Package 'siren'

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Type Package

Title Hybrid FA-CFA for Controlling Acquiescence in Restricted Factorial Solutions

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Description Performs hybrid multi-stage factor analytic procedure for controlling acquiescence in restricted solutions (Ferrando & Lorenzo-Seva, 2000 <https://www.uv.es/revispsi/articulos3.00/ferran7.pdf>).

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siren-package *An hybrid CFA-EFA R package for controlling acquiescence in restricted solutions*

Description

Hybrid multi-stage factor analytic procedure for controlling the effects of acquiescence in multidimensional questionnaires for which a restricted factorial solution (Ferrando & Lorenzo-Seva, 2000) can be specified.

Value

\link{acquihybrid}
: Performs hybrid multi-stage factor analytic procedure for controlling acquiescence in restricted solutions.

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References

Ferrando, P. J., & Seva, U. L. (2000). Unrestricted versus restricted factor analysis of multidimensional test items: Some aspects of the problem and some suggestions. Psicologica, 21(2), 301-323. Ferrando, P. J., & Lorenzo-Seva, U. (2010). Unrestricted item factor analysis and some relations with item response theory. Technical report, Department of Psychology, Universitat Rovira i Virgili, Tarragona.http://psico.fcep.urv.es/utilitats/factor. Ferrando, P. J., Lorenzo-Seva, U., & Chico, E. (2003). Unrestricted factor analytic procedures for assessing acquiescent responding in balanced, theoretically unidimensional personality scales. Multivariate Behavioral Research, 3(38):353–374, doi:10.1207/S15327906MBR3803_04

acquihybrid *An hybrid CFA-EFA R package for controlling acquiescence in restricted solutions*

Description

Hybrid multi-stage factor analytic procedure for controlling the effects of ACQ in multidimensional questionnaires for which a restricted factorial solution (Ferrando & Lorenzo-Seva, 2000) can be specified. In the first stage, an ACQ factor is estimated and its effects are partialled-out from the inter-item correlations. In the second, a specified CFA solution is fitted to the cleaned matrix. This solution can be specified in two ways: (a) using the cleaned correlation matrix as input, or (b) specifying a full solution which has fixed loadings on the ACQ factor. The use of the program allows (a) the structural properties of the questionnaire to be assessed and (b) unbiased factor score estimates to be obtained for each respondent.

Usage

```
acquihybrid(x, content_factors, target, corr = "Pearson", raw_data=TRUE,
   method = "fixed", display = TRUE)
```

Arguments

x	Raw sample item scores or a covariance/correlation matrix, as a data.frame or a numerical matrix.
content_factors	The number of content factors to be retained. At least, each factor has to be defined by at least 3 items, so the maximum number of content factors will be the number of items / 3.
target	The pattern loading target matrix, which provides the signed dominant loading (higher in absolute values) of each item on its corresponding factor. The target is only used as a reference for determining which items have significant loadings on which factors. The specific loading estimates are not used.
corr	Determines the type of matrices to be used in the factor analysis. "Pearson": Computes Pearson correlation matrices (linear model); "Polychoric": Computes Polychoric/Tetrachoric correlation matrices (graded model). If the matrix is not positive definite, the smoothing procedure proposed by Bentler and Yuan (2011) is used.
raw_data	Logical argument, if TRUE, the entered data will be treated as raw scores (default). If FALSE, the entered data will be treated as a covariance/correlation matrix.
method	Two possibilities are provided: fixed, which use the ACQ loadings obtained in the first step to use it as input for CFA and resid, which use the ACQ free covariance matrix as input for the CFA.
display	Determines if the output will be displayed in the console, TRUE by default. If it is TRUE, the output is printed in console and if it is FALSE, the output is returned silently to the output variable.

Details

Hybrid multi-stage factor analytic procedure for controlling the effects of ACQ in multidimensional questionnaires for which a restricted factorial solution (Ferrando & Lorenzo-Seva, 2000) can be specified.

The procedure is structurated in several steps:

1. Estimate the ACQ loadings obtaining the first MRFA factor of the inter-item correlation matrix, thereafter, obtaining the centroid of this matrix (using it as target) and rotating the MRFA factor to the position of maximal congruence with respect to target.

2. Obtain the corrected inter-item residual matrix, that is, free of ACQ. This matrix will be trated as a residual covariance matrix.

3. Specify the prescribed CFA solution. There are two alternatives. (a) using the cleaned correlation matrix as input, or (b) specifying a full solution which has fixed loadings on the ACQ factor. This step uses the `cfa` (Rosseel, 2012), with the model obtained in the previous steps.

4. Obtain the goodness fit indices and factor scores. The factor scores are obtained using `fitmeasures` (Rosseel, 2012).

Value

`loadings`	Obtained loading matrix.
`fit_indices`	Fit indices: Goodness of Fit Index (GFI), Root Mean Square Residuals (RMSR), Root Mean Square Error of Approximation (RMSEA) and Comparative Fit Index (CFA)
`AC_variance`	The amount of variance explained by ACQ
`pfactors`	factor scores. If corr="Pearson", the method is "regression". In the categorical case, with Polychoric correlation, the option is the empirical bayes Modal approach (EBM)

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References

Bentler, P. M., & Yuan, K. H. (2011). Positive definiteness via off-diagonal scaling of a symmetric indefinite matrix. Psychometrika, 76(1), 119-123. doi:10.1007/s1133601091913

Ferrando, P. J., & Seva, U. L. (2000). Unrestricted versus restricted factor analysis of multidimensional test items: Some aspects of the problem and some suggestions. Psicológica, 21(2), 301-323.

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. Journal of Statistical Software, 48(2).doi:10.18637/jss.v048.i02

Examples

```
## This is an example using the psymas dataset, which contains 1309 responders to PSYMAS
## questionnaire. For this example, only 10 items are used, measuring two subscales.

psymas_target=cbind(c(-9,-9,0,0,0,9,0,0,9,0),c(0,0,-9,9,-9,0,9,-9,0,9))
```

```
acquihybrid(psymas,content_factors=2,psymas_target)


## For speeding purposes, some options have been disabled. Pearson correlation matrix is
## being used, but Polychoric matrix may be advisable.
```

---

psymas *psymas database*

Description

A database to be used as example in the functions included on `siren` package. It contains the answers of 1309 participants to the Psychological Maturity Assessment Scale (Morales-Vives et al., 2012, 2013). The example database provided only contains 10 items and measures two subscales.

Usage

```
data("psymas")
```

Format

A data frame with 1309 observations and 10 variables.

Details

This questionnaire estimates the psychological maturity of adolescents, understood as the ability to take responsibility for one's own obligations, taking into account one's own characteristics and needs, without showing excessive dependence on others. More specifically, we have used twelve items from two of the subscales of this questionnaire (four items of Self-reliance subscale and six items of Identity subscale) so that within each subscale half of the items were in one direction (lack of maturity) and the other half in the opposite direction (high maturity). Self-reliance refers to willingness to take the initiative without allowing others to exercise excessive control, and Identity refers to knowledge about own's characteristics and needs. The study carried out by Morales-Vives et al. (2013) shows that these factors are correlated, and that some of the items are affected by the acquiescence response bias.

References

Morales-Vives, F., Camps, E., & Lorenzo-Seva, U. (2012). Manual del Cuestionario de Madurez Psicológica PSYMAS. TEA Ediciones, S.A. Morales-Vives, F., Camps, E., & Lorenzo-Seva, U. (2013). Development and validation of the psychological maturity assessment scale (PSYMAS). European Journal of Psychological Assessment. doi:10.1027/10155759/a000115

Examples

```
data(psymas)
```

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