with 0), the columns represent cohort years (the limits are in <code>yearlim</code> , the increase is in <code>int.length</code>).
women	a matrix containing the yearly (conditional) probabilities of one year survival for women.
yearlim	the first and last cohort year given in the tables.
int.length	the length of intervals in which cohort years are given.

Details

This function only applies for ratetables that are organized by age, sex and year.

Value

An object of class `ratetable`.

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[ratetable](#).

Examples

```
men <- cbind(exp(-365*exp(-14.5+.08*(0:100))), exp(-365*exp(-14.7+.085*(0:100))))
women <- cbind(exp(-365*exp(-15.5+.085*(0:100))), exp(-365*exp(-15.7+.09*(0:100))))
table <- transrate(men,women,yearlim=c(1980,1990),int.length=10)
```

transrate.hld	<i>Reorganize Data obtained from Human Life-Table Database into a Ratetable Object</i>
---------------	--

Description

The function assists in reorganizing the .txt files obtained from Human Life-Table Database (<http://www.lifetable.de> -> Data by Country) into a ratetable object.

Usage

```
transrate.hld(file,cut.year,race)
```

Arguments

file	a vector of file names which the data are to be read from. Must be in .tex format and in the same format as the files in Human Life-Table Database.
cut.year	a vector of cutpoints for years. Must be specified when the year spans in the files are not consecutive.
race	a vector of race names for the input files.

Details

This function works with any table organised in the format provided by the Human Life-Table Database, but currently only works with TypeLT 1 (i.e. age intervals of length 1). The age must always start with value 0, but can end at different values (when that happens, the last value is carried forward). The rates between the cutpoints are taken to be constant.

Value

An object of class `ratetable`.

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[ratetable](#), [transrate.hmd](#), [joinrate](#), [transrate](#).

Examples

```
## Not run:
finpop <- transrate.hld(c("FIN_1981-85.txt", "FIN_1986-90.txt", "FIN_1991-95.txt"))
## End(Not run)
## Not run:
nzpop <- transrate.hld(c("NZL_1980-82_Non-maori.txt", "NZL_1985-87_Non-maori.txt",
                        "NZL_1980-82_Maori.txt", "NZL_1985-87_Maori.txt"),
                      cut.year=c(1980,1985), race=rep(c("nonmaori", "maori"), each=2))
## End(Not run)
```

transrate.hmd	<i>Reorganize Data obtained from Human Mortality Database into a Ratetable Object</i>
---------------	---

Description

The function assists in reorganizing the .txt files obtained from Human Mortality Database (<http://www.mortality.org>) into a ratetable object.

Usage

```
transrate.hmd(male, female)
```

Arguments

male	a .txt file, containing the data on males.
female	a .txt file, containing the data on females.

Details

This function works with tables organised in the format provided by the Human Mortality Database. The period lifetables, organized by date of death, must be downloaded separately for men and women for each country and the top line deleted. The function only works for tables that have yearly cutpoints for age as well as calendar year (1x1). The only two columns needed are calendar year (Year) and probability of death (qx). Death probabilities must be calculated up to age 110 (in yearly intervals).

Value

An object of class `ratetable`.

References

Package. Pohar M., Stare J. (2006) "Relative survival analysis in R." *Computer Methods and Programs in Biomedicine*, **81**: 272–278

Relative survival: Pohar, M., Stare, J. (2007) "Making relative survival analysis relatively easy." *Computers in biology and medicine*, **37**: 1741–1749.

See Also

[ratetable](#), [transrate.hld](#), [joinrate](#), [transrate](#).

Examples

```
## Not run:  
auspop <- transrate.hmd("mltper_1x1.txt", "fltper_1x1.txt")  
## End (Not run)
```

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