Package ‘Mmcsd’

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Title  Modeling Complex Longitudinal Data in a Quick and Easy Way

Version  1.0.0

Description  Matching longitudinal methodology models with complex sampling design. It fits fixed and random effects models and covariance structured models so far. It also provides tools to perform statistical tests considering these specifications as described in : Pacheco, P. H. (2021). "Modeling complex longitudinal data in R: development of a statistical package." <https://repositorio.ufjf.br/jspui/bitstream/ufjf/13437/1/pedrohenriquedemesquitapacheco.pdf>.

License  GPL (>= 3)

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LazyData  true

RoxygenNote  7.2.3

Imports  dplyr, knitr, magrittr, methods, purrr, rlist, stats, tibble, tidyr

Depends  R (>= 2.10)

Suggests  rmarkdown, simstudy, kableExtra, tidyverse

VignetteBuilder  knitr

NeedsCompilation  no

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**cov_mmcsd**

Fit covariance structured longitudinal model.

**Description**

Responsible for performing the modeling of the model’s covariance matrix through the use of covariance structures.

**Usage**

```r
cov_mmcsd(fit, fittingType, sigmaThetaExpr, optimParams)
```

**Arguments**

- `fit` A fit model with class 'mmcsd'
- `fittingType` A character with the fitting function type. See optim above
- `sigmaThetaExpr` A character with the covariance structure type or a list of expressions
- `optimParams` A list with configuration for optim function. 'Par' is required.

**Value**

The fit model with class 'mmcsd.theta'.

**Examples**

```r
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
fitTheta_ucm <- cov_mmcsd(fit, 
  fittingType = "PML", sigmaThetaExpr = "UCM",
  optimParams = list(par = c(7, 5))
)
```
example_data

A longitudinal example dataset.

Description

An example dataset containing the individuals scores for certain subject.

Usage

example_data

Format

A data frame with 6700 rows and 9 variables:

- **id**: respondent id
- **wave**: wave number
- **score**: respondent score
- **weight**: sampling weight
- **strata**: strata variable
- **cluster**: cluster variable
- **ageg**: categorical age
- **ecacg**: educational level
- **qualifg**: economic activity

mcmds

Fit fixed and random effects longitudinal model.

Description

Estimate the fixed effects of the model, also known as B parameters of the regression, taking into account the sampling plan of the research, and also estimating the covariance matrix of the model considering the estimates of B.

Usage

mcmds(formula, waves, ids, weights, stratum, cluster, data, sigma = "identity")
**Arguments**

- **formula**: A formula
- **waves**: a dataframe column or an array
- **ids**: a dataframe column or an array
- **weights**: a dataframe column or an array
- **stratum**: a dataframe column or an array
- **cluster**: a dataframe column or an array
- **data**: A dataframe or tibble
- **sigma**: A character or a square matrix

**Value**

The fit model with class 'mmcsd'.

**Examples**

```r
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
```

---

**sigmaThetaExpr_viewer**

covariance structure viewer to preview sigmaThetaExpr to be used in 'cov_mmcsd'.

**Description**

Knowing the difficulty of visualizing the covariance structure, especially when the user chooses to
determine his own structure. This function was developed, that allows the user to view the provided
structure even before it is evaluated, that is, through mathematics symbolic.

**Usage**

```r
sigmaThetaExpr_viewer(sigmaThetaExpr, numWaves = NULL)
```

**Arguments**

- **sigmaThetaExpr**: A character with the covariance structure type or a list of expressions
- **numWaves**: An integer with the size of the square matrix to be printed.
Value

Return NULL and print in terminal the sigmaThetaExpr.

Examples

sigmaThetaExpr_viewer("UCM", 5)

Description

Summarise the results of ‘mmcsd’ fit.

Usage

```r
## S3 method for class 'mmcsd'
summary(object, ...)
```

Arguments

- `object` A mmcsd fitted model
- `...` Additional params passed to summary

Value

Return NULL and print in terminal the results.

Examples

```r
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
summary(fit)
```
summary.mmcsd.theta  

Summarise the results of 'cov_mmcsd' fit.

Description

Summarise the results of 'cov_mmcsd' fit.

Usage

## S3 method for class 'mmcsd.theta'
summary(object, ...)

Arguments

object  
A mmcsd.theta fitted model

...  
Additional params passed to summary

Value

Return NULL and print in terminal the results.

Examples

```r
fit <- mmcsd(
  score ~ wave + ageg + ecacg + qualifg,
  waves = wave, ids = id,
  weights = weight, stratum = strata, cluster = cluster,
  data = example_data, sigma = "exchangeable"
)
fitTheta_ucm <- cov_mmcsd(fit,
  fittingType = "PML", sigmaThetaExpr = "UCM",
  optimParams = list(par = c(7, 5))
)
summary(fitTheta_ucm)
```
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