Package ‘mbir’

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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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aipe_smd

Accuracy in Parameter Estimation: Standardized Mean Difference

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

```r
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**

```r
aipe_smd(moe = 0.55, paired = TRUE, conf.int = .9, assur.lvl = .99, r = 0.75)
```

**Description**

Provides nonparametric confidence intervals via percentile-based resampling.

**Usage**

```r
boot_test(x, y, conf.int, resample, med)
```

**Arguments**

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

**Details**

Refer to vignette for further information.

**Examples**

```r
require(graphics)
a <- rnorm(25, 80, 35)
b <- rnorm(25, 100, 50)
boot_test(a, b, 0.95, 10000)
```
**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, 0.95)
```

---

**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)
```

**References**

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

```r
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

```r
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(25, 80, 35)
b <- rnorm(25, 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")
```
### odds

**Odds Ratio**

**Description**

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

**Usage**

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

**Arguments**

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

**Details**

Refer to vignette for further information.

**References**


**Examples**

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

---

### prop

**Test of Two Proportions**

**Description**

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

**Usage**

\[
\text{prop}(\text{p1, n1, p2, n2, conf.int})
\]
Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>p1</td>
<td>proportion of group 1</td>
</tr>
<tr>
<td>n1</td>
<td>sample size of group 1</td>
</tr>
<tr>
<td>p2</td>
<td>proportion of group 2</td>
</tr>
<tr>
<td>n2</td>
<td>sample size of group 2</td>
</tr>
<tr>
<td>conf.int</td>
<td>(optional) confidence level</td>
</tr>
<tr>
<td></td>
<td>of the interval. Defaults to 0.90</td>
</tr>
</tbody>
</table>

Details

Refer to vignette for further information.

References


Examples

```
prop(p1 = 0.7, 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

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

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>es</td>
<td>effect size measure (Cohen’s d)</td>
</tr>
<tr>
<td>p</td>
<td>associated p-value from t-statistic</td>
</tr>
<tr>
<td>df</td>
<td>associated degrees of freedom from t-statistic</td>
</tr>
<tr>
<td>conf.int</td>
<td>(optional) confidence level of the interval. Defaults to 0.90</td>
</tr>
<tr>
<td>swc</td>
<td>(optional) number indicating smallest worthwhile change. Defaults to 0.5</td>
</tr>
<tr>
<td>plot</td>
<td>(optional) logical indicator specifying to print associated plot. Defaults to FALSE</td>
</tr>
</tbody>
</table>

Details

Refer to vignette for further information.
References

Examples
smd(.75, 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
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

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

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

ss_smd(exp, con, es)
swc_ind

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

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

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.
References


Examples

def<-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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