Title  Refining Evaluation Methodology on Stage System

Description

T (extent of the primary tumor), N (absence or presence and extent of regional lymph node metastasis) and M (absence or presence of distant metastasis) are three components to describe the anatomical tumor extent. TNM stage is important in treatment decision-making and outcome predicting. The existing oropharyngeal Cancer (OPC) TNM stages have not made distinction of the two sub sites of Human papillomavirus positive (HPV+) and Human papillomavirus negative (HPV-) diseases. We developed novel criteria to assess performance of the TNM stage grouping schemes based on parametric modeling adjusting on important clinical factors. These criteria evaluate the TNM stage grouping scheme in five different measures: hazard consistency, hazard discrimination, explained variation, likelihood difference, and balance. The methods are described in Xu, W., et al. (2015) <https://www.austinpublishinggroup.com/biometrics/fulltext/biometrics-v2-id1014.php>.

Depends  R (>= 3.5.0)

License  GPL-2

Encoding  UTF-8

LazyData  true

Imports  survival

RoxygenNote  6.1.1

Suggests  knitr, rmarkdown, testthat

VignetteBuilder  knitr

NeedsCompilation  no

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Repository  CRAN

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### Description

`balance_measure` returns balance measurement for the grouping scheme.

### Usage

```r
balance_measure(OS_ind, stage_list, data)
```

### Arguments

- **OS_ind**
  
  OS_ind is the survival indicator variable.

- **stage_list**
  
  stage_list original of each scheme.

- **data**
  
  Data set.

### Value

Ranking of balance measurement and its standardized score.

### References

explain_var_measure

**Explanation**

explain_var_measure returns explained variation measurement for the grouping scheme.

**Usage**

```r
explain_var_measure(main_list, stage_list, stage_list_2, covar_list, data)
```

**Arguments**

- `main_list`: main_list includes survival indicator variable, Duration time of survival variable and basic group variable.
- `stage_list`: stage_list original of each scheme.
- `stage_list_2`: stage_list_2 is numerical form of each scheme by using other of stages information.
- `covar_list`: Covariate variables taking into consideration.
- `data`: Data set.

**Value**

Ranking of explained variation measurement and its standardized score.

**References**


hz_cons_measure

**Explanation**

hz_cons_measure returns Hazard consistency for the grouping scheme.

**Usage**

```r
hz_cons_measure(main_list, stage_list, covar_list, data)
```
hz_dis_measure

Arguments

<table>
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<th>Argument</th>
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<tr>
<td>main_list</td>
<td>main_list includes survival indicator variable, Duration time of survival variable and basic group variable.</td>
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<td>Covariate variables taking into consideration.</td>
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Value

Ranking of hazard consistency measurement and standardized score.

References


hz_dis_measure returns hazard discrimination for the grouping scheme.

Usage

hz_dis_measure(main_list, stage_list, stage_list2, covar_list, data)

Arguments

<table>
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<tr>
<th>Argument</th>
<th>Description</th>
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<tbody>
<tr>
<td>main_list</td>
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<td>stage_list original of each scheme.</td>
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<td>covar_list</td>
<td>Covariate variables taking into consideration.</td>
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<tr>
<td>data</td>
<td>Data set.</td>
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</tbody>
</table>

Value

Ranking of hazard discrimination measurement and its standardized score.

References

**lik_diff_measure**

**Likelihood difference measurement.**

**Description**

lik_diff_measure returns likelihood difference for the grouping scheme.

**Usage**

```r
lik_diff_measure(main_list, stage_list, covar_list, data)
```

**Arguments**

- `main_list`: main_list includes survival indicator variable, Duration time of survival variable and basic group variable.
- `stage_list`: stage_list is numerical form of each scheme by using other of stages information.
- `covar_list`: Covariate variables taking into consideration.
- `data`: Data set.

**Value**

Ranking of likelihood difference measurement and its standardized score.

**References**


---

**overall_rank**

**Overall Ranking.**

**Description**

overall_rank returns overall ranking for the grouping scheme.

**Usage**

```r
overall_rank(HCM, HDM, LDM, EVM, BM, weight)
```
Arguments

HCM  HCM is the hazard consistency measurement results.
HDM  HDM is the hazard discrimination measurement results.
LDM  LDM is the likelihood difference measurement results.
EVM  EVM is the explained variance measurement results.
BM   BM is the balance measurement results.
weight  weight vector of five measurements.

Value

Overall score and overall ranking.

References


Description

rank returns five measurements for the grouping scheme and its overall rank.

Usage

rank(os, ostime, groupvar, scheme, order, covariate, weight, data)

Arguments

os  Survival indicator, 1 for death, 0 for censoring.
ostime  Duration time of survival.
groupvar  Basic group variable having the most number of stages.
scheme  Different grouping scheme, which has less stages than the basic group variable.
order  The other of stages in each grouping, from
covariate  Covariate variables taking into consideration.
weight  Weight on five measurements of grouping scheme.
data  Data set.

Value

Ranking of five measurements, which are Hazard consistency, Hazard discrimination, Explained variation, Likelihood difference and Balance. By standardized each measurement score, we provides overall ranking of schemes.
References


Examples

```r
data(Rdata)
Scheme=c('Scheme.1','Scheme.2','Scheme.3')
Covar=c('Age','Treatment')
weight=c(1,1,0.5,0.5,1)
Order=list(c('I','II','III'),c('I','II','III','IV'),c('I','II','III','IV'))
rank(os='OS',ostime='survmonth',groupvar='Basic_group', scheme=Scheme, order=Order, covariate=Covar,weight=weight,data=Rdata)
```

<table>
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<th>Rdata</th>
<th>Simulation data for Genetic association models for X-chromosome SNPS</th>
</tr>
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Description

A simulated dataset containing 504 observations. The variables list as follows:

Usage

data(Rdata)

Format

A data frame with 504 rows and 10 variables.

Details

- Id Identification number.
- Gender 1 for male, 0 for female.
- Age Age variable.
- OS Survival indicator, 1 for death, 0 for censoring.
- survmonth Duration time of survival.
- Treatment Treatment variable.
- Basic_group Basic group variable having the most number of stages.
- Scheme.1 Grouping scheme 1.
- Scheme.2 Grouping scheme 2.
- Scheme.3 Grouping scheme 3.
Description

TNM stage is important in treatment decision-making and outcome predicting. The existing oropharyngeal Cancer (OPC) TNM stages have not made distinction of the two sub sites of HPV+ and HPV- diseases. We developed novel criteria to assess performance of the TNM stage grouping schemes based on parametric modeling adjusting on important clinical factors. These criteria evaluate the TNM stage grouping scheme in five different measures: hazard consistency, hazard discrimination, explained variation, likelihood difference, and balance.

remss functions

- rank

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