Package 'utest'

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Title Lind/Mehlum Utest

Version 0.4.0

Description An implementation of Lind and Mehlum's (2010) <doi:10.1111/j.1468-0084.2009.00569.x> Utest to test for the presence of a U shaped or inverted U shaped relationship between
variables in (generalized) linear models. It also implements a test of upward/downward sloping relationships at the lower and upper
boundary of the data range.

URL https://github.com/jotlind/utest

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Encoding UTF-8

RoxygenNote 7.3.2

Suggests testthat

NeedsCompilation no

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Repository CRAN

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Contents

uslopes *Estimates slopes at extremes*

Description

This function estimates the slope of the relationship at the lower and upper extreme points of the independent variable

Usage

```
uslopes(lmObject, vars, .vcov = NULL, x.min = NULL, x.max = NULL)
```

Arguments

lmObject	The model to be tested
vars	A vector with the name of the linear and squared terms. Can also be provided as a formula
.vcov	The covariance matrix to use
x.min	Lower bound of interval. If NULL, the minimum observed in the data is used.
x.max	Upper bound of interval. If NULL, the maximum observed in the data is used.

Details

The function computes slopes of a quadratic relationship at the lower and upper bound defined by x.min and x.max. Standard errors of the estimated slopes, t-values, and p-values from a one-sided test of a flat relationship as well as the extreme point of the estimated relationship are also provided.

Value

A list with class "uslopes" containing the following components:

interval	a vector with the interval for the independent varaible.
slope	a vector with the slope of the relationship at the extremes.
tval	a vector with the t-value of the relationship at the extremes.
pval	a vector with the p-value from a one-sided test a the extremes of the interval.
extreme	the estimated extreme point of the relationship.

See Also

utest

Examples

```
x <- runif(100,min=-1,max=1)
xsq <- x^2
y <- x^2+rnorm(100)
mod <- lm(y~x+xsq)

uslopes(mod,c("x","xsq"))
uslopes(mod,~x+xsq,x.max=0.8)
```

`utest` *Perform Utest*

Description

This function computes the Lind/Mehlum test of a U shaped relationship.

Usage

```
utest(lmObject, vars, .vcov = NULL, x.min = NULL, x.max = NULL)
```

Arguments

`lmObject`	The model to be tested
`vars`	A vector with the name of the linear and squared terms. Can also be provided as a formula
`.vcov`	The covariance matrix to use
`x.min`	Lower bound of interval. If `NULL`, the minimum observed in the data is used.
`x.max`	Upper bound of interval. If `NULL`, the maximum observed in the data is used.

Details

To test for a U shaped or inverse U shaped relationship, it is necessary to provide an interval where the shape is located. A U shaped relationship is downward sloping at the lower bound and upward sloping at the upper bound, and vice versa for an inverted U shape.

The function assumes inputs from a model including a squared specification. The sign of the squared term is used to differentiate between U shaped and inverted U shaped relationships.

The function provides a test of the joint hypothesis of a downward sloping relationship at `x.min` and an uppward sloping relationship at `x.max` for U shaped relationships and vice versa for inverted U shaped relationships, as detailed in Lind and Mehlum (2010) doi:10.1111/j.1468-0084.2009.00569.x.

Value

A list with class "htest" containing the following components:

`statistic`	the test statistic.
`p.value`	the p-value for the test.
`method`	a character string indicating what type of test was performed.
`data.name`	a character string giving the name(s) of the data.
`alternative`	a character string describing the alternative hypothesis.

References

J. T. Lind and H. Mehlum (2010) , With or without U? The appropriate test for a U shaped relationship. *Oxford Bulletin of Economics and Statistics* **72(1)**: 109-18, doi:10.1111/j.14680084.2009.00569.x.

See Also

uslopes

Examples

```
x <- runif(100,min=-1,max=1)
xsq <- x^2
y <- x^2+rnorm(100)
mod <- lm(y~x+xsq)

utest(mod,c("x","xsq"))
utest(mod,~x+xsq,x.max=0.8)

mod.logit <- glm((y>0)~x+xsq,family="binomial")
utest(mod.logit,c("x","xsq"))
```

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