Package 'DIFboost'

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Type Package

Title Detection of Differential Item Functioning (DIF) in Rasch Models by Boosting Techniques

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Imports mboost, penalized, stabs

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Description Performs detection of Differential Item Functioning using the method DIFboost as proposed by Schauberger and Tutz (2016) <doi:10.1111/bmsp.12060>.

License GPL-2

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Contents

DIFboost-package *DIFboost*

Description

A package to perform DIFboost, a method to detect DIF (Differential Item Functioning) in Rasch Models. It can handle settings with many covariates and also metric covariates simultaneously. The method is described in Tutz and Schauberger (2015). Model/variable selection is performed using stability selection.

Details

The method assumes the DIFmodel from Tutz and Schauberger (2015) where boosting is used for DIF detection. Computation is based on the functions `gamboost` and `stabsel`.

Author(s)

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References

Schauberger, Gunther and Tutz, Gerhard (2016): *Detection of Differential Item Functioning in Rasch Models by Boosting Techniques*, British Journal of Mathematical and Statistical Psychology, 69(1), 80 - 103

See Also

`DIFboost`, `print.DIFboost`

Examples

```
## Not run:
data(simul.data)

Y <- simul.data[,1:10]
X <- simul.data[,11:13]

m1 <- DIFboost(Y = Y, X = X)
print(m1)

## End(Not run)
```

DIFboost *Detection of Differential Item Functioning (DIF) in Rasch Models by Boosting Techniques*

Description

A function to perform DIFboost, a method to detect DIF (Differential Item Functioning) in Rasch Models. It can handle settings with many covariates and also metric covariates simultaneously. The method is described in Tutz and Schauberger (2015). Model/variable selection is performed using stability selection.

Usage

```
DIFboost(Y, X, mstop = 400, trace = TRUE, cutoff = 0.9,
         B = 500, mc.cores = 1, q = 0.6 * I)
```

Arguments

Y	Data frame (one row per person, one column per item) containing response. May only contain 0 or 1.
X	Data frame (one row per person, one column per covariate) containing covariates. Has to be standardized.
mstop	Number of boosting iterations maximally performed in one iteration of the stability selection.
trace	Should the trace of the single boosting steps be printed?
cutoff	Cutoff value for stability selection.
B	Number of subsamples used for stability selection.
mc.cores	Number of cores for parallelized stability selection. For windows machines, parallelization is not possible.
q	Maximum number of base learner to be included in the boosting algorithm for one subsample in stability selection. By default set to 60 percent of the total number of items.

Details

The method assumes the DIFmodel from Tutz and Schauberger (2015) where boosting is used for DIF detection. Computation is based on the functions gamboost and stabsel.

Value

model	Model from inital gamboost fit
dif.mat	Estimates of the item-specific parameter estimates, with zeros for non-DIF items
coefficients	coefficient vector with all estimates from refitted model
theta	Estimated person abilities

beta	Estimated item difficulties
gamma	Estimated item-specific parameters
P	Number of (valid) persons
I	Number of items
names.y	Names of the items
names.x	Names of the covariates
design.matrix	Design matrix for refitted model
PFER	upper bound for the per-family error rate. For details see stabsel.
lin.pred	linear predictor from refitted model
DIF.items	Which items have been detected to be DIF items?
ref.item	Reference item
phat	selection probabilities for single base learners in stability selection. For details see stabsel
cutoff	cutoff value used for stability selection

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See Also

print.DIFboost, gamboost, stabsel

Examples

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## Not run:
data(simul.data)

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print(m1)

## End(Not run)
```

print.DIFboost *Print function for DIFboost*

Description

Prints the most important output of a DIFboost object.

Usage

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

Arguments

x	DIFboost object, created by DIFboost
...	Further arguments to be passed to the print function.

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References

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See Also

DIFboost

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m1 <- DIFboost(Y = Y, X = X)
print(m1)

## End(Not run)
```

`simul.data` *Simulated data set*

Description

Simulated data set with 100 persons, 10 items and 3 (standardized) covariates. Items 1, 2 and 3 are DIF items.

Usage

```
data(simul.data)
```

Format

`Item1` Item 1, DIF item

`Item2` Item 2, DIF item

`Item3` Item 3, DIF item

`Item4` Item 4, non-DIF item

`Item5` Item 5, non-DIF item

`Item6` Item 6, non-DIF item

`Item7` Item 7, non-DIF item

`Item8` Item 8, non-DIF item

`Item9` Item 9, non-DIF item

`Item10` Item 10, non-DIF item

`CovBin1` Binary covariate (standardized)

`CovBin2` Binary covariate (standardized)

`CovMet` Metric covariate (standardized)

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See Also

`DIFboost`, `print.DIFboost`

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