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Type Package

Title Rosenthal's Fail Safe Number and Related Functions

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Depends R (>= 3.6.0)

Imports graphics, grDevices, Rfast, stats

Description Estimation of Rosenthal's fail safe number including confidence intervals. The relevant papers are the following. Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2014). ``Publication Bias in Meta-Analysis: Confidence Intervals for Rosenthal's Fail-Safe Number". International Scholarly Research Notices, Volume 2014. <doi:10.1155/2014/825383>. Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). ``Exploring the distribution for the estimator of Rosenthal's fail-safe number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672--5684. <doi:10.1080/03610926.2015.1109664>.

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`fsn-package` *Rosenthal's Fail Safe Number and Related Functions*

Description

Estimation of Rosenthal's fail safe number including confidence intervals. We have kept the same name functions as in the supplementary materials of the two relevant papers.

Details

Package:	fsn
Type:	Package
Version:	0.1
Date:	2020-11-11
License:	GPL-2

Maintainers

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Author(s)

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References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). "Exploring the distribution for the estimator of Rosenthal's "fail-safe" number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672–5684.

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2014). "Publication Bias in Meta-Analysis: Confidence Intervals for Rosenthal's Fail-Safe Number". International Scholarly Research Notices, Volume 2014.

Rosenthal R. (1979). "The file drawer problem and tolerance for null results". Psychological Bulletin, 86, 638–641.

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a fixe

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a fixed number of studies

Description

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a fixed number of studies.

Usage

```
halfnorm.fixednr.ci(stat, se, alpha = 0.05, type = "dist", B = 1000)
```

Arguments

stat	A vector with the statistics.
se	A vector with the standard errors of the stat.
alpha	The significance level, set to 0.05 by default.
type	The type of confidence intervals to construct. Based on distributional assumptions ("dist"), based on the method of moments ("mom"), using non-parametric bootstrap ("boot") or all of these three ("all").
B	Number of bootstrap samples to generate.

Details

The function computes confidence intervals assuming a half normal distribution assuming that the number of studies is fixed and estimating the variance either via MLE, moments or bootstrap as described in Fragkos, Tsagris & Frangos (2014).

Value

A list including:

Nr	Rosenthal's fail safe number.
variance	The variance of Rosenthal's fail safe number.
ci	The (1-alpha)% confidence interval for the true Rosenthal's fail safe number.

Author(s)

Michail Tsagris and Constantinos Frangos

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2014). "Publication Bias in Meta-Analysis: Confidence Intervals for Rosenthal's Fail-Safe Number". International Scholarly Research Notices, Volume 2014.

See Also

halfnorm.randomnr.ci, den.plot, rosenthal, convergence.rate

Examples

```
stat <- rnorm(30, 3, 0.2)
se <- rchisq(30, 1)
halfnorm.fixednr.ci(stat, se)
```

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a rand

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a random number of studies

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Description

Confidence intervals for Rosenthal's fail-safe number assuming a half normal distribution with a random number of studies.

Usage

```
halfnorm.randomnr.ci(stat, se, alpha = 0.05, type = "dist")
```

Arguments

stat	A vector with the statistics.
se	A vector with the standard errors of the stat.
alpha	The significance level, set to 0.05 by default.
type	The type of confidence intervals to construct. Based on distributional assumptions ("dist") or based on the method of moments ("mom") or both "both".

Details

The function computes confidence intervals assuming a half normal distribution assuming that the number of studies is random and estimating the variance either via MLE or moments or bootstrap as described in Fragkos, Tsagris & Frangos (2014).

Value

A list including:

`Nr`	Rosenthal's fail safe number.
`variance`	The variance of Rosenthal's fail safe number.
`ci`	The (1-alpha)% confidence interval for the true Rosenthal's fail safe number.

Author(s)

Michail Tsagris and Constantinos Frangos

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2014). "Publication Bias in Meta-Analysis: Confidence Intervals for Rosenthal's Fail-Safe Number". International Scholarly Research Notices, Volume 2014.

See Also

`halfnorm.fixednr.ci` `den.plot`,`rosenthal`,`convergence.rate`

Examples

```
stat <- rnorm(30, 3, 0.2)
se <- rchisq(30, 1)
halfnorm.fixednr.ci(stat, se)
```

`Density of Nr assuming a truncated normal or a folded normal`

Density of Nr assuming a truncated normal or a folded normal

Description

Density of Nr assuming a truncated normal or a folded normal.

Usage

```
truncnorm.nr.density(nr, k, alpha = 0.05)
foldnorm.nr.density(nr, k, alpha = 0.05)
```

Arguments

`nr`	The value of Nr, which must be positive aparently.
`k`	The number of studies.
`alpha`	The significance level, set to 0.05 by default.

Details

The function calculates the density of Nr assuming either a truncated normal (Equation (9)) or a folded normal (Equation (15)) in Fragkos, Tsagris & Frangos (2017).

Value

The density value of Nr assuming either a truncated normal or a folded normal.

Author(s)

Michail Tsagris, Constantinos Frangos, and Christos Frangos.

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr>, Constantinos Frangos <kfragkos@outlook.com> and Christos Frangos <cfragos@teiath.gr>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). "Exploring the distribution for the estimator of Rosenthal's fail-safe number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672–5684.

See Also

den.plot,rosenthal,convergence.rate

Examples

```
truncnorm.nr.density(100, k = 30)
foldnorm.nr.density(100, k = 30)
```

`Numerical estimation of the convergence rate of Rosenthal's fail-safe number Nr`

Numerical estimation of the convergence rate of Rosenthal's fail-safe number Nr

---

Description

Numerical estimation of the convergence rate of Rosenthal's fail-safe number Nr.

Usage

```
convergence.rate(k = seq( 10, 5000, by = 10), R = 1000, alpha = 0.05)
```

Arguments

k	A grid of number of studies to consider.
R	The number of repeats for each number of studies.
alpha	The significance level, set to 0.05 by default.

Details

This function replicates the Figures 6 and 5 in Fragkos, Tsagris and Frangos (2017).

Value

Two plots, the absolute relative error of Nr agains the number of studies and the logarithm of absolute relative error against the logarithm of the number of studies and the coefficients of the regression model of the second plot. The second coefficient is the numerically estimated convergence rate of Nr.

Author(s)

Michail Tsagris and Constantinos Frangos

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). "Exploring the distribution for the estimator of Rosenthal's fail-safe number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672–5684.

See Also

den.plot,truncnorm.nr.density,rosenthal

Examples

```
convergence.rate(k = seq( 10, 5000, by = 10), R = 1000, alpha = 0.05)
```

`Plot of both densities of Nr`

Plot of both densities of Nr

Description

Plot of both densities of Nr.

Usage

```
den.plot(k, max_k = 20 * k, dist = "truncnorm")
```

Arguments

k	The number of studies.
max_k	The maximum number for which the densities are calcualted. It is set to $20k$ by default.
dist	The distribution to plot, either "truncnorm", "foldnorm" or "both".

Details

The function plot the density of Nr assuming a truncated normal (Equation (9)) or a folded normal (Equation (15)) in Fragkos, Tsagris and Frangos (2017).

Value

The density plot of Nr assuming either a truncated normal or a folded normal.

Author(s)

Michail Tsagris and Constantinos Frangos

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). "Exploring the distribution for the estimator of Rosenthal's fail-safe number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672–5684.

See Also

truncnorm.nr.density, rosenthal

Examples

```
den.plot(30, dist = "both")
```

Rosenthal's fail-safe number Nr

Rosenthal's fail-safe number Nr

Description

Rosenthal's fail-safe number Nr.

Usage

```
rosenthal(stat, se, alpha = 0.05)
```

Arguments

`stat`	A vector with the statistics.
`se`	A vector with the standard errors of the stat.
`alpha`	The significance level, set to 0.05 by default.

Details

The function Calculates of Rosenthal's fail-safe number Nr.

Value

A vector with two values, Rosenthal's fail-safe number Nr and the rule of thumb, $5k + 10$, where k denotes the number of studies.

Author(s)

Michail Tsagris and Constantinos Frangos

R implementation and documentation: Michail Tsagris <mtsagris@uoc.gr> and Constantinos Frangos <kfragkos@outlook.com>.

References

Konstantinos C. Fragkos, Michail Tsagris and Christos C. Frangos (2017). "Exploring the distribution for the estimator of Rosenthal's fail-safe number of unpublished studies in meta-analysis". Communications in Statistics-Theory and Methods, 46(11):5672–5684.

Rosenthal R. (1979). "The file drawer problem and tolerance for null results". Psychological Bulletin, 86, 638–641.

See Also

`truncnorm.nr.density`, `den.plot`, `convergence.rate`

Examples

```
stat <- rnorm(30, 3, 0.2)
se <- rchisq(30, 1)
rosenthal(stat, se)
```

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