Package ‘AUtests’

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Title  Approximate Unconditional and Permutation Tests
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Description Performs approximate unconditional and permutation testing for 2x2 contingency tables. Motivated by testing for disease association with rare genetic variants in case-control studies. When variants are extremely rare, these tests give better control of Type I error than standard tests.

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R topics documented:

au.firth .................................................. 2
au.test.strat ............................................. 2
au.tests .................................................. 3
basic.tests ............................................. 4
perm.test.strat ........................................ 4
perm.tests ............................................. 5

Index 6
au.firth \hspace{1cm} Firth AU testing

Description
Calculates approximate unconditional Firth test p-value for testing independence in 2x2 case-control tables. The Firth test requires significantly more computational time than the tests computed in the au.tests function.

Usage
\texttt{au.firth(m0, m1, r0, r1, lowthresh = 1e-12)}

Arguments
- \texttt{m0} \hspace{1cm} Number of control subjects
- \texttt{m1} \hspace{1cm} Number of case subjects
- \texttt{r0} \hspace{1cm} Number of control subjects exposed
- \texttt{r1} \hspace{1cm} Number of case subjects exposed
- \texttt{lowthresh} \hspace{1cm} A threshold for probabilities below to be considered as zero. Defaults to 1e-12.

Value
A single AU p-value, computed under the Firth test.

Examples
\texttt{au.firth(15000, 5000, 1, 0)}

au.test.strat \hspace{1cm} Stratified AU testing

Description
Calculates AU p-values for testing independence in 2x2 case-control tables, while adjusting for categorical covariates. Inputs are given as a vector of counts in each strata defined by the covariate(s). Note that computational time can be extremely high.

Usage
\texttt{au.test.strat(m0list, m1list, r0list, r1list, lowthresh = 1e-12)}
au.tests

Arguments

m0list Number of control subjects in each strata
m1list Number of case subjects in each strata
r0list Number of control subjects exposed in each strata
r1list Number of case subjects exposed in each strata
lowthresh A threshold for probabilities below to be considered as zero. Defaults to 1e-12.

Value

An AU p-value, computed under the likelihood ratio test.

Examples

au.test.strat(c(500, 1250), c(150, 100), c(0, 0), c(10, 5))

au.tests(15000, 5000, 30, 25)
au.tests(10000, 10000, 30, 25)

Description

Calculates approximate unconditional p-values for testing independence in 2x2 case-control tables.

Usage

au.tests(m0, m1, r0, r1, lowthresh = 1e-12)

Arguments

m0 Number of control subjects
m1 Number of case subjects
r0 Number of control subjects exposed
r1 Number of case subjects exposed
lowthresh A threshold for probabilities below to be considered as zero. Defaults to 1e-12.

Value

A vector of AU p-values, computed under score, likelihood ratio, and Wald tests.

Examples

au.tests(15000, 5000, 30, 25)
au.tests(10000, 10000, 30, 25)
**basic.tests**  
*Basic testing*

Description

Calculates standard p-values for testing independence in 2x2 case-control tables.

Usage

```r
basic.tests(m0, m1, r0, r1)
```

Arguments

- `m0`: Number of control subjects
- `m1`: Number of case subjects
- `r0`: Number of control subjects exposed
- `r1`: Number of case subjects exposed

Value

A vector of p-values, computed under score, likelihood ratio, Wald, Firth, and Fisher's exact tests.

Examples

```r
basic.tests(15000, 5000, 30, 25)
```

**perm.test.strat**  
*Stratified permutation testing*

Description

Calculates permutation p-values for testing independence in 2x2 case-control tables, while adjusting for categorical covariates. Inputs are given as a vector of counts in each strata defined by the covariate(s). Note that computational time can be extremely high.

Usage

```r
perm.test.strat(m0list, m1list, r0list, r1list)
```

Arguments

- `m0list`: Number of control subjects in each strata
- `m1list`: Number of case subjects in each strata
- `r0list`: Number of control subjects exposed in each strata
- `r1list`: Number of case subjects exposed in each strata
perm.tests

Value

A permutation p-value, computed under the likelihood ratio test.

Examples

perm.test.strat(c(7000, 1000), c(11000, 1000), c(50, 30), c(70, 40))

perm.tests

Permutation testing

Description

Calculates permutation p-values for testing independence in 2x2 case-control tables.

Usage

perm.tests(m0, m1, r0, r1, lowthresh = 1e-12)

Arguments

m0 Number of control subjects
m1 Number of case subjects
r0 Number of control subjects exposed
r1 Number of case subjects exposed
lowthresh A threshold for probabilities below to be considered as zero. Defaults to 1e-12.

Value

A vector of permutation p-values, computed under score, likelihood ratio, Wald, and Firth tests.

Examples

perm.tests(15000, 5000, 30, 25)
Index

au.firth, 2
au.test.strat, 2
au.tests, 3

basic.tests, 4

perm.test.strat, 4
perm.tests, 5