package ‘mbir’

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Type Package
Title Magnitude-Based Inferences
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Description Allows practitioners and researchers a wholesale approach for deriving magnitude-based inferences from raw data. A major goal of ‘mbir’ is to programmatically detect appropriate statistical tests to run in lieu of relying on practitioners to determine correct stepwise procedures independently.
Imports graphics, stats, utils, effsize, psych
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Copyright Segments of the package are based upon Will G. Hopkins' work. See vignette and COPYRIGHT file for details.
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aipe_smd

Description

Estimates sample size for paired or independent, two-sample study designs via Accuracy in Parameter Estimation. Calculates $n$ so a given study is likely to obtain margin of error no larger than chosen target margin of error.

Usage

aipe_smd(moe, paired = c(TRUE, FALSE), conf.int, assur.lvl, r)

Arguments

- **moe**: target margin of error in standard deviation units
- **paired**: (character) logical indicator specifying if x and y are paired (TRUE) or independent (FALSE)
- **conf.int**: (optional) confidence level of the interval. Defaults to 0.90
- **assur.lvl**: (optional) desired level of assurance (percent experiments whose MOE is less than target MOE). Defaults to 0.99
- **r**: (required if paired = TRUE) population correlation between the two measures

Details

Refer to vignette for further information.

References


Examples

\texttt{aipe\_smd(moe = 0.55, paired = TRUE, conf.int = .9, assur.lvl = .99, r = .75)}

\begin{verbatim}
require(graphics)
a <- rnorm(80)
b <- rnorm(100)
boot_test(a, b, 0.9, 10000)
\end{verbatim}

\section*{Description}

Provides nonparametric confidence intervals via percentile-based resampling.

\section*{Usage}

\texttt{boot_test(x, y, conf.int, resample, med)}

\section*{Arguments}

- \texttt{x, y} numeric vectors of data values
- \texttt{conf.int} (optional) confidence level of the interval. Defaults to 0.90
- \texttt{resample} (optional) number of resamples. Defaults to 10,000
- \texttt{med} (optional) number indicating true difference in medians to test against. Defaults to zero.

\section*{Details}

Refer to vignette for further information.

\section*{Examples}

\begin{verbatim}
require(graphics)
a <- rnorm(25, 80, 35)
b <- rnorm(25, 100, 50)
boot_test(a, b, 0.95, 10000)
\end{verbatim}
**corr**  
*Correlation Coefficient*

### Description

Provides magnitude-based inferences upon given $r$ value and sample size. Based upon WG Hopkins Microsoft Excel spreadsheet.

### Usage

```r
corr(r, n, conf.int = 0.9, swc = 0.1, plot = false)
```

### Arguments

- **r**: correlation coefficient
- **n**: sample size
- **conf.int**: (optional) confidence level of the interval. Defaults to 0.90
- **swc**: (optional) number indicating smallest worthwhile change. Defaults to 0.1
- **plot**: (optional) logical indicator specifying to print associated plot. Defaults to `FALSE`

### Details

Refer to vignette for further information.

### References


### Examples

```r
corr(.40, 25, .95)
```

---

**corr_diff**  
*Test of Two Correlations*

### Description

Provides statistical inference upon the difference between two independent correlations.

### Usage

```r
corr_diff(r1, n1, r2, n2, conf.int = 0.9, plot = FALSE)
```

### Details

Refer to vignette for further information.
**corr_test**

**Arguments**

- `r1`: correlation of group 1
- `n1`: sample size of group 1
- `r2`: correlation of group 2
- `n2`: sample size of group 2
- `conf.int`: (optional) confidence level of the interval. Defaults to 0.90
- `plot`: (optional) logical indicator specifying to print associated plot. Defaults to FALSE

**Details**

Refer to vignette for further information.

**References**


**Examples**

corr_diff(r1 = 0.20, n1 = 71, r2 = 0.55, n2 = 46)

---

**corr_test**  
*Correlation Coefficient Test*

**Description**

Provides magnitude-based inferences for the association between given data vectors. Evaluates normality assumption, performs either Pearson or Spearman correlation and subsequently estimates magnitude-based inferences.

**Usage**

corr_test(x, y, conf.int = 0.9, auto = TRUE, method = "pearson", swc = 0.1, plot = FALSE)

**Arguments**

- `x, y`: numeric vectors of data values
- `conf.int`: (optional) confidence level of the interval. Defaults to 0.90
- `auto`: (character) logical indicator specifying if user wants function to programmatically detect statistical procedures. Defaults to TRUE
- `method`: (character) if auto = F, logical indicator specifying which correlation to execute (pearson, spearman, kendall). Defaults to "pearson".
- `swc`: (optional) number indicating smallest worthwhile change. Defaults to 0.1
- `plot`: (optional) logical indicator specifying to print associated plot. Defaults to FALSE
Details
Refer to vignette for further information.

Value
Associated effect size measure, \( r \), and respective confidence intervals.

Examples
```r
a <- rnorm(80, 25, 35)
b <- rnorm(100, 35)
corr_test(a, b, 0.95)
```

---

**es_convert**

**Effect Size Converter**

Description
Converts between equivalent effect size measures: \( d \), \( r \), odds ratio.

Usage
```r
es_convert(x, from = c("d", "or", "r"), to = c("d", "or", "r"))
```

Arguments
- **x**: numeric value
- **from**: (character) current effect size of \( x \)
- **to**: (character) effect size measure to convert to

Details
Refer to vignette for further information.

References


Examples
```r
# Odds ratio to Cohen's d
es_convert(1.25, from = "or", to = "d")
```
Description

Provides magnitude-based inferences upon given odds ratio and \( p \)-value. Based upon WG Hopkins Microsoft Excel spreadsheet.

Usage

\[
\text{odds}(\text{or}, \text{p}, \text{conf.int} = 0.9)
\]

Arguments

- \text{or} \quad \text{odds ratio}
- \text{p} \quad \text{associated} \ p\text{-value}
- \text{conf.int} \quad (\text{optional}) \text{confidence level of the interval. Defaults to} 0.90

Details

Refer to vignette for further information.

References


Examples

\[
\text{odds}(1.25, 0.06, 0.95)
\]

Description

Provides magnitude-based inferences upon given proportions and sample sizes. Based upon WG Hopkins Microsoft Excel spreadsheet.

Usage

\[
\text{prop}(p_1, n_1, p_2, n_2, \text{conf.int})
\]
Arguments

- **p1**: proportion of group 1
- **n1**: sample size of group 1
- **p2**: proportion of group 2
- **n2**: sample size of group 2
- **conf.int**: (optional) confidence level of the interval. Defaults to 0.90

Details

Refer to vignette for further information.

References


Examples

```r
prop(p1 = 0.7L, n1 = 25, p2 = 0.5, n2 = 20)
```

---

**smd**

*Standardized Mean Difference*

Description

Provides magnitude-based inferences upon given \( d \), \( p \)-value, and degrees of freedom. Based upon WG Hopkins Microsoft Excel spreadsheet.

Usage

```r
smd(es, p, df, conf.int = 0.9, swc = 0.5, plot = FALSE)
```

Arguments

- **es**: effect size measure (Cohen’s \( d \))
- **p**: associated \( p \)-value from t-statistic
- **df**: associated degrees of freedom from t-statistic
- **conf.int**: (optional) confidence level of the interval. Defaults to 0.90
- **swc**: (optional) number indicating smallest worthwhile change. Defaults to 0.5
- **plot**: (optional) logical indicator specifying to print associated plot. Defaults to FALSE

Details

Refer to vignette for further information.
smd_test

References

Examples

\[
\text{smd(.7, 0.06, 20, 0.95)}
\]

---

**smd_test**  
*Standardized Mean Difference Test*

---

**Description**
Performs two-sample difference of means analysis to produce magnitude-based inferences. Evaluates both normality and homogeneity, performs either t-test or wilcoxon test, computes effect sizes and estimates magnitude-based inferences. Allows both independent and paired designs.

**Usage**

\[
\text{smd_test(x, y, paired = c(TRUE, FALSE), auto = TRUE, var = TRUE, normal = TRUE, conf.int = 0.9, mu = 0, swc = 0.5, plot = FALSE)}
\]

**Arguments**

- **x, y** numeric vectors of data values
- **paired** (character) logical indicator specifying if x and y are paired (TRUE) or independent (FALSE)
- **auto** (character) logical indicator specifying if user wants function to programmatically detect statistical procedures. Defaults to TRUE
- **var** (optional) if auto = F, logical indicator specifying if homogeneity of variance assumed. Defaults to TRUE
- **normal** (optional) if auto = F, logical indicator specifying if normality assumed. Defaults to TRUE
- **conf.int** (optional) confidence level of the interval. Defaults to 0.90
- **mu** (optional) number indicating true difference in means to test against. Defaults to zero.
- **swc** (optional) number indicating smallest worthwhile change. Defaults to 0.5
- **plot** (optional) logical indicator specifying to print associated plot. Defaults to FALSE

**Details**
Refer to vignette for further information.
Value

Associated effect size measures (d, r, odds ratio) and respective confidence intervals based upon which statistical test(s) performed.

Examples

```r
a <- rnorm(25, 80, 35)
b <- rnorm(25, 100, 50)
smd_test(a, b, paired = FALSE, conf.int=0.95)
```

---

**ss_corr**  
Sample Size Estimation: Correlation Coefficient

Description

Estimates magnitude-based inferences upon planned sample size and r value. Based upon WG Hopkins Microsoft Excel spreadsheet.

Usage

```r
ss_corr(n, r)
```

Arguments

- `n`: planned sample size
- `r`: planned correlation coefficient

Details

Refer to vignette for further information.

References


Examples

```r
ss_corr(n = 20, r = 0.2)
```
**ss_odds**  
*Sample Size Estimation: Odds Ratio*

**Description**
Estimates magnitude-based inferences upon planned sample size and odds ratio. Based upon WG Hopkins Microsoft Excel spreadsheet.

**Usage**
```r
ss_odds(exp, con, or)
```

**Arguments**
- `exp`: planned sample size of experimental group
- `con`: planned sample size of control group
- `or`: planned odds ratio

**Details**
Refer to vignette for further information.

**References**

**Examples**
```r
ss_odds(exp = 15, con = 18, or = 3.25)
```

---

**ss_smd**  
*Sample Size Estimation: Standardized Mean Difference*

**Description**
Estimates magnitude-based inferences upon planned sample size and $d$ value. Based upon WG Hopkins Microsoft Excel spreadsheet.

**Usage**
```r
ss_smd(exp, con, es)
```
Arguments

- **exp**: planned sample size of experimental group
- **con**: planned sample size of control group
- **es**: planned Cohen’s $d$

Details

Refer to vignette for further information.

References


Examples

```r
ss_smd(exp = 20, con = 15, es = 0.6)
```

**Swc_ind**

*Smallest Worthwhile Change: Individual*

Description

Provides longitudinal magnitude-based inferences for an individual’s change from previous time point and magnitude of deviation from trend line.

Usage

```r
swc_ind(x, swc, type = c("previous", "trend"), ts, te, main, xlab, ylab)
```

Arguments

- **x**: numeric vectors of data values
- **swc**: smallest worthwhile change
- **type**: (character) indicator specifying which type of analysis: "previous" or "trend"
- **ts**: (required if type = "trend") target slope
- **te**: (optional) typical error. Defaults to typical error of the estimate
- **main**: (optional) plot title. Defaults to blank
- **xlab**: (optional) x-axis label. Defaults to "Measurement"
- **ylab**: (optional) y-axis label. Defaults to name of x

Details

Refer to vignette for further information.
swc_ind

References

Examples
\[ df<-c(97.5, 99.9, 100.2, 101, 101.2, 99.8) \]

\[ swc_ind(x = df, swc = 0.5, te = 1, ts = 0.25, type = "trend") \]
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