Package 'LFDR.MME'

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Type Package

Title Estimating Local False Discovery Rates Using the Method of Moments

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Description Estimation of the local false discovery rate using the method of moments.

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Contents

LFDR.MM *Performs a Multiple Hypothesis Testing Using the Method of Moments*

Description

Based on a given vector of chi-square test statistics, provides estimates of local false discoveries.

Usage

```
LFDR.MM(x)
```

Arguments

x	A vector of chi-square test statistics with one degree of freedom.

Details

For N given features (genes, proteins, SNPs, etc.), the function tests the null hypothesis H_{0i}, $i = 1, \ldots, N$, indicating that there is no association between feature i and a specific disease, versus its alternative hypothesis H_{1i}. For each unassociated feature i, it is suppoed that the corresponding test stiatistic x_i follows a central chi-square distribution with one degree of freedom. For each associated feature i, it is assumed that the corresponding test stiatistic x_i follows a non-central chi-square distribution with one degree of freedom and non-centrality parameter λ. In this packag, association is measured by estimating the local false discovery rate (LFDR), the posterior probability that the null hypothesis H_{0i} given the test statistic x_i is true. This package returns three components as mentioned in the **Value** section.

Value

Outputs three elements as seen below:

pi0.hat	estimate of proportion of unassocaited features π_0.
ncp.hat	estimate of the non-centrality parameter λ of the chi-square model for associated features.
lfdr.hat	estimates of local false discovery rates.

Author(s)

Code: Ali Karimnezhad.
Documentation: Ali Karimnezhad.

References

Karimnezhad, A. (2020). A Simple Yet Efficient Parametric Method of Local False Discovery Rate Estimation Designed for Genome-Wide Association Data Analysis. Retrieved from https://arxiv.org/abs/1909.13307

Examples

```
# vector of test statistics for assocaited features
stat.assoc<- rchisq(n=1000,df=1, ncp = 3)

# vector of test statistics for unassocaited features
stat.unassoc<- rchisq(n=9000,df=1, ncp = 0)

# vector of test statistics
stat<- c(stat.assoc,stat.unassoc)
```

```
output <- LFDR.MM(x=stat)

# Estimated pi0
output$p0.hat

# Estimated non-centrality parameter
output$ncp.hat

# Estimated LFDRs
output$lfdr.hat
```

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