Package ‘ROC’

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R topics documented:

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AUC functionals of ROC curve

Description

various functionals of ROC (Receiver Operating Characteristic) curves

Usage

AUC(rocoobj)
AUCi(rocoobj)
pAUC(rocoobj,t0)
pAUCi(rocoobj,t0)
Arguments

rocobj element of class rocc
t0 FPR point at which TPR is evaluated or limit in (0,1) to integrate to

Details

AUC, pAUC, AUCi and pAUCi compute the Area Under the Curve.
AUC and pAUC employ the trapezoidal rule. AUCi and pAUCi use integrate().
AUC and AUCi compute the area under the curve from 0 to 1 on the x-axis (i.e., the 1 - specificity axis).
pAUC and pAUCi compute the area under the curve from 0 to argument t0 on the x-axis (i.e., the 1 - specificity axis).
Elements of class rocc can be created by rocdemo.sca() or other constructors you might make using the code of rocdemo.sca() as a template.

Author(s)

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References

Duda, R. O., Hart, P. E., Stork, D. G., 2001 Pattern Classification, 2nd Ed., p. 49

See Also

rocdemo.sca

Examples

set.seed(123)
R1 <- rocdemo.sca( rbinom(40,1,.3), rnorm(40), dxrule.sca,
        caseLabel="new case", markerLabel="demo Marker" )
print(AUC(R1))
print(pAUC(R1,.3))
print(pAUCi(R1,.3))
print(ROC(R1,.3))
Methods

\texttt{x = rocc} plots an ROC curve object, with additional parameters available:

- \texttt{show.thresh (logical)}: should marker threshold values be plotted?
- \texttt{jit (logical)}: should plotted points be jittered?
- \texttt{add (logical)}: increment to current plot?
- \texttt{line (logical)}: plot points or lines?
- \texttt{threshCex (numeric)}: if showing threshold values, set character expansion in text call to this value
- \texttt{threshYsh (numeric)}: if showing threshold values, add this quantity to y coordinate of curve to plot the threshold value (should be negative for printing below point)
- \texttt{threshDig (numeric)}: if showing threshold values, use this as the digits parameter to round to display the threshold

... extra parameters passed to base \texttt{plot}, \texttt{lines} or \texttt{points} as needed

Examples

\begin{verbatim}
set.seed(123)
R1 <- rocdemo.sca( rbinom(40,1,.3), rnorm(40), dxrule.sca, 
   caseLabel="new case", markerLabel="demo Marker" )
plot(R1, line=TRUE, show.thresh=TRUE, lwd=2, threshDig=2)
R2 <- rocdemo.sca( rbinom(40,1,.3), rnorm(40), dxrule.sca, 
   caseLabel="new case", markerLabel="demo Marker" )
plot(R2, line=TRUE, add=TRUE, col="green", lwd=2 )
R3 <- rocdemo.sca( rbinom(40,1,.4), rnorm(40), dxrule.sca, 
   caseLabel="new case", markerLabel="demo Marker" )
points(R3, col="red", pch=19)
\end{verbatim}

rocc-class

\textit{Class rocc, ROC curve representation}

Description

object representing ROC curve, typically created using rocdemo.sca

Creating Objects

\begin{verbatim}
new('rocc', 
   sens = ...., # Object of class numeric 
   spec = ...., # Object of class numeric 
   rule = ...., # Object of class function 
   cuts = ...., # Object of class numeric 
   markerLabel = ...., # Object of class character 
   caseLabel = ...., # Object of class character 
)
\end{verbatim}
Slots

- **sens**: Object of class "numeric" sensitivity values
- **spec**: Object of class "numeric" specificity values
- **rule**: Object of class "function" rule to classify objects
- **cuts**: Object of class "numeric" thresholds defining curve
- **markerLabel**: Object of class "character" name of measured marker
- **caseLabel**: Object of class "character" name of condition

Methods

- **plot**(rocc, missing): a plotting function with some additional parameters

Examples

```r
set.seed(123)
R1 <- rocdemo.sca( rbinom(40,1,.3), rnorm(40), dxrule.sca,
  caseLabel="new case", markerLabel="demo Marker" )
plot( R1, show.thresh=TRUE )
```

Description

rocdemo.sca – demonstrate 'rocc' class construction using a scalar marker and simple functional rule

Usage

```r
rocdemo.sca(truth, data, rule=NULL,
  cutpts=NA,
  markerLabel="unnamed marker", caseLabel="unnamed diagnosis")
```

Arguments

- **truth**: true classification of objects. Must take values 0 or 1.
- **data**: quantitative markers used to classify
- **rule**: rule: a function with arguments (x, thresh) returning 0 or 1. If no rule is provided or the standard rule dxrule.sca is passed, a faster C-based implementation is used to compute sensitivity and specificity.
- **cutpts**: values of thresholds; no NA allowed, or they will be recomputed using smallest gap between data points with distinct values
- **markerLabel**: textual label describing marker
- **caseLabel**: textual label describing classification

Details

dxrule.sca is function (x, thresh) ifelse(x > thresh, 1, 0)
The default value of argument cutpts is a point less than min(data), points separating the unique values of data and a point greater than max(data).
**trapezint**

**Value**

an object of S4 class rocc

**Author(s)**

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**See Also**

AUC

**Examples**

```r
set.seed(123)
R1 <- rocdemo.sca(rbinom(40,1,.3), rnorm(40), caseLabel="new case", markerLabel="demo Marker")
plot(R1, line=TRUE, show.thresh=TRUE)

truth <- c(0, 1, 0, 1, 0, 1, 0, 1, 1)
data <- c(2, 3, 4, 4, 5, 6, 7, 8)
R2 <- rocdemo.sca(truth, data, dxrule.sca)
plot(R2, line=TRUE, show.thresh=TRUE)
R3 <- rocdemo.sca(truth, data, function(x, thresh) 1 - dxrule.sca(x, thresh))
if (AUC(R2) + AUC(R3) != 1) stop("Sum of AUCs should be 1."
  
# more involved
#
set.seed(1234)
x = runif(1000)
w = runif(1000)
z = rbinom(1000, 1, plogis(-2.7+6.2*x + .3*w))
m1 = glm(z~x, fam=binomial)
demorule.glm.clo = function(model) function(w,thresh)
  ifelse(predict(model, newdata=list(x=w), type="response">thresh, 1, 0)
demorule.glm = demorule.glm.clo(m1)
R4 = rocdemo.sca(z, x, demorule.glm)
plot(R4)
```

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**trapezint**

**trapezoidal rule for AUC**

**Description**

trapezoidal rule for AUC

**Usage**

`trapezint(x, y, a, b)`
Arguments

- \( x \) - abscissae
- \( y \) - ordinates
- \( a \) - lower limit of integration
- \( b \) - upper limit of integration

Details

uses approx

Value

estimated AUC

Examples

```r
x <- sort(runif(30))
y <- sin(x)
print(trapezint(x,y,0,1))
```
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