

Package ‘irtrees’

February 20, 2015

Title Estimation of Tree-Based Item Response Models

Version 0.1.0

Date 2012-05-14

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Description Helper functions and example data sets accompanying De Boeck, P. and Partchev, I. (2012) IRTrees: Tree-Based Item Response Models of the GLMM Family, Journal of Statistical Software - Code Snippets, 48(1), 1-28.

Depends R(>= 2.10)

License GPL (>= 2)

LazyLoad yes

LazyData yes

Suggests lme4

Repository CRAN

Date/Publication 2012-05-19 11:53:03

NeedsCompilation no

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irtrees-package

Estimation of Tree-Based Item Response Models

Description

Helper functions and example data sets to facilitate the estimation of tree-based item Response models of the GLMM family with function `g1mer` from the `lme4` package

Author(s)

Ivailo Partchev <partchev@gmail.com>

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

dendrify

Measurement Mapping for an IRTree Model

Description

Expands a wide-form matrix of item responses to a long-form data frame of sub-item responses

Usage

```
dendrify(mat, cmx)
```

Arguments

mat	An integer matrix of IRT responses (columns represent items, rows represent respondents)
cmx	A mapping matrix with as many rows as there are response options for the items.

Value

A data frame with one row per sub-item response

Author(s)

Ivailo Partchev

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

See Also

[exogenize](#)

Examples

```
mapping <- cbind(c(0,1,1), c(NA,0,1))
str(linrespT <- dendrify(linresp, mapping))
```

exogenize

Structural Mapping for an IRTree Model

Description

Expands a wide-form file of item responses to a long-form file supporting structural mappings among latent variables

Usage

```
exogenize(mat, cmx, items=seq_len(ncol(mat)), endnode, crossitem=NULL)
```

Arguments

<code>mat</code>	An integer matrix of IRT responses (columns represent items, rows represent respondents)
<code>cmx</code>	The mapping matrix.
<code>items</code>	A numeric vector with the column positions of all items (measurement variables) in <code>mat</code> . Defaults to all columns of <code>mat</code> .
<code>endnode</code>	A factor with the same length as <code>items</code> indicating the latent variable to which the item is attached, and compatible with the mapping matrix.
<code>crossitem</code>	A factor with the same length as <code>items</code> indicating the original items that have been crossed with <code>endnode</code> (e.g., given at various occasions over time), thus producing the actual items. This is not meaningful when the design is nested, and should better be omitted in such cases.

Value

A data frame with columns:

person	a factor identifying the respondent;
item	a factor identifying the items;
exo1 to exoS	dummy variables identifying the internal nodes: these play the same role as exofactor but are necessary when the model must include independent random effects;
endnode	a factor identifying the end nodes and thus the endogeneous latent variables;
crossitem	a factor produced only for crossed designs, identifying the items that are crossed with endnode, for example, in the case when the same items are repeated over time in a longitudinal design;
value	the binary item responses.

Author(s)

Ivailo Partchev

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

See Also

[dendrify](#)

Examples

```
str(linlatT <- exogenize(linlat,
  cbind(c(1,0,0), c(1,1,0), c(0,1,0), c(0,1,1), c(0,0,1)),
  endnode = rep(1:3, each=10), cross = rep(1:10, 3)))
```

linlat

Example Data: Sequential-Order Latent Variable Models

Description

Simulated example data set for a model with sequential-order latent variable models.

Format

An IRT response matrix with 300 persons and 30 binary items.

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

Examples

```
str(linlat)
str(linlatT <- exogenize(linlat,
  cbind(c(1,0,0), c(1,1,0), c(0,1,0), c(0,1,1), c(0,0,1)),
  endnode = rep(1:3, each=10), cross = rep(1:10, 3)))
```

linresp

Example Data: Linear Hierarchical Categories

Description

Simulated example data set with linear hierarchical categories.

Format

An IRT response matrix with 300 persons and 10 three-category items.

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

Examples

```
str(linresp)
mapping <- cbind(c(0,1,1), c(NA,0,1))
str(linrespT <- dendrify(linresp, mapping))
```

neslat

Example Data: Nested Hierarchical Categories

Description

Simulated example data set for a model with nested hierarchical latent variables.

Format

An IRT response matrix with 300 persons and 30 binary items.

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

Examples

```
str(neslat)
str(neslatT <-
  exogenize(neslat, cbind(c(1,1,1), c(1,0,0), c(0,1,0), c(0,0,1)),
  endnode=rep(1:3, each = 10)))
```

nesresp

Example Data: Nested Hierarchical Latent Variables

Description

Simulated example data set with nested hierarchical categories.

Usage

```
data(nesresp)
```

Format

An IRT response matrix with 300 persons and 10 four-category items.

References

De Boeck, P. and Partchev, I. (2012). IRTrees: Tree-Based Item Response Models of the GLMM Family, *Journal of Statistical Software – Code Snippets*, **48**(1), 1–28. <http://www.jstatsoft.org/v48/c01/>.

Examples

```
str(nesresp)
head(nesresp)
str(nesrespT <-
  dendrify(nesresp, cbind(c(0,0,1,1), c(0,1,NA,NA), c(NA,NA,0,1))))
head(nesrespT, 20)
```

VerbAgg2

Verbal Aggression Data, Dichotomized Items

Description

Item responses to a questionnaire on verbal aggression. These data are used throughout De Boeck and Wilson, Explanatory Item Response Models (Springer, 2004) to illustrate various forms of item response models.

Format

A data matrix with 316 persons, 24 three-category items, and two person covariates (trait anger and gender).

Source

<http://bear.soe.berkeley.edu/EIRM/>

References

De Boeck and Wilson (2004), Explanatory Item Response Models, Springer.

Examples

```
str(VerbAgg2)
mapping <- cbind(c(1,1,1), diag(3))
str(VerbAgg2T <- exogenize(VerbAgg2[, -c(1,2)], mapping,
endnode=rep(1:3, 8)))
```

VerbAgg3

Verbal Aggression Data, Three-Category Items

Description

Item responses to a questionnaire on verbal aggression. These data are used throughout De Boeck and Wilson, Explanatory Item Response Models (Springer, 2004) to illustrate various forms of item response models.

Format

A data matrix with 316 persons, 24 three-category items, and two person covariates (trait anger and gender).

Source

<http://bear.soe.berkeley.edu/EIRM/>

References

De Boeck and Wilson (2004), Explanatory Item Response Models, Springer.

Examples

```
str(VerbAgg3)
mapping <- cbind(c(0,1,1), c(NA,0,1))
str(VerbAgg3T <- dendrify(VerbAgg3[,-c(1,2)], mapping))
```


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