Package ‘zeroEQpart’

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Type Package
Title Zero Order vs (Semi) Partial Correlation Test and CI
Version 0.1.0
Imports ppcor, stats, utils, MASS
Description Uses bootstrap to test zero order correlation being equal to a partial or semi-partial correlation (one or two tailed). Confidence intervals for the parameter (zero order minus partial) can also be determined. Implements the bias-corrected and accelerated bootstrap method as described in "An Introduction to the Bootstrap" Efron (1983) <0-412-04231-2>.
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Description

Calculate the statistical significance of a zero order correlation being equal to a partial or semi-partial correlation using the bias-corrected and accelerated bootstrap method from "An Introduction to the Bootstrap" Efron (1983) <0-412-04231-2>. Confidence intervals for the parameter (zero order minus partial) can also be determined.

pzcor

The pzcor function tests one of the following null hypotheses:

- $\rho_{xy} - \rho_{xy.z} = 0$ (default)
- $\rho_{xy} - \rho_{xy.z} \geq 0$
- $\rho_{xy} - \rho_{xy.z} \leq 0$

See pzcor for details.

pzconf

The pzconf function computes confidence intervals for the parameter: $\rho_{xy} - \rho_{xy.z}$. To be used with pzcor. See pzconf for details.

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See Also

Useful links:

- [GitHub repository](https://github.com/djrichar92/zeroEQpart)
- Report bugs at [GitHub issues](https://github.com/djrichar92/zeroEQpart/issues)
**Description**

The `pzconf` function calculates confidence intervals for a zero order correlation minus a (semi) partial correlation \( \rho_{xy} - \rho_{xy,z} \). It is intended to be used after the `pzcor` function.

**Usage**

`pzconf(pzcor_obj, level = 0.9)`

**Arguments**

- `pzcor_obj`: `pzcor` object (output from `pzcor` function).
- `level`: numerical. Confidence level used to calculate the confidence interval. This may be a vector so multiple intervals can be determined.

**Details**

The `pzconf` function calculates confidence intervals based on the bootstrap distribution determined from the `pzcor` function. See ?`pzcor` for details.

**Value**

The confidence interval(s) is(are) displayed in a dataframe with four columns: Level, Lower, Upper, and Warnings. Level refers to the confidence level of the interval. Lower and Upper are the respective lower and upper bounds of the interval. Warnings may say "Max Level Passed" to show that the specified confidence level exceeds the largest confidence interval that can be determined from the test. The largest confidence interval is shown in the last row (named "Max").

**See Also**

`pzcor`

**Examples**

```r
require(graphics)
require(MASS)
# data
set.seed(1111)
mu <- rep(0,4)
Sigma <- matrix(.2, nrow=4, ncol=4) + diag(4)*.8
data <- mvrnorm(n=100, mu=mu, Sigma=Sigma)

# p.(1,2) = p.(1,2)|\{(3,4)\} test
test <- pzcor(data[,1], data[,2], data[,c(3,4)], k = 1000)
```
Compute a bootstrap test to determine whether zero order correlation is equal to partial or semi-
partial correlation.

Usage

```r
pzcor(x, y, z, semi = FALSE, k = 1000, method = "pearson",
      test = "eq")
```

Arguments

- `x`: a numeric vector.
- `y`: a numeric vector.
- `z`: a numeric vector (data.frame, matrix, etc.)
- `semi`: logical. If `TRUE`, then the semi-partial correlation between `x` and `y` given `z` is
  used. If `FALSE` (default), then the partial correlation between `x` given `z` and `y
  given z` is used.
- `k`: the number of bootstrap samples taken (default is 1000).
- `method`: a character string indicating which correlation coefficient is to be computed. One of
  "pearson" (default), "kendall", or "spearman" can be abbreviated.
- `test`: character string denoting the null hypothesis to be tested. Can be one of the
  three:
  - 'eq' tests $\rho_{xy} - \rho_{xy.z} = 0$ (default)
  - 'gt' tests $\rho_{xy} - \rho_{xy.z} \geq 0$
  - 'lt' tests $\rho_{xy} - \rho_{xy.z} \leq 0$

Details

Uses the bias-corrected and accelerated (BCa) bootstrap method to test if the difference $\rho_{xy} - \rho_{xy.z}$ is equal to, above, or below zero where $\rho_{xy}$ is the zero order correlation between variables $x$ and $y$, and $\rho_{xy.z}$ is the (semi) partial correlation between the respective variables after partialing out variables represented by $z$.

If the bootstrap distribution of $\rho_{xy} - \rho_{xy.z}$ is strictly above or below zero, then the p-value provided is the most extreme value that can be determined by the test. In the case of highly correlated variables, the covariance matrix may be singular which will lead to $k_{eff}$ being less than $k$ (as $\rho_{xy} - \rho_{xy.z}$ would not be computed).
**Value**

- **acceleration**: the acceleration used for the BCa method.
- **alpha**: the proportion of the bootstrapped distribution below zero.
- **bias**: the bias used for the BCa method.
- **call**: shows the function call.
- **difference**: calculated from the data. Same as p.xy - p.xy.z.
- **distribution**: the estimated distribution of the difference as determined through bootstrapping.
- **k_eff**: the number of successful bootstrap samples. Less than or equal to k.
- **method**: the method of correlation used.
- **p.value**: significance level of the test.
- **p.xy**: Zero order correlation between x and y.
- **p.xy.z**: (semi) partial correlation between x and y while accounting for z.
- **semi**: logical. If TRUE, p.xy.z is the semi-partial correlation. Otherwise p.xy.z is the partial correlation.
- **test**: shows the type of test performed.

**See Also**

pzconf

**Examples**

```r
equire(graphics)
require(MASS)
# data
set.seed(1111)
mu <- rep(0,4)
Sigma <- matrix(.2, nrow=4, ncol=4) + diag(4)*.8
data <- mvrnorm(n=100, mu=mu, Sigma=Sigma)

# p.(1,2) = p.(1,2)|(3,4) test
test <- pzcor(data[,1], data[,2], data[,c(3,4)], k = 1000, semi = FALSE, test = 'eq')
hist(test$distribution)
test
```
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