Package ‘additivityTests’

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additivityTests-package

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

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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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 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)
Arguments

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

Value

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

References


See Also

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

Examples

data(boik)
johnson.graybill.test(boik)

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\textbf{lbi.test}  \textit{Locally Best Invariant (LBI) Additivity Test}

Description

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

Usage

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

Arguments

Y  data matrix
alpha  level of the test
critical.value  result of \texttt{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


See Also

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

Examples

data(Boik)
lni.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`  
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

data(Boik)
mandel.test(Boik)

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

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 bootstrapping (correction=1) or sampling (correction=2) should be used to compute the critical value.
tukey.test

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
```r
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.
References


See Also

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

Examples

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

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**tusell.test**  
*Tusell Additivity Test*

Description

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

Usage

```r
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

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tusell.test(Boik)
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