**HandTill2001-package**  
*Multiple Class Area under ROC Curve*

**Description**

A very lean package implementing merely $M$ given by *Hand and Till* (2001), Eq. (7).

**Details**

$M$ given by *Hand and Till* (2001) defines a multiple class version of the area under curve of the receiver operating characteristic.

**References**


**See Also**

help(package="HandTill2001"), especially ?HandTill2001::auc; various packages that calculate binary class AUC (*ROCR*) or multiple class AUC (pROC, caTools).

**Examples**

```r
library(HandTill2001)
data(ht01.multipleclass)

auc(
multcap(
  response = ht01.multipleclass$observed,
  predicted = as.matrix(ht01.multipleclass[, levels(ht01.multipleclass$observed)])
)
)
```

**Description**

Calculate area under curve of the receiver operating characteristic for two or more prediction classes.
Usage

## S4 method for signature 'bincap'
auc(object)

## S4 method for signature 'multcap'
auc(object)

Arguments

object  An object of class \textit{bincap} or \textit{multcap}.

Details

Depending on whether \texttt{object} is of class \texttt{bincap} or of class \texttt{multcap}, a binary class or multiple class AUC is calculated.

Value

An object of class "numeric".

Methods

\texttt{signature(object = "bincap"}) calculates the AUC statistic for a binary class response following \textit{Hand and Till} (2001), Eq. (3)

\texttt{signature(object = "multcap"}) calculates the AUC statistic for a multiple class response following \textit{Hand and Till} (2001), Eq. (7).

References


See Also

class?bincap, class?multcap

Examples

data(ht01.twoclass, package = "HandTill2001")
message(" == AUC for a binary class response")
message(" == == HandTill2001 result:"
HandTill2001::auc(HandTill2001::bincap(
  response = as.factor(ht01.twoclass["observed"])),
  predicted = ht01.twoclass["predicted"],
  true = "1"
))
## Not run:
message(" == == ROCR result:"
ROCR::performance(ROCR::prediction(
bincap

A Constructor for Objects of Class bincap

Description
bincap(...) is an alias to new("bincap", ...).

Usage
bincap(response, predicted, true = "1")

Arguments
response Object of class factor.
predicted Object of class numeric.
true Object of class character.

Details
There is no casting or conversion of data. bincap(...) is just an alias to new("bincap", ...).

Value
An object of class bincap.

See Also
class?HandTill2001::bincap
bincap-class

Examples

```r
library(HandTill2001)
data(ht01.twoclass)
str(ht01.twoclass$observed)
message("note that ht01.twoclass$observed is not a factor; we have to convert it.")
bincap(
  response = as.factor(ht01.twoclass$observed),
  predicted = ht01.twoclass$predicted,
  true = c("1")
)
```

---

bincap-class Binary Class and Prediction Objects

Description

S4 class for a binary class response and corresponding (predicted) probabilities.

Objects from the Class

Objects can be created by calls of the form `new("bincap",...)`. They are used to store a binary class response (one of the two levels of which is supposed to be `true`), the information which of the two levels of the binary class response is thought of as 'true'/positive/present' (the other one would then be thought of as 'false'/negative/absence') and the predicted probabilities that response is true.

Note

No defaults are set. Especially, you have to explicitly initialize `true`, there is no trying to guess it from the levels of `response`.

See Also


Examples

```r
showClass("bincap")
```
Example Data for Multiple Classes

Description

Multiple class data and probability predictions thereof.

Format

A data frame with 214 observations on the following 7 variables.

- **observed**: a factor with levels Con Head Tabl Veh WinF WinNF
- **WinF**: a numeric vector
- **WinNF**: a numeric vector
- **Veh**: a numeric vector
- **Con**: a numeric vector
- **Tabl**: a numeric vector
- **Head**: a numeric vector

Details

Multiple class data (‘observed’: MASS::fgl$type) and probability predictions (predict(fgl.rp4), cf. Venables and Ripley (2002), p. 264 and ‘Source’) from rpart::rpart.

Source

```r
library(MASS);library(rpart);data(fgl);set.seed(123)
fgl.rp4 <- rpart(type ~ ., data = fgl, cp = 0.03 , parms = list(split = "information"))
ht01.multipleclass <- data.frame(observed = fgl$type,
predict(fgl.rp4))
write.table(ht01.multipleclass, file = "ht01.multipleclass.txt")
```

References


Examples

```r
library(HandTill2001)
data(ht01.multipleclass)
str(ht01.multipleclass)
```
Example Data for Binary Classes

Description

Binary class data and probability predictions thereof.

Format

A data frame with 189 observations on the following 2 variables.

- **observed**: a numeric vector
- **predicted**: a numeric vector

Details

Binary class data ('observed': MASS::birthwt$low) and probability predictions (predict(birthwt.step2,type = "response"), cf. Venables and Ripley (2002), pp. 195f and 'Source') from stats::glm.

Source

```r
## From: A binary class data example Venables and Ripley pp. 194--199 library(MASS); data("birthwt"); attach(birthwt) race <- (factor(race, labels = c("white", "black", "other"))) ptd <- factor(ptl > 0) ftv <- factor(ftv) levels(ftv)[-c(1:2)] <- "2+") bwt <- data.frame(low = factor(low), age, lwt, race, smoke = (smoke > 0), ptd, ht = (ht > 0), ui = (ui > 0), ftv) detach(birthwt) birthwt.glm <- glm(low ~ ., family=binomial(link=logit), data=bwt) birthwt.step2 <- stepAIC(birthwt.glm, ~ .^2 + I(scale(age)^2) + I(scale(lwt)^2), trace = F ) ht01.twoclass <- data.frame(observed = bwt$low, predicted = predict(birthwt.step2 , type = "response")) write.table(ht01.twoclass, file = "ht01.twoclass.txt")
```

References


Examples

```r
library(HandTill2001)
data(ht01.twoclass)
str(ht01.twoclass)
```
A Constructor for Objects of Class multcap

Description

multcap(...) is an alias to new("multcap", ...).

Usage

multcap(response, predicted)

Arguments

response Object of class factor.
predicted Object of class matrix.

Details

There is no casting or conversion of data. multcap(...) is just an alias to new("multcap", ...).

Value

An object of class multcap.

See Also

class?HandTill2001::multcap

Examples

library(HandTill2001)
data(ht01.multipleclass)
str(ht01.multipleclass$observed)
message("note that ht01.multipleclass$observed is a factor; we do not have to convert it.")
multcap(
  response = ht01.multipleclass$observed,
  predicted = as.matrix(ht01.multipleclass[, levels(ht01.multipleclass$observed)])
)
Description

S4 class for a multiple class response and corresponding (predicted) probabilities.

Objects from the Class

Objects can be created by calls of the form `new("multcap",...)`. They are used to store a multiple class response and the predicted probabilities for each of the `levels(response)`.

See Also


Examples

`showClass("multcap")`
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