Package ‘survIDINRI’

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Description Performs inference for a class of measures to compare competing risk prediction models with censored survival data. The class includes the integrated discrimination improvement index (IDI) and category-less net reclassification index (NRI).
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Description

Performs inference for a class of measures to compare competing risk prediction models with censored survival data. The class includes the integrated discrimination improvement index (IDI) and category-less net reclassification index (NRI).

Details

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Author(s)

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Maintainer: Hajime Uno <huno@jimmy.harvard.edu>

References


See Also

survC1-package

Examples

#--- sample data (pbc in survival package) ---
D=subset(pbc, select=c("time","status","age","albumin","edema","protime","bili"))
D$status=as.numeric(D$status==2)
D=D[!is.na(apply(D,1,mean)),] ; dim(D)
mydata=D[1:100,]
t0=365*5
indata1=mydata;
indata0=mydata[,,-7] ; n=nrow(D) ;
covs1<-as.matrix(indata1[,c(-1,-2)])
covs0<-as.matrix(indata0[,c(-1,-2)])

#--- inference ---
x<IDI.INF(mydata[,1:2], covs0, covs1, t0, npert=200) ;

#--- results ---
IDI.INF.OUT(x) ;

#--- Graphical presentation of the estimates ---
# IDI.INF.GRAPH(x) ;

IDI.INF

Inference for IDI, continuous NRI, and median improvement

Description
This function performs inference for IDI, continuous NRI, and median improvement. Censoring is adjusted by the inverse probability censoring weight. Proportional hazards models are used as working models.

Usage
IDI.INF(indata, covs0, covs1, t0, npert = 300,
npert.rand = NULL, seed1 = NULL, alpha = 0.05)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>indata</td>
<td>Time-to-event data. The number of columns should be 2. The 1st column should be time-to-event, and the 2nd column is event indicator (1=event, 0=censor).</td>
</tr>
<tr>
<td>covs0</td>
<td>Covariates/predictors data for a base model (Model 0). Factor variables or character variables are not allowed. If any factor variable is involved in the set of predictors, use <code>model.matrix()</code> for dummy coding. covs0 need to be a design matrix. Also missing value should not be included here.</td>
</tr>
<tr>
<td>covs1</td>
<td>Covariates/predictors data for a new model (Model 0). Factor variables or character variables are not allowed. If any factor variable is involved in the set of predictors, use <code>model.matrix()</code> for dummy coding. covs1 need to be a design matrix. Also missing value should not be included here.</td>
</tr>
<tr>
<td>t0</td>
<td>A timepoint to define event=yes/no (case/control). Risk score is calculated as the event probability at t0 for each model.</td>
</tr>
<tr>
<td>npert</td>
<td>The number of iterations for the perturbation-resampling. Default is 300.</td>
</tr>
</tbody>
</table>
**npert.rand**  
If NULL (default), fresh random numbers will be generated in this routine. If a \((n \times m)\) matrix is given as npert.rand, those numbers are used in the perturbation instead, where \(n\) is the number of subjects and \(m\) is the number of iterations of the resampling. The random numbers should be generated from a distribution with mean 1 and variance 1 independently.

**seed1**  
A seed for generating random numbers for the perturbation-resampling. Default is NULL.

**alpha**  
(1-\(\alpha/2\)) confidence interval will be calculated. A 0.95 confidence interval will be provided as a default.

**Value**

\[ \text{m1} \]
Result of IDI. Point and corresponding (1-\(\alpha/2\)) confidence interval are given

\[ \text{m2} \]
Result of continuous-NRI. Point and corresponding (1-\(\alpha/2\)) confidence interval are given. Note that \(m2\) corresponds to the quantity defined as “1/2 NRI(>0)” in Pencina et al.(2011)

\[ \text{m3} \]
Result of median improvement in risk score. Point and corresponding (1-\(\alpha/2\)) confidence interval are given

\[ \text{m1.est} \]
A vector with 3 elements. The 1st element is the point estimate of the IDI and the 2nd element is the average of risk score in “event” group, and the 3rd element is the average of risk score in “non-event” group. The 1st element is equal to the 2nd element minus the 3rd element.

\[ \text{m2.est} \]
A vector with 3 elements. The 1st element is the point estimate of the continuous-NRI. The 2nd element is the proportion of patients in whom the risk scores with the new model were higher than the risk scores with the old model, among “event” group. The 3rd element is the same proportion but among “non-event” group. The 1st element is equal to the 2nd element minus the 3rd element.

\[ \text{m3.est} \]
A vector with 3 elements. The 1st element is the point estimate of the median improvement and the 2nd element is the median of risk score in “event” group, and the 3rd element is the median of risk score in “non-event” group. The 1st element is equal to the 2nd element minus the 3rd element.

\[ \text{m3.est} \]
A vector with 3 elements. The 1st element is the point estimate of the median improvement and the 2nd element is the median of risk score in “event” group, and the 3rd element is the median of risk score in “non-event” group. The 1st element is equal to the 2nd element minus the 3rd element.

**point**  
An object used in IDI.INF.GRAPH()

**Note**

\(m2\) corresponds to the quantity defined as “1/2 NRI(>0)” in Pencina et al.(2011)

When the base model and the new model are nested, make sure that regression coefficients for the added predictors are significantly different from 0 in the new model, before using this function.
References


See Also

Papers regarding the issue on evaluating nested models:


Examples

```r
#--- sample data (pbc in survival package) ---
D=subset(pbc, select=c("time","status","age","albumin","edema","protime","bili"))
D$status=as.numeric(D$status==2)
D=D[!is.na(apply(D,1,mean)),] ; dim(D)
mydata=D[1:100,]
t0=365*5
indata1=mydata;
indata0=mydata[,,-7] ; n=nrow(D) ;
covs1<-as.matrix(indata1[,c(-1,-2)])
covs0<-as.matrix(indata0[,c(-1,-2)])

#--- inference ---
x<-IDI.INF(mydata[,1:2], covs0, covs1, t0, npert=200) ;

#--- results ---
IDI.INF.OUT(x) ;

#--- Graphical presentanion of the estimates ---
# IDI.INF.GRAPH(x) ;
```

IDI.INF.GRAPH

Function to display IDI and other measures in a graph

Description

This function generates a plot to graphically display IDI, continuous NRI, and median improvement.
Usage

IDI.INF.GRAPH(x, main = NULL, xlab = NULL, ylab = NULL,
cex.main = NULL, cex.lab = NULL, ...)

Arguments

x An object generated by IDI.INF
main main title of graph
xlab label of x-axis. The default is "s"
ylab label of y-axis. The default is expression(paste("pr(\hat{D} \leq s")
cex.main size of the main title
cex.lab size of the labels
... Arguments passed to plot()

Details

This function provide a plot to graphically display IDI, continuos-NRI and median improvement.

Examples

## see example in IDI.INF

IDI.INF.OUT

Function to print the summary

Description

This function display a summary result performed by IDI.INF()

Usage

IDI.INF.OUT(x)

Arguments

x An object generated by IDI.INF

Details

This function displays the point estimates of IDI, continuos-NRI and median improvement, and corresponding (1-alpha) confidence intervals.
Examples

## see example in IDI.INF
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