Package ‘regtomean’

October 26, 2022

Type Package
Title Regression Toward the Mean
Version 1.1
Imports formattable, effsize, mefa, plyr, plotrix, sjPlot, sjmisc, sjlabelled,
Description In repeated measures studies with extreme large or small values it is common
that the subjects measurements on average are closer to the mean of the basic population.
Interpreting possible changes in the mean in such situations can lead to biased results
since the values were not randomly selected, they come from truncated sampling.
This method allows to estimate the range of means where treatment effects are likely to occur
when regression toward the mean is present.
Ostermann, T., Willich, Stefan N. & Luedtke, Rainer. (2008). Regression toward the mean - a de-
tection method for unknown population mean based on Mee and Chua's algorithm. BMC Medi-
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Encoding UTF-8
LazyData true
RoxygenNote 7.1.1
Depends R (>= 2.10)
NeedsCompilation no
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Repository CRAN
Date/Publication 2022-10-26 13:52:37 UTC

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Description

This function calculates the correlation for the data and Cohen’s d effect sizes, both based on pooled and on treatment standard deviations.

Usage

cordata(Before, After, data)

Arguments

Before: a numeric vector giving the data values for the first (before) measure.
After: a numeric vector giving the data values for the second (after) measure.
data: an optional data frame containing the variables in the formula. By default the variables are taken from environment (formula).

Details

This function computes the correlation between both measures as also both effect sizes based on Cohen’s d statistic.

The inputs must be numeric.

Value

Return a table containing the correlation, effect size pooled and effect size based on treatment.

Author(s)

Daniela R. Recchia, Thomas Ostermann.

References


See Also

cohen.d, cor
Examples

cordata("Before","After",data=language_test)

language_test  Language Test in High School

Description

A dataset with scores from 8 students who failed a high school test and could not get their diploma. They repeated the exam and got new scores.

Usage

data("language_test")

Format

A data frame with 8 observations on the following 9 variables.

Student  a numeric vector
Before   a numeric vector
After    a numeric vector
‘Total N’ a numeric vector
Cross    a numeric vector
‘Pre-treatment Mean’ a numeric vector
‘Pre-treatment Std’ a numeric vector
‘Post-treatment Mean’ a numeric vector
‘Post-treatment Std’ a numeric vector

Source


Examples

data(language_test)
## maybe str(language_test) ; plot(language_test) ...
meechua_eff.CI

Calculates and plots treatment and regression effects as also its p-values.

Description
This function calculates and plots treatment and regression effects of both before and after measures as also its p-values.

Usage
meechua_eff.CI(x, n, se.after)

Arguments
x  a data frame containing the results from meechua_reg. It is stored as mod_coef.
n  the original sample size (number of observations) from data.
se.after  the estimated standard error from meechua_reg. It is stored as se.after.

Details
After performing the meechua_reg the model coefficients mod_coef as also its global variable se.after are used as input in this function to estimate treatment and regression effects.

Value
Two plots are performed, the first "Treatment Effect and p-value" and the second "Confidence Intervals" for mu.

Author(s)
Daniela R. Recchia, Thomas Ostermann

References

See Also
meechua_reg
Examples

```r
# First perform replicate_data and meechua_reg
replicate_data(50,60,"Before","After",data=language_test)
mee_chua_sort <- mee_chua[with(mee_chua,order(mu)),]
meechua_reg(mee_chua_sort)

# Model coeeficients (mod_coef) and se.after are stored in the environment
# as a result from the function meechua_reg
meechua_eff.CI(mod_coef,8,se.after)
```

---

meechua_plot  Plot models from meechua_reg

Description

This function plots all 4 diagnostics plots for each linear regression model: "Residuals vs Fitted", "Normal Q-Q", "Scale-Location" and "Residuals vs Leverage".

Usage

```r
meechua_plot(x)
```

Arguments

- `x` List containing the estimated linear models from `meechua_reg`. It is stored as `models`.

Details

For each model from `models` 4 diagnostic plots are performed. For the first model the numbers 1 to 4 should be given, for the second model numbers from 8 to 12, and so on.

Value

Diagnostics plots for the set of models from `meechua_reg`.

Author(s)

Daniela R. Recchia, Thomas Ostermann.

References


See Also

- `plot.lm`, `meechua_reg`
Examples

```r
# models are an output from meechua_reg
replicate_data(50,60,"Before","After",data=language_test)
mee_chua_sort <- meechua[with(mee_chua,order(mu)),]
meechua_reg(mee_chua_sort)

# models are the output from meechua_reg saved in the environment after running the function
meechua_plot(models)
```

---

**meechua_reg**

*Fit linear models on the (replication) data.*

**Description**

This function fit linear models for a subset of data frames.

**Usage**

```r
meechua_reg(x)
```

**Arguments**

- `x` Data to be used in the regression.

**Details**

The data used for the regression must be sorted by `mu`.

- A set of linear models will be estimated and model coefficients are saved and stored in `mod_coef`.
- The estimated standard error for the `after` measure is also stored in `se_after` to be used further in other functions.

**Value**

A table containing the estimations for each `mu`. Global variables `models`, `mod_coef`, `se_after` are stored for further analysis. The models are saved in an object called `mee_chua`, which is not automatically printed but is saved in the environment.

**Author(s)**

Daniela R. Recchia, Thomas Ostermann.

**References**

**replicate_data**

**See Also**

lm, dply

**Examples**

```r
## get the values ##
mee_chua <- replicate_data(50, 60, "Before", "After", data = language_test)
## sort mu ##
mee_chua_sort <- mee_chua[with(mee_chua, order(mu)), ]
meechua_reg(mee_chua_sort)
```

---

**replicate_data**

Replicates before and after values 100 times.

**Description**

This function replicates 100 times the before and after values giving a start and end reference.

**Usage**

```r
replicate_data(start, end, by = NULL, Before, After, data)
```

**Arguments**

- `start`: A start value for mu.
- `end`: An end value for mu.
- `by`: An increment for the sequence, if not informed (default) the increment is calculated as the difference between `end` - `start`.
- `Before`: A numeric vector giving the data values for the first (before) measure.
- `After`: A numeric vector giving the data values for the second (after) measure.
- `data`: An optional data frame containing the before and after variables in the formula. By default the variables are taken from environment (formula).

**Details**

In order to overcome the limitation of Mee and Chua’s test regarding the population mean mu a replication of the data is performed.

After replicating the data the unknown population mean mu is systematically estimated over a range of values. Further estimations will be based on this new dataset.

**Value**

Return a data frame we could call `mee_chua` containing the values for mu, before and after.
Author(s)
Daniela R. Recchia, Thomas Ostermann.

References

See Also
rep

Examples
replicate_data(50,60,"Before","After",data=language_test)
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