Package 'ORTH.Ord'

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Title Alternating Logistic Regression with Orthogonalized Residuals
for Correlated Ordinal Outcomes

Version 1.0.1

Description A modified version of alternating logistic regressions (ALR) with estimation based on orthogonalized residuals (ORTH) is implemented, which use paired estimating equations to jointly estimate parameters in marginal mean and within-association models. The within-cluster association between ordinal responses is modeled by global pairwise odds ratios (POR). A finite-sample bias correction is provided to POR parameter estimates based on matrix multiplicative adjusted orthogonalized residuals (MMORTH) for correcting estimating equations, and different bias-corrected variance estimators such as BC1, BC2, and BC3.

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Encoding UTF-8

RoxygenNote 7.3.1

Depends R (>= 4.0), magic, MASS

Suggests knitr, rmarkdown

VignetteBuilder knitr

LazyData true

NeedsCompilation no

Author Can Meng [aut, cre] (ORCID: <https://orcid.org/0000-0002-8257-6243>),
Fan Li [aut]

Maintainer Can Meng <can.meng@yale.edu>

Repository CRAN

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ORTH.Ord   *function: ORTH.Ord*

Description

This function is designed for analyzing correlated ordinal data with ability to correct small-sample bias.

Usage

```
ORTH.Ord(
  formula_mean,
  data_mean,
  cluster,
  formula_por = NULL,
  data_por = NULL,
  MMORTH = FALSE,
  BC = NULL,
  init_beta = NULL,
  init_alpha = NULL,
  miter = 30,
  crit_level = 1e-04
)
```

Arguments

formula_mean	the symbolic description of the marginal mean model that contains the ordinal outcome and marginal mean covariates.
data_mean	the data set containing the ordinal outcome and marginal mean covariates.
cluster	cluster ID (consecutive integers) in data_mean.
formula_por	the symbolic description of marginal association model in the form of a one-sided formula, default is NULL. When leaving formula_por as default, independence working correlation will be used.
data_por	a data set for marginal association model, default is NULL. When leaving data_por as default, independence working correlation will be used.
MMORTH	a logical value to indicate if matrix-adjusted estimating equations will be applied for the association estimation, default is FALSE.
BC	an option to apply bias-correction on covariance estimation, default is NULL. Possible values are "BC1", "BC2", or "BC3".
init_beta	pre-specified starting values for parameters in the mean model, default is NULL.
init_alpha	pre-specified starting values for parameters in the association model, default is NULL.
miter	maximum number of iterations for Fisher scoring, default is 30.
crit_level	tolerance for convergence, default is 0.0001.

Details

The method is a modified version of alternating logistic regressions with estimation based on orthogonalized residuals (ORTH). The within-cluster association between ordinal responses is modeled by global pairwise odds ratios (POR). A small-sample bias correction to POR parameter estimates based on matrix multiplicative adjusted orthogonalized residuals (MMORTH) for correcting estimating equations, and bias-corrected sandwich estimators with different options for covariance estimation, i.e. BC1 (Kauermann & Zeger (1986)), BC2 (Mancl & DeRouen (2001)), and BC3 (Fay & Graubard (2001)).

Value

A list is returned. The first element is a matrix for model parameter estimates; the second element is a variance-covariance matrix for model parameters without bias correction (BC0). Additional variance-covarianc matrices will be added if argument BC is specified.

References

Can Meng, Mary Ryan, Paul Rathouz, Elizabeth Turner, John S Preisser, and Fan Li. 2023. ORTH.Ord: An R package for analyzing correlated ordinal outcomes using alternating logistic regressions with orthogonalized residuals. *Computer Methods and Programs in Biomedicine*, 237, doi:10.1016/j.cmpb.2023.107567.

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simdata	*A simulated data with correlated ordinal outcome for cluster randomized trial*

Description

A dataset contains 50 clusters, in which 25 clusters are in group 1 and the other 25 clusters are in group 0 Each cluster has 9 observations, each observation has an ordinal outcome Y with three levels (i.e., 0, 1, 2). The outcomes within each cluster are correlated.

Usage

```
simdata
```

Format

a data frame with 450 rows and 5 variables:

Obs number of observations per cluster

Y ordinal outcome with three levels, possible values are 0, 1, and 2

Cluster number of clusters

X1 a cluster-level binary covariate: X1=1 if in group 1 and X1=0 otherwise

X2 an observation-level continuous covariate: generatd from normal distribution with mean=1 and SD=1

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