Package 'irtreliability'

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Type Package

Title Item Response Theory Reliability

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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

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R topics documented:

`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)

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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)

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Examples

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

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