Package 'additivityTests'

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Type Package

Title Additivity tests in the two way ANOVA with single sub-class numbers

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Description Implementation of the Tukey, Mandel, Johnson-Graybill, LBI, Tussel and modified Tukey non-additivity test

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R topics documented:

Boik *Multi-headed Machine Data*

Description

Performance of a multiple-headed machine used to fill bottles. Weights for six heads on five occasions were recorded.

Usage

```
data(Boik)
```

Source

Robert J. Boik: A comparison of three invariant tests of additivity in two-way classifications with no replications, Computational Statistics \& Data Analysis, 1993.

Examples

```
data(Boik)
Boik
```

critical.values *Critical Values for the Johnson-Graybill, LBI and Tussel tests*

Description

Compute the critical values by performing N simulation.

Usage

```
critical.values(a, b, N = 1e+05, alpha = 0.05)
```

Arguments

a	number of rows
b	number of columns
N	number of simulations
alpha	level(s) of the test

Value

A list containing three components: critical values for Johnson-Graybill, LBI and Tussel tests, respectively.

See Also

johnson.graybill.test, lbi.test, tussel.test

Examples

```
data(Boik)
critical.values(nrow(Boik),ncol(Boik),0.01)
```

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johnson.graybill.test

Johnson and Graybill Additivity Test

Description

Test for an interaction in two-way ANOVA table by the Johnson-Graybill test.

Usage

```
johnson.graybill.test(Y, alpha = 0.05, critical.value = NA, Nsim = 1000)
```

Arguments

Y	data matrix
alpha	level of the test
critical.value	result of critical.values function, see Details
Nsim	number of simulations to be used for a critical value estimation

Details

The critical value can be computed in advance and given in the parameter critical value. If not a function critical.values is called to do that.

Value

A list with class "aTest" containing the following components: test statistics stat, critical value critical.value and the result of the test result, i.e. whether the additivity hypothesis has been rejected.

References

Johnson, D.E. and Graybill, F.A.: An analysis of a two-way model with interaction and no replication, *Journal of the American Statistical Association* **67**, pp. 862–868, 1972.

See Also

tukey.test, mtukey.test, mandel.test, lbi.test, tussel.test

Examples

```
data(Boik)
johnson.graybill.test(Boik)
```

`lbi.test` *Locally Best Invariant (LBI) Additivity Test*

Description

Test for an interaction in two-way ANOVA table by the LBI test.

Usage

```
lbi.test(Y, alpha = 0.05, critical.value = NA, Nsim=1000)
```

Arguments

`Y`	data matrix
`alpha`	level of the test
`critical.value`	result of `critical.values` function, see `Details`
`Nsim`	number of simulations to be used for a critical value estimation

Details

The critical value can be computed in advance and given in the parameter `critical value`. If not a function `critical.values` is called to do that.

Value

A list with class "`aTest`" containing the following components: test statistics `stat`, critical value `critical.value` and the result of the test `result`, i.e. whether the additivity hypothesis has been rejected.

References

Boik, R.J.: Testing additivity in two-way classifications with no replications:the locally best invariant test, *Journal of Applied Statistics* **20**,pp. 41–55, 1993.

See Also

`tukey.test`, `mtukey.test`, `mandel.test`, `johnson.graybill.test`, `tussel.test`

Examples

```
data(Boik)
lbi.test(Boik)
```

`mandel.test` *Mandel Additivity Test*

Description

Test for an interaction in two-way ANOVA table by the Mandel test.

Usage

```
mandel.test(data, alpha = 0.05, critical.value = NA)
```

Arguments

`data`	data matrix
`alpha`	level of the test
`critical.value`	NA = standard critical value

Value

A list with class "`aTest`" containing the following components: test statistics `stat`, critical value `critical.value` and the result of the test `result`, i.e. whether the additivity hypothesis has been rejected.

References

Mandel, J.: Non-additivity in Two-way Analysis of Variance, *Journal of the American Statistical Association* **56**, pp. 878–888, 1961.

See Also

`tukey.test`, `mtukey.test`, `johnson.graybill.test`, `lbi.test`, `tussel.test`

Examples

```
data(Boik)
mandel.test(Boik)
```

`mtukey.test` *Modified Tukey Additivity Test*

Description

Test for an interaction in two-way ANOVA table by the modified Tukey test.

Usage

```
mtukey.test(Y, alpha=0.05, correction=0, Nboot=1000)
```

Arguments

`Y`	data matrix
`alpha`	level of the test
`correction`	type of small sample size correction (0=none, 1=bootstrap without replacement, 2=sampling), see `Details`
`Nboot`	number of simulations to be used for small sample size correction

Details

The level of the modified Tukey test is unstable for a small sample size. In such cases either bootstraping (`correction=1`) or sampling (`correction=2`) should be used to compute the critical value.

References

Simecek, P. and Simeckova M.: On a Modification of The Tukey Additivity Test, *To be appeared*.

See Also

`tukey.test`, `mandel.test`, `johnson.graybill.test`, `lbi.test`, `johnson.graybill.test`

Examples

```
data(Boik)
mtukey.test(Boik)
mtukey.test(Boik,correction=2,Nboot=2000)
```

tukey.test *Tukey Additivity Test*

Description

Test for an interaction in two-way ANOVA table by the Tukey test.

Usage

```
tukey.test(data, alpha = 0.05, critical.value = NA)
```

Arguments

`data`	data matrix
`alpha`	level of the test
`critical.value`	NA = default

Value

A list with class "`aTest`" containing the following components: test statistics `stat`, critical value `critical.value` and the result of the test `result`, i.e. whether the additivity hypothesis has been rejected.

References

Tukey, J.W.: One Degree of Freedom for Non-additivity, *Biometrics* **5**, pp. 232–242, 1949.

Examples

```
data(Boik)
tukey.test(Boik)
```

tussel.test *Tussel Additivity Test*

Description

Test for an interaction in two-way ANOVA table by the Tussel test.

Usage

```
tussel.test(Y, alpha = 0.05, critical.value = NA, Nsim=1000)
```

Arguments

Y	data matrix
alpha	level of the test
critical.value	result of critical.values function, see Details
Nsim	number of simulations to be used for a critical value estimation

Details

The critical value can be computed in advance and given in the parameter critical value. If not a function critical.values is called to do that.

Value

A list with class "aTest" containing the following components: test statistics stat, critical value critical.value and the result of the test result, i.e. whether the additivity hypothesis has been rejected.

References

Tusell, F.: Testing for Interaction in Two-way ANOVA Tables with no Replication, *Computational Statistics \& Data Analysis* **10**, pp. 29–45, 1990

See Also

tukey.test, mtukey.test, mandel.test, lbi.test, johnson.graybill.test

Examples

```
data(Boik)
tussel.test(Boik)
```

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