

Package ‘mltest’

February 3, 2025

Title Classification Evaluation Metrics

Version 1.0.3

Description A fast, robust and easy-to-use calculation
of multi-class classification evaluation metrics based on confusion matrix.

License GPL-2

Encoding UTF-8

RoxygenNote 7.2.3

NeedsCompilation no

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Repository CRAN

Date/Publication 2025-02-03 09:30:08 UTC

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ml_test	<i>multi-class classifier evaluation metrics based on a confusion matrix (contingency table)</i>
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Description

Calculates multi-class classification evaluation metrics: balanced accuracy (**balanced.accuracy**), diagnostic odds ratio (**DOR**), error rate (**error.rate**), F.beta (**F0.5**, **F1** (F-measure, F-score), **F2** with where beta is 0.5, 1 and 2 respectively), false positive rate (**FPR**), false negative rate (**FNR**), false omission rate (**FOR**), false discovery rate (**FDR**), geometric mean (**geometric.mean**), **Jaccard**, positive likelihood ratio (p+, LR(+) or simply **L**), negative likelihood ratio (p-, LR(-) or simply **lambda**), Matthews corellation coefficient (**MCC**), markedness (**MK**), negative predictive value

(**NPV**), optimization precision **OP**, **precision**, **recall** (sensitivity), **specificity** and finally **Youden's** index. The function calculates the aforementioned metrics from a confusion matrix (contingency matrix) where *TP*, *TN*, *FP* *FN* are abbreviations for *true positives*, *true negatives*, *false positives* and *false negatives* respectively.

Usage

```
ml_test(predicted, true, output.as.table = FALSE)
```

Arguments

`predicted` class labels predicted by the classifier model (a set of classes convertible into type factor with levels representing labels)

`true` true class labels (a set of classes convertible into type factor of the same length and with the same levels as predicted)

`output.as.table` the function returns all metrics except for **accuracy** and **error.rate** in a tabular format if this argument is set to *TRUE*

Value

the function returns a list of following metrics:

`accuracy` = $(TP+TN) / (TP+FP+TN+FN)$ (*doesn't show up when output.as.table = TRUE*)

`balanced.accuracy` = $(TP / (TP+FN)+TN / (TN+FP)) / 2 = (\text{recall}+\text{specificity}) / 2$

`DOR` = $TP*TN / (FP*FN) = L / \lambda$

`error.rate` = $(FP+FN) / (TP+TN+FP+FN) = 1-\text{accuracy}$ (*doesn't show up when output.as.table = TRUE*)

`F0.5` = $1.25*\text{recall}*\text{precision}/(0.25*\text{precision}+\text{recall})$

`F1` = $2*\text{recall}*\text{precision} / (\text{precision}+\text{recall})$

`F2` = $5*\text{recall}*\text{precision} / (4*\text{precision}+\text{recall})$

`FDR` = $1-\text{precision}$

`FNR` = $1-\text{recall}$

`FOR` = $1-\text{NPV}$

`FPR` = $1-\text{specificity}$

`geometric.mean` = $(\text{recall}*\text{specificity})^{0.5}$

`Jaccard` = $TP / (TP+FP+FN)$

`L` = $\text{recall} / (1-\text{specificity})$

`lambda` = $(1-\text{recall}) / (\text{specificity})$

`MCC` = $(TP*TN-FP*FN) / (((TP+FP)*(TP+FN)*(TN+FP)*(TN+FN))^{0.5})$

`MK` = $\text{precision} + \text{NPV} - 1$

`NPV` = $TN / (TN+FN)$

`OP` = $\text{accuracy} - |\text{recall}-\text{specificity}| / (\text{recall}+\text{specificity})$

precision	= TP / (TP+FP)
recall	= TP / (TP+FN)
specificity	= TN / (TN+FP)
Youden	= recall+specificity-1

Author(s)

G. Dudnik

References

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Examples

```
library(mltest)

# class labels ("cat", "dog" and "rat") predicted by the classifier model
predicted_labels <- as.factor(c("dog", "cat", "dog", "rat", "rat"))

# true labels (test set)
true_labels <- as.factor(c("dog", "cat", "dog", "rat", "dog"))

classifier_metrics <- ml_test(predicted_labels, true_labels, output.as.table = FALSE)

# overall classification accuracy
accuracy <- classifier_metrics$accuracy

# F1-measures for classes "cat", "dog" and "rat"
F1 <- classifier_metrics$F1

# tabular view of the metrics (except for 'accuracy' and 'error.rate')
classifier_metrics <- ml_test(predicted_labels, true_labels, output.as.table = TRUE)
```

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