Package ‘funest’

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Title Functional Ensemble Survival Tree for Dynamic Prediction

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Description
A fast implementation of functional ensemble survival tree is provided to facilitate dynamic prediction with right-censored data. Multiple time-varying covariates can be accommodated via multivariate principal component analysis. These extracted features along with baseline covariates are nested within the ensemble survival tree where dynamic prediction can be done under user-specified sliding windows. Prediction accuracy measures, Area under the receiver operating characteristic (ROC) curve and Brier score, are provided in this package.

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Encoding UTF-8

LazyData true

KeepSource TRUE

RoxygenNote 7.0.2

Depends R (>= 3.5.0)

Imports MFPCA, funData, ranger, survival, pec, tdROC, prodlim, Rdpack, purrr

RdMacros Rdpack

Suggests testthat

NeedsCompilation no

Repository CRAN

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funest_fit

Fitting functional ensemble survival tree model

Description

The function funest_fit takes a long and a short form of the survival data, among other arguments for a random survival forest, to fit an functional ensemble survival tree model for predicting survival probability.

Usage

funest_fit(
  long_train,
  surv_train,
  noftree = 500,
  nofcov = 2,
  split_rule = "maxstat",
  tv_names,
  fv_names,
  nofp = 3,
  t_star,
  t_pred,
  ...
)

Arguments

  long_train | long form of survival data from the training set
  surv_train | short form of survival data from the training set
  noftree    | number of trees in the random survival forest
  nofcov     | number of covariates selected in each survival tree
  split_rule | binary splitting rule for random survival forest, default is "maxstat"
  tv_names   | a list of names of time-varying covariates
  fv_names   | a list of names of fixed covariates
  nofp       | number of multivariate principal components
  t_star     | time for the last observed biomarker measurement
  t_pred     | time at prediction
  ...        | extra arguments that can be passed to ranger()
funest_pred

Value

A list composed two items. The first item is a list of necessary information for prediction used in funest_pred() function. The second item is the ranger object of the fitted random survival forest.

- **misc** - a list composed of 1) long_train: long form of survival data from the training set, 2) surv_train: short form of survival data from the training set, 3) fmla: covariates passed into the ensemble survival tree 4) score_names: intermediate names for the covariates 5) nofp: number of multivariate principal components 6) train_data.sub: data frame of all covariates after MFPCA been performed
- **rg** - functional ensemble survival tree model

References


Examples

```r
library(funest)
data("long_train")
data("surv_train")
w = funest_fit(long_train, surv_train, tv_names = list("Y1", "Y2", "Y3"), fv_names = list("W"), noftree = 10, t_star = 5.5, t_pred = 11)
```

funest_pred Predicting survival probability with time-varying covariates

Description

The function funest_pred takes the functional ensemble survival tree object from funest_fit() to produce predicted survival probability at user specified t_star and t_pred along with prediction accuracy measures. Must run "predictSurvProb.ranger = predictor_loader()" before calling this function.

Usage

```r
funest_pred(
  funest.fit,
  long_test,
  surv_test,
  tv_names,
  fv_names,
  t_star,
  t_pred
)
```
Arguments

funest.fit  returned object from funest_fit() function
long_test  long form of survival data from the testing set
surv_test  short form of survival data from the testing set
tv_names  a list of names of time-varying covariates
tv_names  a list of names of fixed covariates
t_star  time for the last observed biomarker measurement
t_pred  time at prediction

Value

A list of three items. The first is a matrix of individual ID and their corresponding predicted survival probability. The second is the estimated Brier score. The third is the estimated area under the ROC curve.

- pred_pb - predicted survival probability at t_pred for each individual conditional on being alive at t_star
- bs - Brier score
- AUC - area under the receiver operating characteristic (ROC) curve

References


Examples

library(funest)
data("long_train")
data("surv_train")
data("long_test")
data("surv_test")
# must run the following line before calling funest_pred()
predictSurvProb.ranger = predictor_loader()
w = funest_fit(long_train, surv_train, tv_names = list("Y1", "Y2", "Y3"), noftree = 10,
            tv_names = list("W"), t_star = 5.5, t_pred = 11)
pred = funest_pred(w, long_test, surv_test, tv_names = list("Y1", "Y2", "Y3"),
                tv_names = list("W"), t_star = 5.5, t_pred = 11)
pred$bs
pred$AUC
long_test

long_test  A sample of long form of testing data

Description
This contains the long form of the simulated testing data.

Usage
data(long_test)

Format
data.frame

Examples
data(long_test)

long_train  A sample of long form of training data

Description
This contains the long form of the simulated training data.

Usage
data(long_train)

Format
data.frame

Examples
data(long_train)
predictor_loader

Description

An intermediate function for loading the necessary function into .GlobalEnv

Usage

predictor_loader()

Value

None

Examples

# must run the following code before calling funest_pred()
predictSurvProb.ranger = predictor_loader()

surv_test

A sample of short form of testing data

Description

This contains the short form of the simulated testing data.

Usage

data(surv_test)

Format

data.frame

Examples

data(surv_test)
Surv_train

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**surv_train**

*A sample of short form of training data*

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**Description**

This contains the short form of the simulated training data.

**Usage**

```r
data(surv_train)
```

**Format**

`data.frame`

**Examples**

```r
data(surv_train)
```
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