Package ‘PCMRS’

January 4, 2018

Type Package
Title Model Response Styles in Partial Credit Models
Version 0.1-1
Date 2018-01-04
Author Gunther Schauberger
Maintainer Gunther Schauberger <gunther@stat.uni-muenchen.de>
Description Implementation of PCMRS (Partial Credit Model with Response Styles) as proposed in by Tutz, Schauberger and Berger (2016) <https://epub.ub.uni-muenchen.de/29373/> . 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)
Depends ltm, statmod, cubature, mvtnorm, parallel
LinkingTo Rcpp, RcppArmadillo
SystemRequirements C++11
RoxygenNote 6.0.1
NeedsCompilation yes
Repository CRAN
Date/Publication 2018-01-04 10:06:38 UTC

R topics documented:

PCMRS-package .................................................. 2
emotion .......................................................... 3
PCMRS .......................................................... 4
person,posterior ............................................... 6
tenseness ....................................................... 7

Index 9
Description

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

Author(s)

Gunther Schauberger
<gunther@stat.uni-muenchen.de>
https://tinyurl.com/gunther-lmu

References


See Also

PCMRS, person.posterior, tenseness, emotion

Examples

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

data(tenseness)
set.seed(1860)
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)
```
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 intensities 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


References

Examples

```r
## 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**

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

**Arguments**

- **Y**
  Data frame containing the ordinal item response data (as ordered factors), one row per observation, 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.

**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 observation, one column per item.

- **scaled**
  Logical, `TRUE` if scaled version of the response style parameterization is used.
Author(s)

Gunther Schauberger
<gunther@stat.uni-muenchen.de>
https://tinyurl.com/gunther-lmu

References


See Also

person.posterior PCMRS-package

Examples

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

data(tenseness)
set.seed(1860)
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 de-
tails 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.

Author(s)

Gunther Schauberger
<gunther@stat.uni-muenchen.de>
https://tinyurl.com/gunther-lmu

References

Tutz, Gerhard, Schauberger, Gunther and Berger, Moritz (2017): Response Styles in the Partial
Credit Model, Applied Psychological Measurement, to appear

See Also

PCMRS PCMRS-package
tenseness

Examples

```r
## Not run:
#########################################################################
## Small example to illustrate model and person estimation
#########################################################################
data(tenseness)
sample.seed(1860)
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)
```

### 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 intensities 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 lighting 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**


**References**


**Examples**

```r
## 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)
```
Index

*Topic Credit
  PCMRS-package, 2
*Topic PCMRS
  PCMRS, 4
  PCMRS-package, 2
  person.posterior, 6
*Topic Partial
  PCMRS-package, 2
*Topic Response
  PCMRS-package, 2
*Topic Style
  PCMRS-package, 2
*Topic datasets
  emotion, 3
  tenseness, 7
*Topic package
  PCMRS-package, 2
  adaptIntegrate, 6

emotion, 2, 3

optim, 4

PCMRS, 2, 4, 6
PCMRS-package, 2
person.posterior, 2, 5, 6

tenseness, 2, 7