Package 'irtreliability'

February 22, 2018

Type Package

Title Item Response Theory Reliability

Version 0.1-1

Date 2018-02-22

Author Bjorn Andersson

Maintainer Bjorn Andersson <bjoern.h.andersson@gmail.com>

Description Estimation of reliability coefficients for ability estimates and sum scores from item response theory models as defined in Cheng, Y., Yuan, K.-H. and Liu, C. (2012) <doi:10.1177/0013164411407315> and Kim, S. and Feldt, L. S. (2010) <doi:10.1007/s12564-009-9062-8>. The package supports the 3-PL and generalized partial credit models and includes estimates of the standard errors of the reliability coefficient estimators, derived in Andersson, B. and Xin, T. (2018) <doi:10.1177/0013164417713570>.

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LazyLoad yes

Depends R(>= 2.11.0), methods, stats, graphics

Imports ltm, mirt, fastGHQuad

NeedsCompilation no

Repository CRAN

Date/Publication 2018-02-22 18:19:26 UTC

R topics documented:

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irtreliability	*Marginal and Test Reliability Coefficients with Item Response Theory*

Description

A function to estimate marginal and test reliability from estimated item response theory models.

Usage

```
irtreliability(input, model, cats, relcoef = "trc", nquad = 49, SE = TRUE)
```

Arguments

input	An object of class SingleGroupClass from package mirt.
model	A character vector indicating the item response theory model used, options are "GPCM" and "3-PL".
cats	A numeric vector indicating the number of possible categories for each item.
relcoef	A character vector indicting which reliability coefficients to calculate, options are "mrc" for the marginal reliability coefficient and "trc" for the test reliability coefficient.
nquad	The number of Gauss-Hermite quadrature points to be used.
SE	A logical vector denoting whether the standard errors for the reliability coefficient estimates should be calculated.

Value

An S4 object of class 'relout' which includes the following slots

est	The estimated coefficient.
cov	The estimated variance.
pder	The partial derivatives of the coefficient with respect to the item parameters.
type	The type of coefficient.

Author(s)

<bjoern.h.andersson@gmail.com>

References

Andersson, B. and Xin, T. (2018). Large Sample Confidence Intervals for Item Response Theory Reliability Coefficients. *Educational and Psychological Measurement*, 78, 32-45.
Cheng, Y., Yuan, K.-H. and Liu, C. (2012). Comparison of reliability measures under factor analysis and item response theory. *Educational and Psychological Measurement*, 72, 52-67.
Green, B. F., Bock, R. D., Humphreys, L. G., Linn, R. L. and Reckase, M. D. (1984). Technical guidelines for assessing computerized adaptive tests. *Journal of Educational Measurement*, 21,

347-360.

Kim, S. (2012). A note on the reliability coefficients for item response model-based ability estimates. *Psychometrika*, 77, 153-162.

Kim, S. and Feldt, L. S. (2010). The estimation of the IRT reliability coefficient and its lower and upper bounds, with comparisons to CTT reliability statistics. *Asia Pacific Education Review*, 11, 179-188.

Examples

```
#Generate 2-PL data
set.seed(14)
akX <- runif(15, 0.5, 2)
bkX <- rnorm(15)
data2pl <- matrix(0, nrow = 1000, ncol = 15)

for(i in 1:1000){
ability <- rnorm(1)
data2pl[i,1:15] <- (1 / (1 + exp(-akX *(ability - bkX)))) > runif(15)
}

#Estimate the 2-PL IRT model with package mirt
library(mirt)
sim2pl <- mirt(data.frame(data2pl), 1, "gpcm", SE = TRUE)
mrc2pl <- irtreliability(sim2pl, "GPCM", rep(2, 15), relcoef = "mrc")
trc2pl <- irtreliability(sim2pl, "GPCM", rep(2, 15))
```

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relout-class　　　　　　*Class "relout"*

Description

Estimates of reliability coefficients and coefficients related to the reliability.

Objects from the Class

Objects can be created by calls of the form new("keout", ...).

Slots

est The estimated coefficient.

cov The estimated variance.

pder The partial derivatives of the coefficient with respect to the item parameters.

type The type of coefficient.

Author(s)

<bjoern.h.andersson@gmail.com>

Examples

```
showClass("relout")
```

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