

Package ‘car2’

July 2, 2015

Type Package

Title Extends capabilities of 'car' to include companion functions for logistic regression

Version 0.1

Date 2015-05-26

Author Selva Prabhakaran

Maintainer Selva Prabhakaran <selva86@gmail.com>

Description More about what it does (maybe more than one line)

License GPL (>= 2)

LazyData TRUE

LazyLoad yes

Depends car

Import ggplot2

R topics documented:

aROC	2
calcConcordance	2
confusionMatrix	3
getWOETable	4
iv	5
kappaCohen	5
misClassError	6
plotROC	7
sensitivity	8
somersD	9
specificity	9
woe	10
youdensIndex	11

Index	13
--------------	-----------

aROC	aROC
<p>Description</p> <p>Calculate the area under ROC curve statistic for a given logit model.</p> <p>Usage</p> <pre>aROC(logitMod)</pre> <p>Arguments</p> <p>logitMod A logit model</p> <p>Details</p> <p>For a given logit model, the area under the ROC curve shows how well the model performs at capturing the false events and false non-events. An best case model will have an area of 1. However that would be unrealistic, so the closer the aROC to 1, the better is the model.</p> <p>Value</p> <p>The area under the ROC curve for a given logit model.</p> <p>Author(s)</p> <p>Selva Prabhakaran</p> <p>Examples</p> <pre>accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0,1, 0, 1, 0, 0, 1) acad <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76) sports <- c (2.6,4.6,4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9) rank <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1) inputData <- data.frame (accept, acad , sports, rank) # assemble the data frame logitModel <- glm(accept ~ ., family="binomial", data = inputData) aROC(logitMod=logitModel)</pre>	
calcConcordance	calcConcordance

Description

Calculate concordance and discordance percentages for a logit model

Usage

```
calcConcordance(logitMod)
```

Arguments

logitMod A logit model

Details

Calculate the percentage of concordant and discordant pairs for a given logit model.

Value

a list containing percentage of concordant pairs, percentage discordant pairs, percentage ties and No. of pairs.

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad   <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank   <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
calcConcordance(logitModel)
```

confusionMatrix	<i>confusionMatrix</i>
-----------------	------------------------

Description

Calculate the confusion matrix for the fitted values for a logistic regression model.

Usage

```
confusionMatrix(logitMod, threshold = 0.5)
```

Arguments

logitMod A logit model

threshold If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, the confusion matrix showing the count of predicted events and non-events against actual events and non events.

Value

For a given logit model, returns the confusion matrix showing the count of predicted events and non-events against actual events and non events.

Author(s)

Selva Prabhakaran

Examples

```

accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad  <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank  <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad , sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData )
confusionMatrix(logitMod=logitModel)

```

getWOETable

*getWOETable***Description**

Compute the woe table that contains the weight of evidence for respective classes in a categorical variable.

Usage

```
getWOETable(X = X, Y = Y, valueOfGood = 1)
```

Arguments

X	A categorical variable for which WOE is to be calculated.
Y	A binary response variable
valueOfGood	The value of denoting the occurrence of the event of interest in the response (Y) variable.

Details

For a given binary response variable (Y) and a categorical (X) variable, compute the WOE and IVs for respective classes.

Value

The WOE table containing the WOE and information values for each class.

Author(s)

Selva Prabhakaran

Examples

```

data("OJ")
X <- factor(as.character(OJ$STORE)) # prepares X
Y <- as.character(OJ$Purchase)
valueOfGood <- "CH" # input argument
getWOETable(X, Y, valueOfGood)

```

iv

*iv***Description**

Compute the information value of a predictor categorical variable to explain a response variable.

Usage

```
iv(X = X, Y = Y, valueOfGood = 1)
```

Arguments

X	A categorical variable for which WOE is to be calculated.
Y	A binary response variable
valueOfGood	The value of denoting the occurrence of the event of interest in the response (Y) variable.

Details

Compute the information value for a categorical variable. An IV of greater than 0.1 implies a high predictive power while that below 0.03 shows its not predictive.

Value

The IV for a categorical variable of interest in predicting a binary response variable.

Author(s)

Selva Prabhakaran

Examples

```
data("OJ")
X <- factor(as.character(OJ$STORE)) # prepares X
Y <- as.character(OJ$Purchase)
valueOfGood <- "CH" # input argument
getIV(X, Y, valueOfGood)
```

kappaCohen

*kappaCohen***Description**

Calculate the Cohen's kappa statistic for a given logit model.

Usage

```
kappaCohen(logitMod, threshold = 0.5)
```

Arguments

logitMod	A logit model
threshold	If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, Cohen's kappa is calculated. Cohen's kappa is calculated as (probability of agreement - probability of expected) / (1-(probability of expected))

Value

The Cohen's kappa of the logit model

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad    <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports  <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank    <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
kappaCohen(logitMod=logitModel)
```

misClassError

misClassError

Description

Calculate the percentage misclassification error for this logit model's fitted values.

Usage

```
misClassError(logitMod, threshold = 0.5)
```

Arguments

logitMod	A logit model
threshold	If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, misclassification error is the number of mismatches between the predicted and actuals direction of the binary y variable.

Value

The misclassification error, which tells what proportion of predicted direction did not match with the actuals.

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad    <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports  <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank    <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
misClassError(logitMod=logitModel)
```

plotROC

plotROC

Description

Plot the Receiver Operating Characteristics(ROC) Curve based on ggplot2

Usage

```
plotROC(logitMod)
```

Arguments

logitMod A logit model

Details

For a given logit model, A ROC curve is plotted using the ggplot2 framework along the the area under the curve.

Value

Plots the ROC curve

Author(s)

Selva Prabhakaran

Examples

```

accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad    <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports  <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank    <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
plotROC(logitMod=logitModel)

```

sensitivity

sensitivity

Description

Calculate the sensitivity for a given logit model.

Usage

```
sensitivity(logitMod, threshold = 0.5)
```

Arguments

logitMod	A logit model
threshold	If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, sensitivity is defined as number of observations with the event AND predicted to have the event divided by the number of observations with the event. It can be used as an indicator to gauge how sensitive is your model in detecting the occurrence of events, especially when you are not so concerned about predicting the non-events as true.

Value

The sensitivity of the logit model, which is, the number of observations with the event AND predicted to have the event divided by the number of observations with the event.

Author(s)

Selva Prabhakaran

Examples

```

accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad    <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports  <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank    <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
sensitivity(logitMod=logitModel)

```


somersD

*somersD***Description**

Calculate the Somers D statistic for a given logit model

Usage

```
somersD(logitMod)
```

Arguments

logitMod A logit model

Details

For a given logit model, Somer's D is calculated as the number of concordant pairs less number of discordant pairs divided by total number of pairs.

Value

The Somers D statistic, which tells how many more concordant than discordant pairs exist divided by total number of pairs.

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad   <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank   <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
somersD(logitMod=logitModel)
```

specificity

*specificity***Description**

Calculate the specificity for a given logit model.

Usage

```
specificity(logitMod, threshold = 0.5)
```

Arguments

logitMod	A logit model
threshold	If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, specificity is defined as number of observations without the event AND predicted to not have the event divided by the number of observations without the event. Specificity is particularly useful when you are extra careful not to predict a non event as an event, like in spam detection where you dont want to classify a genuine mail as spam(event) where it may be somewhat ok to occasionally classify a spam as a genuine mail(a non-event).

Value

The specificity of the logit model, which is, the number of observations without the event AND predicted to not have the event divided by the nummber of observations without the event.

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0,1, 0, 1, 0, 0, 1)
acad   <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports <- c (2.6,4.6,4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank   <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad , sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData )
specificity(logitMod=logitModel)
```

woe	<i>woe</i>
-----	------------

Description

Compute the weights of evidence for a categorical variable.

Usage

```
woe(X = X, Y = Y, valueOfGood = 1)
```

Arguments

X	A categorical variable for which WOE is to be calculated.
Y	A binary response variable
valueOfGood	The value of denoting the occurence of the event of interest in the response (Y) variable.

Details

Compute the weights of evidence for a categorical variable so it can be used as predictor in place of the categorical variable itself.

Value

The WOE for the categorical variable of interest.

Author(s)

Selva Prabhakaran

Examples

```
data("OJ")
X <- factor(as.character(OJ$STORE)) # prepares X
Y <- as.character(OJ$Purchase)
valueOfGood <- "CH" # input argument
getWOE(X, Y, valueOfGood)
```

youdensIndex	<i>youdensIndex</i>
--------------	---------------------

Description

Calculate the specificity for a given logit model.

Usage

```
youdensIndex(logitMod, threshold = 0.5)
```

Arguments

logitMod	A logit model
threshold	If predicted value is above the threshold, it will be considered as an event (1), else it will be a non-event (0). Defaults to 0.5.

Details

For a given logit model, Youden's index is calculated as sensitivity + specificity - 1

Value

The youdensIndex of the logit model, which is calculated as Sensitivity + Specificity - 1

Author(s)

Selva Prabhakaran

Examples

```
accept <- c (1, 0, 1, 0, 1, 1, 0, 0, 0, 1, 0, 1, 0, 0, 1)
acad   <- c (66, 60, 80, 60, 52, 60, 47, 90, 75, 35, 46, 75, 66, 54, 76)
sports <- c (2.6, 4.6, 4.5, 3.3, 3.13, 4, 1.9, 3.5, 1.2, 1.8, 1, 5.1, 3.3, 5.2, 4.9)
rank   <- c (3, 3, 1, 4, 4, 2, 4, 4, 4, 3, 3, 3, 2, 2, 1)
inputData <- data.frame (accept, acad, sports, rank) # assemble the data frame
logitModel <- glm(accept ~ ., family="binomial", data = inputData)
youdensIndex(logitMod=logitModel)
```

Index

aROC, [2](#)

calcConcordance, [2](#)

confusionMatrix, [3](#)

getWOETable, [4](#)

iv, [5](#)

kappaCohen, [5](#)

misClassError, [6](#)

plotROC, [7](#)

sensitivity, [8](#)

somersD, [9](#)

specificity, [9](#)

woe, [10](#)

youdensIndex, [11](#)