Package: PCMRS (via r-universe)

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Type Package

Title Model Response Styles in Partial Credit Models

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Description Implementation of PCMRS (Partial Credit Model with Response Styles) as proposed in by Tutz, Schauberger and Berger (2018) <doi:10.1177/0146621617748322> . PCMRS is an extension of the regular partial credit model. PCMRS allows for an additional person parameter that characterizes the response style of the person. By taking the response style into account, the estimates of the item parameters are less biased than in partial credit models.

License GPL (>= 2)

Imports Rcpp (>= 0.12.4)

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PCMRS-package *Model Response Styles in Partial Credit Models*

Description

Performs PCMRS, a method to model response styles in Partial Credit Models

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References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2018): Response Styles in the Partial Credit Model, *Applied Psychological Measurement*, doi:10.1177/0146621617748322

See Also

PCMRS, person.posterior, tenseness, emotion

Examples

```
## Not run:
##############################################
## Small example to illustrate model and person estimation
##############################################

data(tenseness)

set.seed(5)
samples <- sample(1:nrow(tenseness), 100)
tense_small <- tenseness[samples,1:4]
```

```
m_small <- PCMRS(tense_small, cores = 2)
m_small
plot(m_small)

persons <- person.posterior(m_small, cores = 2)
plot(jitter(persons, 100))

################################################
## Example from Tutz et al. 2017:
################################################

data(emotion)
m.emotion <- PCMRS(emotion)
m.emotion

plot(m.emotion)

## End(Not run)
```

`emotion` *Emotional reactivity data from the Freiburg Complaint Checklist (emotion)*

Description

Data from the Freiburg Complaint Checklist. The data contain all 8 items corresponding to the scale *Emotional reactivity* for 2032 participants of the standardization sample of the Freiburg Complaint Checklist.

Format

A data frame containing data from the Freiburg Complaint Checklist with 2032 observations. All items refer to the scale *Emotional reactivity* and are measured on a 5-point Likert scale where low numbers correspond to low frequencies or low intensitites of the respective complaint and vice versa.

Feel upset in whole body Do you feel it in the whole body when you get upset about something?

Eyes well up with tears Do your eyes well up with tears in certain situations?

Stammer Do you sometimes start stammering in certain situations?

Blush Do you blush?

Gasp for air Do you have to gasp for air in exciting situations, so that you have to take a deep breath?

Rapid heartbeat in excitement Do you feel a rapid heartbeat in excitement?

Urge to defecate in excitement Do you feel the urge to defecate in excitement?

Trembling knees Do you start trembling in excitement or do you get trembling knees?

Source

ZPID (2013). PsychData of the Leibniz Institute for Psychology Information ZPID. Trier: Center for Research Data in Psychology.

Fahrenberg, J. (2010). Freiburg Complaint Checklist [Freiburger Beschwerdenliste (FBL)]. Goettingen, Hogrefe.

References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2018): Response Styles in the Partial Credit Model, *Applied Psychological Measurement*, doi:10.1177/0146621617748322

Examples

```
## Not run:
data(emotion)
m.emotion <- PCMRS(emotion)
m.emotion

plot(m.emotion)

## End(Not run)
```

PCMRS *Model Response Styles in Partial Credit Models*

Description

Performs PCMRS, a method to model response styles in Partial Credit Models

Usage

```
PCMRS(
  Y,
  Q = 10,
  scaled = TRUE,
  method = c("L-BFGS-B", "nlminb"),
  cores = 30,
  lambda = 0
)
```

Arguments

Y	Data frame containing the ordinal item response data (as ordered factors), one row per obeservation, one column per item.
Q	Number of nodes to be used (per dimension) in two-dimensional Gauss-Hermite-Quadrature.

scaled	Should the scaled version of the response style parameterization be used? Default is TRUE.
method	Specifies optimization algorithm used by optim, either L-BFGS-B or nlminb.
cores	Number of cores to be used in parallelized computation.
lambda	Tuning parameter for optional L2 penalty on coefficient vector (for stabilized estimation)

Value

delta	Matrix containing all item parameters for the PCMRS model, one row per item, one column per category.
Sigma	2*2 covariance matrix for both random effects, namely the ability parameters theta and the response style parameters gamma.
delta.PCM	Matrix containing all item parameters for the simple PCM model, one row per item, one column per category.
sigma.PCM	Estimate for variance of ability parameters theta in the simple PCM model.
Y	Data frame containing the ordinal item response data, one row per obeservation, one column per item.
scaled	Logical, TRUE if scaled version of the response style parameterization is used.
neg.loglik	Negative marginal log-likelihood

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References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2018): Response Styles in the Partial Credit Model, *Applied Psychological Measurement*, doi:10.1177/0146621617748322

See Also

person.posterior PCMRS-package

Examples

```
## Not run:
################################################
## Small example to illustrate model and person estimation
################################################

data(tenseness)

set.seed(5)
samples <- sample(1:nrow(tenseness), 100)
tense_small <- tenseness[samples,1:4]
```

```
m_small <- PCMRS(tense_small, cores = 2)
m_small
plot(m_small)

persons <- person.posterior(m_small, cores = 2)
plot(jitter(persons, 100))

################################################
## Example from Tutz et al. 2017:
################################################

data(emotion)
m.emotion <- PCMRS(emotion)
m.emotion

plot(m.emotion)

## End(Not run)
```

`person.posterior` *Calculate Posterior Estimates for Person Parameters*

Description

Calculates posterior estimates for both person parameters, namely the ability parameters theta and the response style parameters gamma.

Usage

```
person.posterior(model, cores = 30, tol = 1e-04, maxEval = 600, which = NULL)
```

Arguments

`model`	Object of class `PCMRS`.
`cores`	Number of cores to be used in parallelized computation.
`tol`	The maximum tolerance for numerical integration, default 1e-4. For more details see `adaptIntegrate`.
`maxEval`	The maximum number of function evaluations needed in numerical integration. If specified as 0 implies no limit. For more details see `adaptIntegrate`.
`which`	Optional vector to specify that only for a subset of all persons the posterior estimate is calculated.

Value

Matrix containing all estimates of person parameters, both theta and gamma.

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References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2018): Response Styles in the Partial Credit Model, *Applied Psychological Measurement*, doi:10.1177/0146621617748322

See Also

PCMRS PCMRS-package

Examples

```
## Not run:
################################################
## Small example to illustrate model and person estimation
################################################

data(tenseness)

set.seed(5)
samples <- sample(1:nrow(tenseness), 100)
tense_small <- tenseness[samples,1:4]

m_small <- PCMRS(tense_small, cores = 2)
m_small
plot(m_small)

persons <- person.posterior(m_small, cores = 2)
plot(jitter(persons, 100))

################################################
## Example from Tutz et al. 2017:
################################################

data(emotion)
m.emotion <- PCMRS(emotion)
m.emotion

plot(m.emotion)

## End(Not run)
```

tenseness *Tenseness data from the Freiburg Complaint Checklist (tenseness)*

Description

Data from the Freiburg Complaint Checklist. The data contain all 8 items corresponding to the scale *Tenseness* for 2042 participants of the standardization sample of the Freiburg Complaint Checklist.

Format

A data frame containing data from the Freiburg Complaint Checklist with 2042 observations. All items refer to the scale *Tenseness* and are measured on a 5-point Likert scale where low numbers correspond to low frequencies or low intensitites of the respective complaint and vice versa.

Clammy hands Do you have clammy hands?

Sweat attacks Do you have sudden attacks of sweating?

Clumsiness Do you notice that you behave clumsy?

Wavering hands Are your hands wavering frequently, e.g. when lightning a cigarette or when holding a cup?

Restless hands Do you notice that your hands are restless?

Restless feet Do you notice that your feet are restless?

Twitching eyes Do you notice unvoluntary twitching of your eyes?

Twitching mouth Do you notice unvoluntary twitching of your mouth?

Source

ZPID (2013). PsychData of the Leibniz Institute for Psychology Information ZPID. Trier: Center for Research Data in Psychology.

Fahrenberg, J. (2010). Freiburg Complaint Checklist [Freiburger Beschwerdenliste (FBL)]. Goettingen, Hogrefe.

References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2018): Response Styles in the Partial Credit Model, *Applied Psychological Measurement*, doi:10.1177/0146621617748322

Examples

```
## Not run:
data(tenseness)

set.seed(1860)
samples <- sample(1:nrow(tenseness), 300)
tense_small <- tenseness[samples,]

m_small <- PCMRS(tense_small, cores = 25)
```

```
m_small
plot(m_small)

persons <- person.posterior(m_small, cores = 25)
plot(jitter(persons,100))

## End(Not run)
```

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