Package ‘mRm’

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Type Package

Title An R Package for Conditional Maximum Likelihood Estimation in Mixed Rasch Models

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Description Conditional maximum likelihood estimation via the EM algorithm and information-criterion-based model selection in binary mixed Rasch models.

License GPL-2

NeedsCompilation yes

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mRm-package Parameter estimation and model selection in mixed Rasch models.
Description

This package provides routines for cML estimation and model selection in binary mixed Rasch models (Rost 1990). For a detailed discussion of the accuracy of parameter estimates and reliability of AIC- and BIC-based model selection techniques see Preinerstorfer and Formann (2011).

The core part of the algorithm has been implemented in C++, using parts of the Scythe Statistical Library (2007) for matrix manipulations. Rows with missing values and constant rows are excluded.

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References


Usage

mrm(data.matrix, cl, max.it = 1000, conv.crit = .0001)

Arguments

data.matrix Input 0/1 data matrix or data frame, rows representing individuals and columns representing items. Rows with missing values as well as constant rows are excluded from the analysis.

cl The number of classes to be fitted.
max.it      Maximum number of iterations.
conv.crit   If the absolute difference between two successive log-likelihoods falls below
            this value, the iteration procedure is terminated.

Value

beta        Item easiness parameters.
pi.r.c      Latent score probabilities.
class.size  Estimated class sizes.
logLik      Conditional log-likelihood.
AIC         AIC.
BIC         BIC.
number.of.iterations  Total number of iterations required.
number.of.parameters   Number of parameters.
conv.to.bound Either 0 or 1, where 1 indicates termination due to divergence to the boundary
                 of the parameter space, i.e. the modulus of an item parameter exceeds 20 (see
                 Preinerstorfer and Formann 2011 for details).

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References

Rost (1990). Rasch models in latent classes: An integration of two approaches to item analysis. 

Examples

#Simulate data matrix conforming to a mixed Rasch model with two classes
data <- sim.mrm(1000, 20, c(.5, .5))

#Parameter estimation
fit <- mrm(data$data.matrix, 2)
plot.mrm  

Plot method for Objects of Class mrm.

Description

Figures of item parameters and conditional score probabilities are generated.

Usage

## S3 method for class 'mrm'
plot(x, ...)

Arguments

x  An object of class 'mrm'.
...
Additional parameters to plot.

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Examples

#Simulate data matrix conforming to a mixed Rasch model with two classes
data <- sim.mrm(1000, 20, c(.5, .5))

#Parameter estimation
fit <- mrm(data$data.matrix, 2)

plot(fit)

print.mrm  

Print method for Objects of Class mrm.

Description

Prints arguments of an object of class mrm.

Usage

## S3 method for class 'mrm'
print(x, ...)

### sim.mrm

**Arguments**

- `x` An object of class `mrm`.
- `...` Additional parameters to `print`.

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**Examples**

```r
# Simulate data matrix conforming to a mixed Rasch model with two classes
data <- sim.mrm(1000, 20, c(.5, .5))

# Parameter estimation
fit <- mrm(data$data$matrix, 2)

print(fit)
```

---

**Description**

This function generates data matrices conforming to a mixed Rasch model (Rost 1990). Both, person and item parameters may be provided by the user. Otherwise, person parameters are randomly drawn from a standard normal distribution; random equidistant partitions of the interval [-2, 2] are used as item parameters. Class membership of each object is based on a realization of a multinomial random variable with sample size and class proportions as parameters (see Preinerstorfer and Formann 2011 for details).

**Usage**

```r
sim.mrm(N.sample, N.items, cl.prob, item.para = NULL, pers.para = NULL, seed = NULL)
```

**Arguments**

- `N.sample` Sample size.
- `N.items` Number of items.
- `cl.prob` Vector of relative class sizes.
- `item.para` Matrix of item (easiness) parameters. Rows indicate items, columns indicate classes. If no parameters are provided by the user, random permutations of an equidistant partition of the interval [-2, 2] are used in each class.
pers.para  Vector of person parameters. If no parameters are provided by the user, person parameters are drawn from a standard normal distribution.
seed      Seed value.

Value

data.matrix  0/1 data matrix of item responses.
beta         Generated/Provided easiness parameters.
emp.probs    Observed class sizes
xi           Generated/Provided person parameters.

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References


Examples

#Simulate a data matrix conforming to a 2-class mixed Rasch model with sample size 1000 and 20 items.

data <- sim.mrm(1000, 20, c(.5, .5))
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