Package ‘Rnest’

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R topics documented:

achim ....................................................... 2
briggs_maccallum2003 ..................................... 2
caron2016 ................................................... 3
cormat ....................................................... 3
cormat.1 .................................................... 4
ex_2factors ............................................... 4
ex_3factors_doub_unique ................................ 5
ex_4factors_corr ....................................... 5
gen8 ....................................................... 6
loadings .................................................... 6
meek_bouchard .......................................... 7
achim

**Description**

A list of seven correlation matrices. Given by Achim, A (personal communication).

**Usage**

achim

**Format**

A 12 by 12 correlation matrix

**Source**

https://github.com/quantmeth

briggs_maccallum2003

**Description**


**Usage**

briggs_maccallum2003

**Format**

A list of three correlation matrices found in Briggs & MacCullum (2003).

**Source**

https://github.com/quantmeth
Description


Usage
caron2016

Format

A list of six 9 x 9 correlation matrices found in Caron (2016).

Source

https://github.com/quantmeth

Description

A list containing 120 correlation matrices (R) built to represent different factor structures. Details are found in the ‘cormat.l’ data.

Usage
cormat

Format

A list of 120 correlation matrices

Source

https://github.com/quantmeth
**Description**

A list containing 120 lists of $24 \times 24$ correlation matrices (R) built to represent different factor structures. Different levels of loadings (delta, .4, .5, .6, .7, .8), correlation between factors (corrfact, .0, .1, .2, .3), and number of factors (nfactors, 1:8) are used. The list contained matrices (R), and their underlying characteristics (delta, corrfact, and nfactors).

**Usage**

cormat.l

**Format**

A list containing 120 matrices

**Source**

https://github.com/quantmeth

---

**Description**

A correlation matrix composed of 10 items based on 2 factors with 5 variables each and loadings equals to .80.

**Usage**

ex_2factors

**Format**

A 10 by 10 correlation matrix

**Source**

https://github.com/quantmeth
ex_3factors_doub_unique

A correlation matrix composed of two factors, a double factor and a unique variable.

Description
A correlation matrix composed of 10 items based on two main factors among which there is two cross-loadings. There is also a double factors and an unique variable. Given by Achim, A. (personal communication).

Usage
ex_3factors_doub_unique

Format
A 10 by 10 correlation matrix

Source
https://github.com/quantmeth

ex_4factors_corr

A correlation matrix composed of 4 correlated factors.

Description
A correlation matrix composed of 12 items based on 4 factors with 3 variables each. Loadings equals to .9, .9, and .3. Factors 1 and 2, and factors 3 and 4 are correlated at .7. Given by Achim, A (personal communication).

Usage
ex_4factors_corr

Format
A 12 by 12 correlation matrix

Source
https://github.com/quantmeth
genr8

Simplify the the generation from a Multivariate Normal Distributions

Description

Speeds up the use of MASS::mvrnorm

Usage

genr8(n = 1, R = diag(10), mean = rep(0, ncol(R)), ...)

Arguments

n the number of samples required.
R a positive-definite symmetric matrix specifying the covariance matrix of the variables.
mean an optimal vector giving the means of the variables. Default is 0.
... Arguments for MASS::mvrnorm(), such as tol, empirical, and EISPACK.

Value

A data frame of size n by ncol(R).

Examples

set.seed(19)
R <- caron2016$mat1
mydata <- genr8(n = nrow(R)+1, R = R, empirical = TRUE)
round(mydata, 2)
round(cov(mydata), 2)

loadings

Print Loadings in NEST

Description

Print Loadings in NEST

Usage

loadings(x, nfactors = x$nfacors, method = x$method, ...)

Arguments

- **x**: An object of class "nest".
- **nfactors**: The number of factors to retain.
- **method**: A method used to compute loadings and uniquenesses.
- **...**: Further arguments to methods in "nest" or the `stats::loadings` function.

Value

A \( p \times k \) matrix containing loadings where \( p \) is the number of variables and \( k \) is the number of factors (nfactors).

Note

See `stats::loadings` for the original documentation.

Examples

```r
results <- nest(ex_2factors, n = 100)
loadings(results)
```

---

**meek_bouchard**

*A correlation matrix given by Meek-Bouchard.*

Description

An empirical correlation matrix composed of 44 items given by Meek-Bouchard, C. (personal communication).

Usage

```r
meek_bouchard
```

Format

A 44 by 44 correlation matrix

Source

[https://github.com/quantmeth](https://github.com/quantmeth)
Description

nest is used to identify the number of factors to retain in exploratory factor analysis.

Usage

```r
nest(
  data,
  n = NULL,
  nrep = 1000,
  alpha = 0.05,
  max.fact = ncol(data),
  method = "ml",
  ...
)
```

Arguments

data: A data frame, a numeric matrix, covariance matrix or correlation matrix from which to determine the number of factors.
n: The number of cases (subjects, participants, or units) if a covariance matrix is supplied in `data`.
nrep: The number of replications to simulate. Default is 1000.
alpha: A vector of type I error rates or (1-alpha)*100% confidence intervals. Default is .05.
max.fact: An optional maximum number of factor to extract. Default is `max.fact = ncol(data)`.
method: A method used to compute loadings and uniquenesses. Four methods are implemented in `Rnest`: maximum likelihood `method = "ml"` (default), regularized common factor analysis `method = "rcfa"`, minimum rank factor analysis `method = "mrfa"`, and principal axis factoring `method = "paf"`. See details for custom methods.

Details

The Next Eigenvalues Sufficiency Test (NEST) is an extension of parallel analysis by adding a sequential hypothesis testing procedure for every $k = 1, ..., p$ factor until the hypothesis is not rejected.

At $k = 1$, NEST and parallel analysis are identical. Both use an Identity matrix as the correlation matrix. Once the first hypothesis is rejected, NEST uses a correlation matrix based on the loadings and uniquenesses of the $k^{th}$ factorial structure. NEST then resamples the eigenvalues of this new correlation matrix. NEST stops when the $S_{k-1}^2S$ eigenvalues is within the confidence interval.
There is two method already implemented in nest to extract loadings and uniquenesses: maximum likelihood ("ml"; default), principal axis factoring ("paf"), and minimum rank factor analysis ("mrfa"). The functions use as arguments: covmat, n, factors, and ... (supplementary arguments passed by nest). They return loadings and uniquenesses. Any other user-defined functions can be used as long as it is programmed likewise.

Value

nest returns an object of class nest. The functions summary and plot are used to obtain and show a summary of the results.

An object of class nest is a list containing the following components:

- nfactors - The number of factors to retains (one by alpha).
- cor - The supplied correlation matrix.
- n - The number of cases (subjects, participants, or units).
- values - The eigenvalues of the supplied correlation matrix.
- alpha - The type I error rate.
- method - The method used to compute loadings and uniquenesses.
- nrep - The number of replications used.
- prob - Probabilities of each factor.
- Eig - A list of simulated eigenvalues.

Generic function

plot.nest Scree plot of the eigenvalues and the simulated confidence intervals for alpha.
loadings Extract loadings. It does not overwrite stat::loadings.

Author(s)

P.-O. Caron

References


Examples

nest(ex_2factors, n = 100)
nest(mtcars)
Parallel analysis

Description

Parallel analysis

Usage

\[
\text{pa}(
\quad \text{data} = \text{NULL}, \\
\quad \text{n} = \text{NULL}, \\
\quad \text{p} = \text{NULL}, \\
\quad \text{nrep} = 1000, \\
\quad \text{alpha} = 0.05, \\
\quad \text{crit} = \text{NULL}, \\
\quad \ldots
\)
\]

Arguments

data : data.frame.
n : number of subjects.
p : number of variables.
nrep : number of replications.
alpha : type I error rate.
crit : Critical values to compare the eigenvalues.
\ldots : Other arguments

Value

nfactors (if data is supplied) and sampled eigenvalues

Examples

\[
\text{pa}(\text{ex}_2factors, \text{n} = 42)
\]
\[
E \leftarrow \text{pa}(\text{n} = 10, \text{p} = 2, \text{nrep} = 5)
\]
Description

Scree plot of the eigenvalues and the (1-\(\alpha\))\% confidence intervals derived from the re-sampled eigenvalues supplied to \texttt{nest}.

Usage

```r
## S3 method for class 'nest'
plot(x, pa = FALSE, y, ...)
```

Arguments

- `x`: An object of class "nest".
- `pa`: Show results of Parallel Analysis.
- `y`: Further arguments for other methods, ignored for "nest".
- `...`: Further arguments for other methods, ignored for "nest".

Value

A ggplot output.

Note

This function is more interesting with many \(\alpha\) values.

Examples

```r
results <- nest(ex_2factors, n = 100, alpha = c(.01, .05, .01))
plot(results)
# Return the data used to produce the plot
df <- plot(results)$data
```

Description

Print the number of factors to retain according to confidence levels.

Usage

```r
## S3 method for class 'nest'
print(x, ...)
```
Arguments

- **x**: An object of class "nest".
- **...**: Further arguments for other methods, ignored for "nest".

Value

No return value, called for side effects.

Examples

```r
results <- nest(ex_2factors, n = 100)
print(results)
summary(results)
```
Index

* datasets
  achim, 2
  briggs_maccallum2003, 2
  caron2016, 3
  cormat, 3
  cormat.1, 4
  ex_2factors, 4
  ex_3factors_doub_unique, 5
  ex_4factors_corr, 5
  meek_bouchard, 7

achim, 2

briggs_maccallum2003, 2

caron2016, 3

cormat, 3

cormat.1, 4

ex_2factors, 4

ex_3factors_doub_unique, 5

ex_4factors_corr, 5

genr8, 6

loadings, 6

meek_bouchard, 7

nest, 8

pa, 10

plot.nest, 11

print.nest, 11

summary.nest, 12