Package ‘HandTill2001’

May 31, 2016

Type Package
Title Multiple Class Area under ROC Curve
Version 0.2-12
Date 2016-05-22
Description An S4 implementation of Eq. (3) and Eq. (7) by David J. Hand and
Depends R (>= 2.14), methods, utils
Suggests MASS, rpart, mda, nnet
License GPL (>= 2)
NeedsCompilation no
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Repository CRAN
Date/Publication 2016-05-31 11:10:11

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auc-methods

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 "methods?auc"; various packages that calculate two class AUC ("ROCR") or multiple class AUC (pROC, "caTools").

Examples
library(HandTill2001)
data(ht01.multipleclass)
auc(
    multicap(
        response = ht01.multipleclass$observed
        , predicted = as.matrix(ht01.multipleclass[, levels(ht01.multipleclass$observed)])
    )
)

auc-methods  Methods for Function auc in Package HandTill2001

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

Details
Depending on whether object is of class "bincap" or of class "multcap", a two class or multiple class AUC is calculated.
Value

An object of class "numeric".

Methods

signature(object = "bincap") calculates the AUC statistic for a two class response following Hand and Till (2001), Eq. (3).

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

References


See Also

"class?bincap", "class?multcap"

Examples

library(HandTill2001)
data(ht01.twoclass)
data(ht01.multipleclass)
message(" == AUC for a two class response")
## Not run:
message(" == ROCR result:")
library(ROCR)
performance(prediction(labels=ht01.twoclass$observed, predictions=ht01.twoclass$predicted), measure = "auc")
## End(Not run)
message(" == HandTill2001 result:")

auc(bincap(  
  response = as.factor(ht01.twoclass$observed),
  predicted = ht01.twoclass$predicted,
  true = "1"
))

message(" == AUC for a multiple class response")

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

Author(s)

Andreas Dominik Cullmann

See Also

"class?bincap"

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**

*Class "bincap" in Package HandTill2001*

**Description**

S4 class for a two 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 two class response (one of the two levels of which is supposed to be true), the information which of the two levels of the two 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.

**Slots**

- **predicted**: Object of class "numeric", probabilities for response. Of length \(n\)
- **true**: Object of class "character", indicating which of the two *levels* of response is to be treated as 'true'/"positive"/"presence" (the other one would then accordingly be called 'false'/"negative"/"absence"). Of length 1.
- **response**: Object of class "factor", two class observations. Of length \(n\).

**Extends**

Class "cap", directly.

**Methods**

- **auc** signature(object = "bincap"): ...

**Note**

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

**Author(s)**

Andreas Dominik Cullmann

**See Also**

- "class?cap", "class?multcap", "?bincap"

**Examples**

`showClass("bincap")`
Description

A virtual class for "bincap" and "multcap".

Objects from the Class

A virtual Class: No objects may be created from it.

Slots

response: Object of class "factor", typically two class or multiple class observations.

Methods

No methods defined with class "cap" in the signature.

Author(s)

Andreas Dominik Cullmann

See Also

"class?bincap", "class?multcap"

Description

multiple class data and probability predictions thereof.

Usage

data(ht01.multipleclass)
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.multiplyclass <- data.frame(observed = fgl$type, predict(fgl rp4))
write.table(ht01.multiplyclass, file = "ht01.multiplyclass.txt")
```

References


Examples

```r
library(HandTill2001)
data(ht01.multiplyclass)
str(ht01.multiplyclass)
```

Description

two class data and probability predictions thereof.

Usage

data(ht01.twoclass)
Format

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

observed  a numeric vector
predicted  a numeric vector

Details

two 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

## From: A two 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

ISBN 0-387-95457-0

Examples

library(HandTill2001)
data(ht01.twoclass)
str(ht01.twoclass)
multcap

a ui-constructor for Class "multcap" in Package HandTill2001

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 "bincap"

Author(s)

Andreas Dominik Cullmann

See Also

"class?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)])
)

**multcap-class**  
*Class "multcap" in Package HandTill2001*

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**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`).

**Slots**

- `predicted`: Object of class "matrix", probabilities for response. Of dimension \((n, \text{length(unique(response)))}\). The columns (dimnames()[[2]]) of the prediction matrix have to be named with the values of `unique(response)`.
  This is the default for example with `predict.rpart(type="prob",...`).

- `response`: Object of class "factor", multiple class observations. Of length \(n\).

**Extends**

Class "cap", directly.

**Methods**

- `auc` signature(object = "multcap"): ...  

**Author(s)**

Andreas Dominik Cullmann

**See Also**

"class?cap", "class?bincap", "?multcap"

**Examples**

`showClass("multcap")`
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