

Package ‘correctR’

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Type Package

Title Corrected Test Statistics for Comparing Machine Learning Models on Correlated Samples

Version 0.3.1

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Description Calculate a set of corrected test statistics for cases when samples are not independent, such as when classification accuracy values are obtained over resamples or through k-fold cross-validation, as proposed by Nadeau and Bengio (2003) <doi:10.1023/A:1024068626366> and presented in Bouckaert and Frank (2004) <doi:10.1007/978-3-540-24775-3_3>.

BugReports <https://github.com/hendersontrent/correctR/issues>

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Encoding UTF-8

Depends R (>= 3.5.0)

Imports stats

Suggests knitr, markdown, rmarkdown, pkgdown, testthat (>= 3.0.0)

RoxygenNote 7.2.3

VignetteBuilder knitr

Config/testthat/edition 3

URL <https://hendersontrent.github.io/correctR/>

NeedsCompilation no

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Description

Corrections For Correlated Test Statistics

kfold_ttest	<i>Compute correlated t-statistic and p-value for k-fold cross-validated results</i>
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Description

Compute correlated t-statistic and p-value for k-fold cross-validated results

Usage

```
kfold_ttest(x, y, n, k, tailed = c("two", "one"), greater = NULL)
```

Arguments

x	numeric vector of values for model A
y	numeric vector of values for model B
n	integer denoting total sample size
k	integer denoting number of folds used in k-fold
tailed	character denoting whether to perform a two-tailed or one-tailed test. Can be one of "two" or "one". Defaults to "two"
greater	character specifying whether "x" or "y" is greater for the one-tailed test if tailed = "one". Defaults to NULL

Value

data.frame containing the test statistic and p-value

Author(s)

Trent Henderson

References

Nadeau, C., and Bengio, Y. Inference for the Generalization Error. *Machine Learning* 52, (2003).

Corani, G., Benavoli, A., Demsar, J., Mangili, F., and Zaffalon, M. Statistical comparison of classifiers through Bayesian hierarchical modelling. *Machine Learning*, 106, (2017).

Examples

```
x <- rnorm(100, mean = 95, sd = 0.5)
y <- rnorm(100, mean = 90, sd = 1)
kfold_ttest(x = x, y = y, n = 100, k = 5, tailed = "two")
```

repkfold_ttest	<i>Compute correlated t-statistic and p-value for repeated k-fold cross-validated results</i>
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Description

Compute correlated t-statistic and p-value for repeated k-fold cross-validated results

Usage

```
repkfold_ttest(data, n1, n2, k, r, tailed = c("two", "one"), greater = NULL)
```

Arguments

data	data.frame of values for model A and model B over repeated k-fold cross-validation. Four named columns are expected: "model", "values", "k", and "k"
n1	integer denoting train set size
n2	integer denoting test set size
k	integer denoting number of folds used in k-fold
r	integer denoting number of repeats per fold
tailed	character denoting whether to perform a two-tailed or one-tailed test. Can be one of "two" or "one". Defaults to "two"
greater	value specifying which value in the "model" column is greater for the one-tailed test if tailed = "one". Defaults to NULL

Value

data.frame containing the test statistic and p-value

Author(s)

Trent Henderson

References

- Nadeau, C., and Bengio, Y. Inference for the Generalization Error. *Machine Learning* 52, (2003).
- Bouckaert, R. R., and Frank, E. Evaluating the Replicability of Significance Tests for Comparing Learning Algorithms. *Advances in Knowledge Discovery and Data Mining. PAKDD 2004. Lecture Notes in Computer Science*, 3056, (2004).

Examples

```
tmp <- data.frame(model = rep(c(1, 2), each = 60),
  values = c(stats::rnorm(60, mean = 0.6, sd = 0.1),
    stats::rnorm(60, mean = 0.4, sd = 0.1)),
  k = rep(c(1, 1, 2, 2), times = 15),
  r = rep(c(1, 2), times = 30))

repkfold_ttest(data = tmp, n1 = 80, n2 = 20, k = 2, r = 2, tailed = "two")
```

resampled_ttest	<i>Compute correlated t-statistic and p-value for resampled data</i>
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Description

Compute correlated t-statistic and p-value for resampled data

Usage

```
resampled_ttest(x, y, n, n1, n2, tailed = c("two", "one"), greater = NULL)
```

Arguments

x	numeric vector of values for model A
y	numeric vector of values for model B
n	integer denoting number of repeat samples. Defaults to length(x)
n1	integer denoting train set size
n2	integer denoting test set size
tailed	character denoting whether to perform a two-tailed or one-tailed test. Can be one of "two" or "one". Defaults to "two"
greater	character specifying whether "x" or "y" is greater for the one-tailed test if tailed = "one". Defaults to NULL

Value

data.frame containing the test statistic and p-value

Author(s)

Trent Henderson

References

Nadeau, C., and Bengio, Y. Inference for the Generalization Error. *Machine Learning* 52, (2003).
Bouckaert, R. R., and Frank, E. Evaluating the Replicability of Significance Tests for Comparing Learning Algorithms. *Advances in Knowledge Discovery and Data Mining. PAKDD 2004. Lecture Notes in Computer Science*, 3056, (2004).

Examples

```
x <- rnorm(100, mean = 95, sd = 0.5)
y <- rnorm(100, mean = 90, sd = 1)
resampled_ttest(x = x, y = y, n = 100, n1 = 80, n2 = 20, tailed = "two")
```

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