Package 'tpAUC'

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Type Package

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

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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

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R topics documented:

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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 smooth 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: jack-knife 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 )
```

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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')
```

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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)
```

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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. *Statistic*

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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))
```

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