Package 'afttest'

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Type Package

Title Model Diagnostics for Accelerated Failure Time Models

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Author WooJung Bae [aut, cre],
Dongrak Choi [aut],
Sangwook Kang [aut]

Maintainer WooJung Bae <matt.woojung@gmail.com>

URL https://github.com/WooJungBae/afttest

BugReports https://github.com/WooJungBae/afttest/issues

Description A collection of model checking methods for semiparametric accelerated failure time (AFT) models under the rank-based approach. For the (computational) efficiency, Gehan's weight is used. It provides functions to verify whether the observed data fit the specific model assumptions such as a functional form of each covariate, a link function, and an omnibus test. The p-value offered in this package is based on the Kolmogorov-type supremum test and the variance of the proposed test statistics is estimated through the re-sampling method. Furthermore, a graphical technique to compare the shape of the observed residual to a number of the approximated realizations is provided.

License GPL (>= 3)

Depends R (>= 3.4.0)

Imports Rcpp, survival, aftgee, ggplot2, gridExtra

LinkingTo Rcpp, RcppArmadillo

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R **topics documented:**

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afttest   *afttest*

Description

It gives several test statistics for cheking the aft model assumptions.

Usage

```
afttest(
  formula,
  path = 200,
  testtype = c("omni", "link", "form"),
  eqType = c("mis", "mns"),
  optimType = c("DFSANE", "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", "SANN", "Brent"),
  form = 1,
  pathsave = 100
)
```

Arguments

formula	The argument formula specifies the model to be fitted with the variables coming with data. The expression of the formula argument is equivalent to the Surv in the survival package. The object Surv consists of two columns. The first one is the observed failure time and the second one is the indicator variable, specifying right censoring.
path	The argument path determines the number of simulations of the approximated process. The default is given by 200.
testtype	The argument testtype includes the aforementioned an omnibus test ("omni"), a functional form ("form") and a link function ("linkftn"). The rank weight in the package is the Gehan"s weight and each weight of the test statistics is determined by the testtype arguments. The default option for testtype is given by "omni".
eqType	The argument eqType determines the equation type to estimate the regression parameter while generating approximated process. The following are permitted. Regression parameters are estimated by directly solving the monotonic nonsmooth estimating equations ("mns"). Regression parameters are estimated by directly solving the monotonic induced-smoothing estimating equations.

optimType	The argument optimType determines the algorithm to the objective function be minimized. User can choose one of the following algorithms: "DFSANE", "Nelder-Mead", "BFGS", "CG", "L-BFGS-B", "SANN", and "Brent". The default option is "DFSANE".
form	The argument form is necessary only if testtype is given as "form" and it determines a covariate which will be tested. It needs to be specified the name of covariates in the formula argument and the default option is "1, which represents the first covariate in the formula argument.
pathsave	The argument pathsave is optional and it is the number of paths saved among all the paths. It must be less than or equal to the argument path. 100 is set to be the default. Note that it requires a lot of memory if we save all sampled paths (N by N matrix for each path and so path*N*N elements)

Value

The function afttest gives the list as a result. The result consists of the number of paths ($path), the estimated beta ($beta), the observed failure time ($Time), the right censoring indicator ($Delta), the covariates ($Covari), the time-transformed residual ($Resid), the estimated standard error of the observed process ($SE_process), the observed process ($obs_process), a number of the simulated processes ($app_process), the standardized observed process ($obs_std_process), the standardized processes of realizations ($app_std_process) and two kinds of the p-value obtained by the unstandardized test and the standardized test ($p_value and $p_std_value). Now, we offer two types of p-values for all tests even though the p-value for the standardized test is only used for an omnibus test. For an omnibus test, the observed process and the realizations are composed of the n by n matrix that rows represent the t and columns represent the x in the time-transformed residual order. The observed process and the simulated processes for checking a functional form and a link function are given by the n by 1 vector which is a function of x in the time-transformed residual order.

Examples

```
library(afttest)
library(survival)

set.seed(1)
path = 3

cgd_data = subset(cgd,enum==1)
D_cgd = cgd_data$status
X_cgd = cgd_data$tstop - cgd_data$tstart
X_cgd = X_cgd + runif(length(X_cgd))/1e4

trt = ifelse(cgd_data$treat=="placebo",0,1)
str = cgd_data$steroids
age = cgd_data$age
wei = cgd_data$weight

result01_afttest_omni_mns=afttest(Surv(X_cgd,D_cgd)~
   trt+str+age+wei,path=path,testtype="omni",eqType="mns")
result01_afttest_omni_mns$p_value
```

```
result01_afttest_omni_mns$p_std_value
```

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afttestplot   *afttestplot*

Description

It gives plot for cheking the aft model assumptions.

Usage

```
afttestplot(result, path = 100, std = "std")
```

Arguments

result	For function afttestplot, the only required argument is afttestresult based on the result from the afttest function. Whatever the testtype of the result is, it automatically gives the corresponding graph.
path	The argument path is for the number of the simulation paths that is plotted in the graph. Therefore it needs to be equal or less than the number of paths used in by afttest function, otherwise it is given as the number of paths used in by afttest function. The default is set to be 100.
std	The option for the argument std is "unstd" and "std". In this argument, "std" is the default.

Value

Basically, a graph from the afttestplot is based on the packages ggplot2 (Wickham, 2009) and gridExtra (Auguie, 2017). It offers a graph that y-axis is the test statistics and x-axis represents the rank of the subjects ordered by time transformed residual. Since the result of the omnibus test is the form of n by n matrix, some quantiles of x, which are used in weight, are plotted for graphs, i.e. 0 are used.

Examples

```
library(afttest)
library(survival)

set.seed(1)
path = 3

cgd_data = subset(cgd,enum==1)
D_cgd = cgd_data$status
X_cgd = cgd_data$tstop - cgd_data$tstart
X_cgd = X_cgd + runif(length(X_cgd))/1e4

trt = ifelse(cgd_data$treat=="placebo",0,1)
```

```
str = cgd_data$steroids
age = cgd_data$age
wei = cgd_data$weight

result01_afttest_omni_mns=afttest(Surv(X_cgd,D_cgd)~
    trt+str+age+wei,path=path,testtype="omni",eqType="mns")
afttestplot(result01_afttest_omni_mns,std="std")
```

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plotting_form	*plotting_form*

Description

It gives plot for cheking the aft model assumptions.

Usage

```
plotting_form(result, path, std)
```

Arguments

result   For function afttestplot, the only required argument is afttestresult based on the result from the afttest function. Whatever the testtype of the result is, it automatically gives the corresponding graph.

path   The argument path is for the number of the simulation paths that is plotted in the graph. Therefore it needs to be equal or less than the number of paths used in by afttest function, otherwise it is given as the number of paths used in by afttest function. The default is set to be 100.

std   The option for the argument std is "unstd" and "std". In this argument, "std" is the default.

Value

Basically, a graph from the afttestplot is based on the packages ggplot2 (Wickham, 2009) and gridExtra (Auguie, 2017). It offers a graph that y-axis is the test statistics and x-axis represents the rank of the subjects ordered by time transformed residual.

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plotting_link   *plotting_link*

Description

It gives plot for cheking the aft model assumptions.

Usage

```
plotting_link(result, path, std)
```

Arguments

result   For function afttestplot, the only required argument is afttestresult based on the
                result from the afttest function. Whatever the testtype of the result is, it auto-
                matically gives the corresponding graph.

path   The argument path is for the number of the simulation paths that is plotted in the
                graph. Therefore it needs to be equal or less than the number of paths used in by
                afttest function, otherwise it is given as the number of paths used in by afttest
                function. The default is set to be 100.

std   The option for the argument std is "unstd" and "std". In this argument, "std" is
                the default.

Value

Basically, a graph from the afttestplot is based on the packages ggplot2 (Wickham, 2009) and
gridExtra (Auguie, 2017). It offers a graph that y-axis is the test statistics and x-axis represents the
rank of the subjects ordered by time transformed residual.

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plotting_omni   *plotting_omni*

Description

It gives plot for cheking the aft model assumptions.

Usage

```
plotting_omni(result, path, std)
```

Arguments

result
: For function afttestplot, the only required argument is afttestresult based on the result from the afttest function. Whatever the testtype of the result is, it automatically gives the corresponding graph.

path
: The argument path is for the number of the simulation paths that is plotted in the graph. Therefore it needs to be equal or less than the number of paths used in by afttest function, otherwise it is given as the number of paths used in by afttest function. The default is set to be 100.

std
: The option for the argument std is "unstd" and "std". In this argument, "std" is the default.

Value

Basically, a graph from the afttestplot is based on the packages ggplot2 (Wickham, 2009) and gridExtra (Auguie, 2017). It offers a graph that y-axis is the test statistics and x-axis represents the rank of the subjects ordered by time transformed residual. Since the result of the omnibus test is the form of n by n matrix, some quantiles of x, which are used in weight, are plotted for graphs, i.e. 0 are used.

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