uRegression Function Descriptions
Version 20121206

This document contains help files for the unified regression functions:

- `regress( )`: general regression for an arbitrary functional (mean, geometric mean, proportion, ...), possibly subsetted.

- `uModel( )`: regression model specification for use in `regress()`.

- `print.uRegress( )`: the print method for `uRegress` objects returned by `regress()`.

Note that these functions depend on the `survival` and `sandwich` R libraries.

Function Interface: regress

Description

Produces point estimates, interval estimates, and p values for an arbitrary functional (mean, geometric mean, proportion, median, quantile, odds) of a variable of class `integer, numeric, Surv,` when regressed on an arbitrary number of covariates.

Usage

```
regress (fnctl, y,  model, intercept=fnctl!="hazard",  strata=rep(1,n), weights=rep(1,n), id=1:n,
subset=rep(T,n), robustSE = T, conf.level=0.95, exponentiate=fnctl!="mean",
replaceZeroes, useFdstn=T, ..., version=F)
```

Arguments

`fnctl`	a character string indicating the functional (summary measure of the distribution) for which inference is desired. Choices include `"mean"`, `"geometric mean"`, `"odds"`, `"rate"`,`"hazard"`. The character string may be shortened to a unique substring. Hence `"mea"` will suffice for `"mean"`.
`y`	a variable that serves as the response variable in the regression model. The variable may be of class `numeric`, or `Surv`.
`model`	a single numeric vector, a matrix of variables, a list of variables, or a uModel object that specifies the hierarchical testing to be returned..

strata	vector indicating a a variable to be used for stratification in proportional hazards regression.
weights	vector indicating optional weights for weighted regressions.
subset	vector indicating a subset to be used for all inference.
robustSE	a logical indicator that standard errors are to be computed using the Huber-White sandwich estimator.
conf.level	a numeric scalar indicating the level of confidence to be used in computing confidence intervals. The default is 0.95.
exponentiate	a logical indicator that the regression parameters should be exponentiated. This is by default true for all functionals except the mean.
replaceZeroes	if not FALSE, this indicates a value to be used in place of zeroes when computing a geometric mean. If TRUE, a value equal to one-half the lowest nonzero value is used. If a numeric value is supplied, that value is used.
useFdstn	a logical indicator that the F distribution should be used for test statistics instead of the chi squared distribution even in logistic and proportional hazard regression models. When using the F distribution, the degrees of freedom are taken to be the sample size minus the number of parameters, as it would be in a linear regression model.

Value

An object of class uRegress is returned. Parameter estimates, confidence intervals, and p values are contained in a matrix $augCoefficients.

Details

Regression models include linear regression (for the "mean" functional), logistic regression (for the "odds functional"), Poisson regression (for the "rate" functional), and proportional hazards regression (for the "hazard" functional).

Examples

```
# Sourcing the R code and loading required libraries
source("http://www.emersonstatistics.com/courses/formal/b517_2012/uDescriptives.txt")
source("http://www.emersonstatistics.com/courses/formal/b517_2012/uRegression.txt")
library(survival)
library(sandwich)

# Reading in a dataset
mri <- read.table("http://www.emersonstatistics.com/datasets/mri.txt",header=T)

# Creating a Surv object to reflect time to death
mri$ttodth <- Surv(mri$obstime,mri$death)
```

```
# Attaching the mri dataset
attach(mri)

# Linear regression of LDL on age (with robust SE by default)
regress ("mean", ldl, age)

# Linear regression of LDL on age and sex (with robust SE by default)
regress ("mean", ldl, uModel(age, male))

# Logistic regression on the odds of LDL greater than 140 by age
regress ("odds",ldl>140,age)

# Proportional hazards regression of time to death on LDL
regress ("hazard",ttodth,ldl)
```

Function Interface: uModel

Description

Allows specification of complex regression models in a way that multiple partial F tests will be automatically returned. This function is used with `regress()`.

Usage

```
uModel (..., version=F)
```

Arguments

   `...`   an arbitrary number of numeric vectors, matrices, and lists containing predictors to be used in a multiple regression model. Multiple partial F tests will be returned for all groups of variables contained in a single matrix or a single list.

Value

An object of class `uModel` is returned.

Examples

```
# Sourcing the R code and loading required libraries
source("http://www.emersonstatistics.com/courses/formal/b517_2012/uDescriptives.txt")
source("http://www.emersonstatistics.com/courses/formal/b517_2012/uRegression.txt")
library(survival)
library(sandwich)

# Reading in a dataset
mri <- read.table("http://www.emersonstatistics.com/datasets/mri.txt",header=T)
```

```
# Creating a Surv object to reflect time to death
mri$ttodth <- Surv(mri$obstime,mri$death)

# Attaching the mri dataset
attach(mri)

# Linear regression of LDL on age and sex (with robust SE by default)
regress ("mean", ldl, uModel(age, male))

# Logistic regression on the odds of LDL greater than 140 by age,
# sex, and the multiplicative age sex interaction.
# A test will be performed on sex and the age sex interaction.
regress ("odds",ldl>140,uModel(age,inter=cbind(male,m.a=male*age)))
```