Package 'metaBLUE'

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Title BLUE for Combining Location and Scale Information in a
Meta-Analysis

Version 1.0.0

Description

The sample mean and standard deviation are two commonly used statistics in meta-analyses,
but some trials use other summary statistics such as the median and quartiles to report the results.
Therefore, researchers need to transform those information back to the sample mean and
standard deviation. This package implemented sample mean estima-
tors by Luo et al. (2016) <arXiv:1505.05687>, sample standard deviation estima-
tors by Wan et al. (2014) <arXiv:1407.8038>, and the best linear unbiased estima-
tors (BLUEs) of location and scale parameters by Yang et al. (2018, submitted) based on sam-
ple quantiles derived summaries in a meta-analysis.

Depends R (>= 3.3)

Imports stats, Matrix

License GPL-2

Encoding UTF-8

LazyData true

RoxygenNote 6.0.1

NeedsCompilation no

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R topics documented:

BLUE_c   *BLUEs of global location and scale parameters*

Description

To obtain the global or overall best linear unbiased estimator (BLUE) of location and scale parameters (Yang et al., 2018).

Usage

```
BLUE_c(alpha_c, B_c, X_c)
```

Arguments

alpha_c   the expectation of a combined standardized vector of ordered summary statistics, i.e. equation (3.21) in Yang et al. (2018).

B_c   the variance-covariance matrix of a combined standardized vector of ordered summary statistics, i.e. equation (3.22) in Yang et al. (2018).

X_c   a combined vector of ordered summary statistics.

References

Yang X, Hutson AD, and Wang D. (2018). A generalized BLUE approach for combining location and scale information in a meta-analysis (Submitted).

Examples

```
n1<-30 # sample sizes of three included studies
n2<-45
n3<-67
X1<-c(3,1.2) # the mean and standard deviation
X2<-c(1,4,10) # the sample mean, minimum and maximum values
X3<-c(1.5,3,5.5,8,12) # the sample mean, first and third quartiles, and minimum and maximum values
X_c<-c(X1[1],X2,X3)

alpha1<-0  #Approximate by the CLT.
B1<-1/sqrt(n1)
alpha2<-BLUE_s(X2,n2,"S1")$alpha
B2<-BLUE_s(X2,n2,"S1")$B
alpha3<-BLUE_s(X3,n3,"S3")$alpha
B3<-BLUE_s(X3,n3,"S3")$B

alpha_c<-c(alpha1,alpha2,alpha3)
B_c<-Matrix::bdiag(B1,B2,B3)

BLUE_c(alpha_c,B_c,X_c)
```

BLUE_s | *BLUEs of individual location and scale parameters*

Description

To obtain the best linear unbiased estimator (BLUE) of location and scale parameters based on any set of order statistics (Yang et al., 2018), where the underlying distribution is assumed to be normal.

Usage

```
BLUE_s(X, n, type)
```

Arguments

X   a vector of ordered summary statistics

n   the sample size

type   a character string indicating which type of summary statistics is reported. The options for the **type** argument are:

- "S1" for the sample mean, minimum and maximum values
- "S2" for the sample mean, first and third quartiles
- "S3" for the sample mean, first and third quartiles, and minimum and maximum values
- "tertiles" for tertiles, "quintiles" for quintiles, and "deciles" for deciles

References

Yang X, Hutson AD, and Wang D. (2018). A generalized BLUE approach for combining location and scale information in a meta-analysis (Submitted).

Examples

```
X<-c(1,4,10)
n<-30
type<-"S1"
BLUE_s(X,n,type)

X<-c(5,8)
n<-45
type<-"tertiles"
BLUE_s(X,n,type)
```

Luo.mean   *Luo et al.'s mean estimators*

Description

Use Luo et al.'s methods (Luo et al., 2016) to estimate the sample mean based on sample quantiles derived summaries for a single study.

Usage

```
Luo.mean(X, n, type)
```

Arguments

X	a vector of ordered summary statistics
n	the sample size
type	a character string indicating which type of summary statistics is reported. The options for the **type** argument are:

- "S1" for the sample mean, minimum and maximum values
- "S2" for the sample mean, first and third quartiles
- "S3" for the sample mean, first and third quartiles, and minimum and maximum values

References

Luo D, Wan X, Liu J, and Tong T. (2016). Optimally estimating the sample mean from the sample size, median, mid-range, and/or mid-quartile range. *Statistical Methods in Medical Research*, arXiv:1505.05687.

Examples

```
X<-c(1,4,10)
n<-30
type<-"S1"
Luo.mean(X,n,type)
```

Wan.std   *Wan et al.'s standard deviation estimators*

Description

Use Wan et al.'s methods (Wan et al., 2014) to estimate the sample standard deviation based on sample quantiles derived summaries for a single study.

Usage

```
Wan.std(X, n, type)
```

Arguments

X	a vector of ordered summary statistics
n	the sample size
type	a character string indicating which type of summary statistics is reported. The options for the **type** argument are:

- "S1" for the sample mean, minimum and maximum values
- "S2" for the sample mean, first and third quartiles
- "S3" for the sample mean, first and third quartiles, and minimum and maximum values

References

Wan X,Wang W, Liu J, and Tong T. (2014). Estimating the sample mean and standard deviation from the sample size, median, range and/or interquartile range. *BMC Medical Research Methodology*, **14**:135.

Examples

```
X<-c(1,4,10)
n<-30
type<-"S1"
Wan.std(X,n,type)
```

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