

Package ‘plRasch’

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Type Package

Title Log Linear by Linear Association models and Rasch family models
by pseudolikelihood estimation

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Depends survival

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Description Fit Log Linear by Linear Association models and Rasch family models by pseudolikelihood estimation

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llla

Fit Log Linear by Linear Association Models

Description

This function fits log linear by linear association models using pseudolikelihood method.

Usage

```
llla(data, item.mtx=rep(1, ncol(data)), trait.mtx=1, useMLE=FALSE, uncorrected=FALSE)
```

Arguments

<code>data</code>	is a data frame or matrix with rows indicating individuals and columns indicating items and the values indicating the choices.
<code>item.mtx</code>	is the adjacency matrix between items and the latent traits
<code>trait.mtx</code>	is the adjacency matrix for latent traits
<code>useMLE</code>	indicates whether maximum likelihood estimation is used
<code>uncorrected</code>	if the value is TRUE, calculate the uncorrected standard errors

Value

<code>coefficients</code>	the parameter estimates in the LLLA model
<code>se</code>	the standard error of coefficient estimates (sandwich estimator)
<code>covb</code>	the covariance matrix of the coefficient estimates
<code>se.uncorrected</code>	the standard error not corrected
<code>ncat</code>	number of categories
<code>nexaminee</code>	number of examinees
<code>nitem</code>	number of items

Author(s)

Zhushan "Mandy" Li & Feng Hong

References

Anderson, C.J., Li, Z., & Vermunt, J.K. (2007). Estimation of models in the Rasch family for polytomous items and multiple latent variables. *Journal of Statistical Software*, 20.

See Also

[simRasch](#)

Examples

```
NCAT <- 2;
NITEM <- 4;
NEXAMINEE <- 50;
BETA <- c(-1, 0, 0.5, 1)
set.seed(1);
rasch.sim <- simRasch(ncat=NCAT, nitem=NITEM, nexaminee=NEXAMINEE, beta=BETA)
sim.data <- rasch.sim$data
colnames(sim.data) <- paste("I", 1:NITEM, sep='')
```

```

## The model item adjacency matrix and the latent trait adjacency matrix
item.mtx <- rep(1, NITEM);
trait.mtx <- 1;

### MLE of log-multiplicative Assoc. Model
mlfit <- llla(sim.data, item.mtx, trait.mtx, useMLE=TRUE)
mlfit

#### PLE of log-multiplicative Assoc. Model
plfit <- llla(sim.data, item.mtx, trait.mtx)
plfit

```

RaschPLE

Fit Rasch Family Models Using Pseudolikelihood Estimation

Description

This function fits Rasch family models using pseudolikelihood estimation. It is capable of dealing with polytomous items, and multidimensional latent variables.

Usage

```
RaschPLE(data, item.mtx, trait.mtx)
```

Arguments

data	is a data frame or matrix with rows indicating individuals, columns indicating items, and the entry values indicating the choices.
item.mtx	is the adjacency matrix between items and latent traits
trait.mtx	is the adjacency matrix for latent traits

Details

The model is

$$P(X[v, i] = h) = \frac{\exp(w[i, h]\theta[v] + \beta[i, h])}{\sum_l \exp(w[i, l]\theta[v] + \beta[i, l])}$$

where

$X[v, i]$ is the response of v th individual to i th item; $w[i, h]$ is a vector of known category weights or scores for response h of i th item; $\theta[v]$ is a vector of latent traits for v th individual; $\beta[i, h]$ is the item difficulty parameter for i th item; associated with response h .

The function only returns the item parameter β .

Essentially, it is a wrapper function: the equivalent llla model is fitted.

Value

coefficients	estimated item parameter beta
se	standard error of beta
covb	covariance matrix of the estimated parameter beta

Author(s)

Zhushan "Mandy" Li & Feng Hong

References

Anderson, C.J., Li, Z., & Vermunt, J.K. (2007). Estimation of models in the Rasch family for polytomous items and multiple latent variables. *Journal of Statistical Software*, 20.

See Also

[l11a](#)

Examples

```
NCAT <- 2;
NITEM <- 4;
NEXAMINEE <- 50;
BETA <- c(-1, 0, 0.5, 1)
set.seed(1);
rasch.sim <- simRasch(ncat=NCAT, nitem=NITEM, nexaminee=NEXAMINEE, beta=BETA)
sim.data <- rasch.sim$data
colnames(sim.data) <- paste("I", 1:NITEM, sep='')
## The model item adjacency matrix and the latent trait adjacency matrix
item.mtx <- rep(1, NITEM);
trait.mtx <- 1;

plfit.rasch <- RaschPLE(sim.data, item.mtx, trait.mtx)
plfit.rasch
```

simRasch

Simulate a data matrix from the Rasch Model

Description

Simulate a data matrix from the Rasch Model

Usage

```
simRasch(ncat, nitem, nexaminee, beta = NULL)
```

Arguments

ncat	number of response categories
nitem	number of items
nexaminee	number of examinees
beta	item parameter; if it is NULL, beta will be randomly generated from the standard normal distribution

Value

data	data is generated from Rasch model. It is a data frame or matrix with rows indicating individuals, columns indicating items, and the entry values indicating the choices are either 0 or 1
beta	item parameter
theta	the underlying latent trait

Author(s)

Zhushan "Mandy" Li & Feng Hong

References

Anderson, C.J., Li, Z., & Vermunt, J.K. (2007). Estimation of models in the Rasch family for polytomous items and multiple latent variables. *Journal of Statistical Software*, 20.

See Also

[l11a](#)

Examples

```
NCAT <- 2;
NITEM <- 4;
NEXAMINEE <- 50;
BETA <- c(-1, 0, 0.5, 1)
set.seed(1);
rasch.sim <- simRasch(ncat=NCAT, nitem=NITEM, nexaminee=NEXAMINEE, beta=BETA)
```

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