

Package ‘tpAUC’

April 9, 2017

Type Package

Title Estimation and Inference of Two-Way pAUC, pAUC and pODC

Version 2.1.1

Date 2017-1-12

Author Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao

Maintainer Xiang Lyu <lyu17@purdue.edu>

Description Tools for estimating and inferring two-way partial area under receiver operating characteristic curves (two-way pAUC), partial area under receiver operating characteristic curves (pAUC), and partial area under ordinal dominance curves (pODC). Methods includes Mann-Whitney statistic and Jackknife, etc.

Imports pROC, stats, graphics

Depends R (>= 3.1.1)

License GPL (>= 2)

LazyData true

RoxygenNote 5.0.1

URL <http://arxiv.org/abs/1508.00298>

<http://www3.stat.sinica.edu.tw/statistica/j27n1/j27n117/j27n117.html>

<http://www.ncbi.nlm.nih.gov/pubmed/20729218>

Suggests knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

Repository CRAN

Date/Publication 2017-04-09 13:38:34 UTC

R topics documented:

podc	2
podc.ci	3
podc.est	4

proc	5
proc.ci	6
proc.est	7
tpAUC	9
tproc.est	9

Index	11
--------------	-----------

podc *Partial ODC Estimation and Inference*

Description

Estimate and infer the area of region under ODC curve with pre-specific FNR constraint (FNR-pODC). See [Yang et al., 2017](#) for details.

Usage

```
podc(response, predictor, threshold = 0.9, method = "MW", ci = TRUE,
      cp = 0.95, smooth = FALSE)
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0/1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
threshold	numeric; false negative rate (FNR) constraint.
method	methods to estimate FNR-pODC. MW: Mann-Whitney statistic. expect: method in (2.2) Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .
ci	logic; compute the confidence interval of estimation?
cp	numeric; coverage probability of confidence interval.
smooth	if TRUE, the ODC curve is passed to <code>smooth</code> to be smoothed.

Details

This function estimates and infers FNR partial ODC given response, predictor and pre-specific FNR constraint. MW: Mann-Whitney statistic. expect: method in [Yang et al., 2017](#) adapted from [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Estimation and Inference of FNR partial ODC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[podc.est](#), [podc.ci](#)

Examples

```
library('pROC')
data(aSAH)
podc(aSAH$outcome, aSAH$s100b, threshold=0.9, method='expect', ci=TRUE, cp=0.95 )
```

podc.ci

Partial ODC Inference

Description

Infer the area of region under ordinal dominance curve with pre-specific FNR constraint (FNR-pODC). See [Yang et al., 2017](#) for details.

Usage

```
podc.ci(response, predictor, cp = 0.95, threshold = 0.9, method = "MW")
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0 and 1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
cp	numeric; coverage probability of confidence interval.
threshold	numeric; false negative rate (FNR) constraint.
method	methods to estimate partial ODC. MW: Mann-Whitney statistic. expect: method in Yang et al., 2017 adapted from Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .

Details

This function infers FNR partial ODC given response, predictor and pre-specific FNR constraint. MW: Mann-Whitney statistic. expect: method in (2.2) [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Confidence interval of FNR partial ODC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[proc.ci](#)

Examples

```
library('pROC')
data(aSAH)
podc.ci(aSAH$outcome, aSAH$s100b, method='expect', threshold=0.8, cp=0.97)
```

podc.est

Partial ODC Estimation

Description

Estimate the area of region under ordinal dominance curve with pre-specific FNR constraint (FNR-pODC). See [Yang et al., 2017](#) for details.

Usage

```
podc.est(response, predictor, threshold = 0.9, method = "MW",
  smooth = FALSE)
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0 and 1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
threshold	numeric; false negative rate (FNR) constraint.
method	methods to estimate partial ODC. MW: Mann-Whitney statistic. expect: method in Yang et al., 2017 adapted from Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .
smooth	if TRUE, the ODC curve is passed to smooth to be smoothed.

Details

This function estimates FNR partial ODC given response, predictor and pre-specific FNR constraint. MW: Mann-Whitney statistic. expect: method in [Yang et al., 2017](#) adapted from [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Estimation of FNR partial ODC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[proc.est](#)

Examples

```
library('pROC')
data(aSAH)
podc.est(aSAH$outcome, aSAH$s100b, method='expect', threshold=0.8 )
```

proc

Partial AUC Estimation and Inference

Description

Estimate and infer the area of region under ROC curve with pre-specific FPR constraint (FPR-pAUC). See [Yang et al., 2017](#) for details.

Usage

```
proc(response, predictor, threshold = 0.9, method = "MW", ci = TRUE,
      cp = 0.95, smooth = FALSE)
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0/1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
threshold	numeric; false positive rate (FPR) constraint.

method	methods to estimate FPR-pAUC. MW: Mann-Whitney statistic. expect: method in (2.2) Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .
ci	logic; compute the confidence interval of estimation?
cp	numeric; coverage probability of confidence interval.
smooth	if TRUE, the ROC curve is passed to smooth to be smoothed.

Details

This function estimates and infers FPR partial AUC given response, predictor and pre-specific FPR constraint. MW: Mann-Whitney statistic. expect: method in (2.2) [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Estimate and Inference of FPR partial AUC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[roc](#), [tproc.est](#), [proc.est](#), [proc.ci](#)

Examples

```
library('pROC')
data(aSAH)
proc(aSAH$outcome, aSAH$s100b, threshold=0.9, method='expect', ci=TRUE, cp=0.95)
```

proc.ci

Partial AUC Inference

Description

Infer the area of region under ROC curve with pre-specific FPR constraint (FPR-pAUC). See [Yang et al., 2017](#) for details.

Usage

```
proc.ci(response, predictor, cp = 0.95, threshold = 0.9, method = "MW")
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0/1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
cp	numeric; coverage probability of confidence interval.
threshold	numeric; false positive rate (FPR) constraint.
method	methods to estimate FPR-pAUC. MW: Mann-Whitney statistic. expect: method in (2.2) Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .

Details

This function infers FPR partial AUC given response, predictor and pre-specific FPR constraint. MW: Mann-Whitney statistic. method in [Yang et al., 2017](#) adapted from [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Confidence interval of FPR partial AUC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[tproc.est](#), [podc.ci](#)

Examples

```
library('pROC')
data(aSAH)
proc.ci(aSAH$outcome, aSAH$s100b, cp=0.95 ,threshold=0.9,method='expect')
```

proc.est

Partial AUC Estimation

Description

Estimate the area of region under ROC curve with pre-specific FPR constraint (FPR-pAUC). See [Yang et al., 2017](#) for details.

Usage

```
proc.est(response, predictor, threshold = 0.9, method = "MW",
         smooth = FALSE)
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0 and 1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
threshold	numeric; false positive rate (FPR) constraint.
method	methods to estimate FPR-pAUC. MW: Mann-Whitney statistic. expect: method in (2.2) Wang and Chang, 2011 . jackknife: jackknife method in Yang et al., 2017 .
smooth	if TRUE, the ROC curve is passed to smooth to be smoothed.

Details

This function estimates FPR partial AUC given response, predictor and pre-specific FPR constraint. MW: Mann-Whitney statistic. expect: method in (2.2) [Wang and Chang, 2011](#). jackknife: jackknife method in [Yang et al., 2017](#).

Value

Estimate of FPR partial AUC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[tproc.est](#), [podc.est](#)

Examples

```
library('pROC')
data(aSAH)
proc.est(aSAH$outcome, aSAH$s100b, method='expect', threshold=0.8)
```

 tpAUC

Estimation and Inference of Two-Way Partial AUC, FPR partial AUC and FNR partial ODC

Description

Tools of estimation and inference of two-way partial AUC, FPR partial AUC and FNR partial ODC. Methods are proposed in [Yang et al., 2016](#) and [Yang et al., 2017](#), including Mann-Whitney Statistic, jackknife method, etc.

Details

Package: tpAUC
 Type: Package
 Date: 2017-04-08
 License: GPL (>= 2)

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.
 Maintainer: Xiang Lyu <lyu17@purdue.edu>

References

Wang Z, Chang Y. Marker selection via maximizing the partial area under the ROC curve of linear risk scores[J]. *Biostatistics*, Yang H, Lu K, Lyu X, Hu F. Two-Way Partial AUC and Its Properties[J]. *arXiv:1508.00298*, 2016.
 Yang H, Lu K, Zhao Y. A nonparametric approach for partial areas under ROC curves and ordinal dominance curves. *Statistics*

 tproc.est

Two-Way Partial AUC Estimation

Description

Estimate the area of region under ROC curve under pre-specific FPR/TPR constraints (two-way partial AUC). See [Yang et al., 2016](#) for details.

Usage

```
tproc.est(response, predictor, threshold = c(1, 0), smooth = FALSE)
```

Arguments

response	a factor, numeric or character vector of responses; typically encoded with 0 (negative) and 1 (positive). Only two classes can be used in a ROC curve. If its levels are not 0 and 1, the first level will be defaultly regarded as negative.
predictor	a numeric vector of the same length than response, containing the predicted value of each observation. An ordered factor is coerced to a numeric.
threshold	a length-two numeric vector; the first element is FPR threshold, the second is TPR.
smooth	if TRUE, the ROC curve is passed to smooth to be smoothed.

Details

This function estimates two-way partial AUC given response, predictor and pre-specific FPR/TPR constraints.

Value

Estimate of two-way partial AUC.

Author(s)

Hanfang Yang, Kun Lu, Xiang Lyu, Feifang Hu, Yichuan Zhao.

See Also

[roc](#), [podc.est](#), [proc.est](#)

Examples

```
library('pROC')
data(aSAH)
tproc.est(aSAH$outcome, aSAH$s100b, threshold=c(0.8,0.2))
```

Index

podc, [2](#)
podc.ci, [3](#), [3](#), [7](#)
podc.est, [3](#), [4](#), [8](#), [10](#)
proc, [5](#)
proc.ci, [4](#), [6](#), [6](#)
proc.est, [5](#), [6](#), [7](#), [10](#)

roc, [6](#), [10](#)

smooth, [2](#), [4](#), [6](#), [8](#), [10](#)

tpAUC, [9](#)
tpAUC-package (tpAUC), [9](#)
tproc.est, [6-8](#), [9](#)