Package ‘additivityTests’

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Description

In many applications of statistical methods, it is assumed that the response variable is a sum of several factors and a random noise. In a real world this may not be an appropriate model. For example, some patients may react differently to the same drug treatment or the effect of fertilizer may be influenced by the type of a soil. There might exist an interaction between factors.

If there is more than one observation per cell then standard ANOVA techniques may be applied. Unfortunately, in many cases it is infeasible to get more than one observation taken under the same conditions. For instance, it is not logical to ask the same student the same question twice.

Six tests of additivity hypothesis (under various alternatives) are included in this package: Tukey test, modified Tukey test, Johnson-Graybill test, LBI test, Mandel test and Tussel test.

Details

Testing for interaction in the two way ANOVA with single sub-class numbers.

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See Also

Useful links:
- https://github.com/simecek/additivityTests

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

critical.values

Critical Values for the Johnson-Graybill, LBI and Tusell 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 Tusell tests, respectively.

See Also
- johnson.graybill.test
- lbi.test
- tusell.test

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

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)
lbi.test

Locally Best Invariant (LBI) Additivity Test

Description

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

Usage

\[
\text{lbi.test}(Y, \alpha = 0.05, \text{critical.value} = \text{NA}, \text{Nsim} = 1000)
\]

Arguments

- **Y**: data matrix
- **alpha**: level of the test
- **critical.value**: result of \text{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 \text{critical.value}. If not a function \text{critical.values} is called to do that.

Value

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

References


See Also

tukey.test, mtukey.test, mandel.test, lbi.test, tusell.test

Examples

```r
\text{data(Boik)}
\text{johnson.graybill.test(Boik)}
```
mandel.test

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


See Also
tukey.test, mtukey.test, mandel.test, johnson.graybill.test, tusell.test

Examples

data(Boik)
lbi.test(Boik)

mandel.test Manel 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 result of critical.values function, see Details

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

See Also
`tukey.test`, `mtukey.test`, `johnson.graybill.test`, `lbi.test`, `tusell.test`

Examples
```r
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
```r
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 bootstrapping (`correction=1`) or sampling (`correction=2`) should be used to compute the 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

See Also
tukey.test, mandel.test, johnson.graybill.test, lbi.test, johnson.graybill.test

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

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 result of critical.values function, see Details

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.
tusell.test

**References**


**See Also**

`tusell.test, mtukey.test, mandel.test, lbi.test, johnson.graybill.test`

**Examples**

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

---

**tusell.test**

*Tusell Additivity Test*

**Description**

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

**Usage**

`tusell.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.test

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

Examples
data(Boik)
tusell.test(Boik)
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