Package ‘CoTiMA’

April 19, 2021

Type Package
Title Continuous Time Meta-Analysis (‘CoTiMA’) Version 0.3.9
Date 2021-04-13
Description The ‘CoTiMA’ package performs meta-analyses of correlation matrices of repeatedly measured variables taken from studies that used different time intervals. Different time intervals between measurement occasions impose problems for meta-analyses because the effects (e.g. cross-lagged effects) cannot be simply aggregated, for example, by means of common fixed or random effects analysis. However, continuous time math, which is applied in ‘CoTiMA’, can be used to extrapolate or intrapolate the results from all studies to any desired time lag. By this, effects obtained in studies that used different time intervals can be meta-analyzed. ‘CoTiMA’ fits models to empirical data using the structural equation model (SEM) package ‘ctsem’, the effects specified in a SEM are related to parameters that are not directly included in the model (i.e., continuous time parameters; together, they represent the continuous time structural equation model, CTSEM). Statistical model comparisons and significance tests are then performed on the continuous time parameter estimates. ‘CoTiMA’ also allows analysis of publication bias (Egger's test, PET-PEESE estimates, zcurve analysis etc.) and analysis of statistical power (post hoc power, required sample sizes). See Dormann, C., Guthier, C., & Cortina, J. M. (2019) <doi:10.1177/1094428119847277>, and Guthier, C., Dormann, C., & Voelkle, M. C. (2020) <doi:10.1037/bul0000304>. License GPL-3
URL https://github.com/CoTiMA/CoTiMA
Encoding UTF-8
LazyData true
Depends R (>= 3.5.0), OpenMx (>= 2.18.1), ctsem (>= 3.3.11), lavaan (>= 0.6), foreach (>= 1.5.1)
Imports MBESS (>= 4.6.0), crayon (>= 1.3.4), psych (>= 1.9.12),
doParallel (>= 1.0.15), rootSolve (>= 1.8.2), abind (>= 1.4-5),
RPushbullet (>= 0.3.3), openxlsx (>= 4.2.2), zcurve (>= 1.0.7),
scholar (>= 0.2.0), stringi (>= 1.0.7), MASS

Suggests R.rsp

VignetteBuilder R.rsp

RoxygenNote 7.1.1

NeedsCompilation no

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Repository CRAN

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A128 example matrix

Description
A128 example matrix

Usage
A128

Format
An object of class matrix (inherits from array) with 2 rows and 2 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

A313 example matrix

Description
A313 example matrix

Usage
A313

Format
An object of class matrix (inherits from array) with 2 rows and 2 columns.
Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

addedByResearcher2 example vector

Description

addedByResearcher2 example vector

Usage

addedByResearcher2

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

addedByResearcher3 example vector

Description

addedByResearcher3 example vector

Usage

addedByResearcher3

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
addedByResearcher313 example vector

Usage
addedByResearcher313

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description
ageM128 example vector

Usage
ageM128

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageM18

Description

ageM18 example vector

Usage

ageM18

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

ageM2

Description

ageM2 example vector

Usage

ageM2

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**ageM3**

**ageM3 example vector**

**Description**

ageM3 example vector

**Usage**

ageM3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**ageM313**

**ageM313 example vector**

**Description**

ageM313 example vector

**Usage**

ageM313

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageM32

*ageM32 example vector*

**Description**

ageM32 example vector

**Usage**

ageM32

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

ageSD128

*ageSD128 example vector*

**Description**

ageSD128 example vector

**Usage**

ageSD128

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageSD18  

ageSD18 example vector

Description

ageSD18 example vector

Usage

ageSD18

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

ageSD2  

ageSD2 example vector

Description

ageSD2 example vector

Usage

ageSD2

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description

ageSD3 example vector

Usage

ageSD3

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description

ageSD313 example vector

Usage

ageSD313

Format

An object of class numeric of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
ageSD32

Description
ageSD32 example vector

Usage
ageSD32

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

alphas128

Description
alphas128 example vector

Usage
alphas128

Format
An object of class numeric of length 9.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**alphas313**

**Description**

alphas313 example vector

**Usage**

alphas313

**Format**

An object of class numeric of length 6.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**burnout128**

**Description**

burnout128 example vector

**Usage**

burnout128

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### burnout18

**burnout18 example vector**

**Description**

burnout18 example vector

**Usage**

burnout18

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### burnout2

**burnout2 example vector**

**Description**

burnout2 example vector

**Usage**

burnout2

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**burnout3**

**burnout3 example vector**

**Description**

burnout3 example vector

**Usage**

burnout3

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**burnout313**

**burnout313 example vector**

**Description**

burnout313 example vector

**Usage**

burnout313

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**burnout32**  

**burnout32 example vector**

**Description**

burnout32 example vector

**Usage**

burnout32

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**combineVariables128**  

**combineVariables128 example vector**

**Description**

combineVariables128 example vector

**Usage**

combineVariables128

**Format**

An object of class list of length 3.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

combineVariablesNames128 example vector

**Usage**

combineVariablesNames128

**Format**

An object of class character of length 3.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

ctmaBiG-object reproducing results of Guthier et al. (2020)

**Usage**

CoTiMABiG_D_BO

**Format**

An object of class CoTiMAfit of length 11.

**Author(s)**

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
CoTiMAFullFit_3

ctmaFit-object with a 'full' CoTiMA of 3 studies

Description

ctmaFit-object with a 'full' CoTiMA of 3 studies

Usage

CoTiMAFullFit_3

Format

An object of class CoTiMAFit of length 19.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

CoTiMAFullFit_6

ctmaFit-object with a 'full' CoTiMA of 6 studies

Description

ctmaFit-object with a 'full' CoTiMA of 6 studies

Usage

CoTiMAFullFit_6

Format

An object of class CoTiMAFit of length 13.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
CoTiMAFullInvEq23Fit_6  1st fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Description
1st fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Usage
CoTiMAFullInv23Fit_6

Format
An object of class CoTiMAFit of length 13.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

CoTiMAFullInvEq23Fit_6  2nd fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Description
2nd fitted ctmaFit-object in a series of 2 to test equality of 2 cross effects

Usage
CoTiMAFullInvEq23Fit_6

Format
An object of class CoTiMAFit of length 15.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### Description

*ctmaInit-object with of 3 primary studies*

### Usage

`CoTiMAInitFit_3`

### Format

An object of class `CoTiMAFit` of length 16.

### Author(s)

C. Dormann & M. Homburg `<CoTiMA@uni-mainz.org>`

---

### Description

*ctmaInit-object with 6 primary studies*

### Usage

`CoTiMAInitFit_6`

### Format

An object of class `CoTiMAFit` of length 18.

### Author(s)

C. Dormann & M. Homburg `<CoTiMA@uni-mainz.org> sweep`
CoTiMAInitFit_6_NUTS  ctmaInit-object with a 'full' CoTiMA of 6 studies using NUTS sampler

Description

ctmaInit-object with a 'full' CoTiMA of 6 studies using NUTS sampler

Usage

CoTiMAInitFit_6_NUTS

Format

An object of class CoTiMAFit of length 18.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

CoTiMAInitFit_D_BO  ctmaInit-object created by Guthier et al. (2020) with 48 primary studies

Description

ctmaInit-object created by Guthier et al. (2020) with 48 primary studies

Usage

CoTiMAInitFit_D_BO

Format

An object of class CoTiMAFit of length 13.

Author(s)

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
Description

cmaFit-object with a categorical moderator of the full drift matrix

Usage

CoTiMAMod1onFullFit_6

Format

An object of class CoTiMAFit of length 16.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description

cmaFit-object with a continuous moderator of 2 cross effects

Usage

CoTiMAMod2on23Fit_6

Format

An object of class CoTiMAFit of length 19.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
CoTiMAPart134Inv3Fit_6

*ctmaFit-object with with only one cross effect and this one set equal across primary studies*

Description

*ctmaFit-object with with only one cross effect and this one set equal across primary studies*

Usage

*CoTiMAPart134Inv3Fit_6*

Format

An object of class *CoTiMAFit* of length 19.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

CoTiMAPower_D_BO

*ctmaPower-object reproducing results of Guthier et al. (2020)*

Description

*ctmaPower-object reproducing results of Guthier et al. (2020)*

Usage

*CoTiMAPower_D_BO*

Format

An object of class *CoTiMAFit* of length 11.

Author(s)

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
CoTiMA StanctArgs

This are preset arguments

Description

This are preset arguments

Usage

CoTiMA StanctArgs

Format

An object of class list of length 33.

CoTiMA studyList_3

cmaPrep-object created with 3 primary studies

Description

ctmaPrep-object created with 3 primary studies
cmaPrep-object created with 6 primary studies

Usage

CoTiMA studyList_3

CoTiMA studyList_3

Format

An object of class CoTiMA fit of length 27.
An object of class CoTiMA fit of length 27.

Author(s)

C. Guthier, C. Dormann & J. Cortina <CoTiMA@uni-mainz.org>
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
CoTiMAstudyList_6  
ctmaPrep-object created with 6 primary studies

Description
ctmaPrep-object created with 6 primary studies

Usage
CoTiMAstudyList_6

Format
An object of class CoTiMAFit of length 29.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

----
country128  
country128 example vector

Description
country128 example vector

Usage
country128

Format
An object of class character of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
country18

country18 example vector

Description

country18 example vector

Usage

country18

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

country2

country2 example vector

Description

country2 example vector

Usage

country2

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description

country3 example vector

Usage

country3

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

------------------------
country313  country313 example vector
------------------------

Description

country313 example vector

Usage

country313

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description

country32 example vector

Usage

country32

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

country32

Description

#' @description Fit a CoTiMA model with all params (drift, T0var, diffusion) invariant across primary studies

Usage

ctmaAllInvFit(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  activateRPB = FALSE,
  digits = 4,
  drift = drift,
  coresToUse = c(1),
  n.manifest = 0,
  indVarying = FALSE,
  scaleTime = NULL,
  optimize = TRUE,
  nopriors = TRUE,
  finishsamples = NULL,
  iter = NULL,
  chains = NULL,
  verbose = NULL,
  loadAllInvFit = c(),
)
saveAllInvFit = c(),
silentOverwrite = FALSE,
customPar = TRUE
)

**Arguments**

- `ctmaInitFit`  
- `activeDirectory`  
- `activateRPB`  
- `digits`  
- `drift` - Labels for drift effects. Have to be either of the type V1toV2 or 0 for effects to be excluded, which is usually not recommended.
- `coresToUse`  
- `n.manifest` - Number of manifest variables of the model (if left empty it will assumed to be identical with n.latent).
- `indVarying` - Allows ct intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity)
- `scaleTime`  
- `optimize`  
- `nopriors`  
- `finishsamples`  
- `iter`  
- `chains`  
- `verbose`  
- `loadAllInvFit`  
- `saveAllInvFit`  
- `silentOverwrite`  
- `customPar` - logical. Leverages the first pass using priors and ensure that the drift diagonal cannott easily go too negative (could help with ctsem > 3.4)

**Value**

returns a fitted CoTiMA object, in which all drift parameters, Time 0 variances and covariances, and diffusion parameters were set invariant across primary studies
Description

Analysis of publication bias and generalizability. The function takes a CoTiMA fit object (created with `ctmaInit`) and estimates fixed and random effects of single drift coefficients, heterogeneity (Q, I square, H square, tau square), PET-PEESE corrections, Egger’s tests, and z-curve analysis yielding expected replication and detection rates (ERR, EDR).

Usage

```r
cmmaBiG(
    ctmaInitFit = NULL,
    activeDirectory = NULL,
    PETPEESEalpha = 0.1,
    activateRPB = FALSE,
    digits = 4,
    zcurve = FALSE
)
```

Arguments

- **ctmaInitFit**: fit object created with `ctmaInit` containing the fitted ctsem model of each primary study
- **activeDirectory**: the directory where to save results (if not specified, it is taken from ctmaInitFit)
- **PETPEESEalpha**: probability level (condition) below which to switch from PET to PEESE (cf. Stanley, 2017, p. 582, below Eq. 2; default p = .10)
- **activateRPB**: if TRUE, messages (warning, finished) could be send to smart phone (default = FALSE)
- **digits**: rounding (default = 4)
- **zcurve**: performs z-curve analysis. Could fail if too few studies (e.g. around 10) are supplied. default=FALSE

Value

cmmaBiG returns a list containing some arguments supplied, the results of analyses of publication bias and generalizability, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, and coresToUse. Further arguments, which are just copied from the init-fit object supplied, are, n.studies, n.latent, studyList, statisticsList, modelResults (all parameter estimates and their standard error), and parameter names. All new results are returned as the list element "summary", which is printed if the summary function is applied to the returned object. The summary list element comprises a title (model="Analysis of Publication Bias & Generalizability") and "estimates", which is another list comprising "Fixed Effects of Drift Coefficients", "Heterogeneity", "Random Effects of Drift Coefficients", "PET-PEESE..."
corrections", "Egger’s tests" (constant of the WLS regression of drift coefficients on their standard errors (SE) with 1/SE^2 as weights), "Egger’s tests Alt. Version" (constant of the OLS regression of the standard normal deviates of the drift coefficients on their precision), and "Z-Curve 2.0 Results". Plot type is plot.type=c("funnel", "forest") and model.type="BiG".

Examples

```r
## Not run:
# perform analyses of publication bias and generalizability
CoTiMAInitFit_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMABiG_D_BO <- ctmaBiG(ctmaInitFit=CoTiMAInitFit_D_BO, zcurve=FALSE)

## End(Not run)

# display results
summary(CoTiMABiG_D_BO)

## Not run:
# get funnel & forest plots
CoTiMABiG_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
plot(CoTiMABiG_D_BO)

## End(Not run)
```

Description

Analysis of publication bias and fixed and ranom effects analysis of single drift coefficients if OLD OpenMx fit files are supplied

Usage

```r
c DMABiGOMX(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  PETPEESEalpha = 0.1,
  activateRPB = FALSE,
  digits = 4
)
```

Arguments

- `ctmaInitFit`: fit object created with ctmaInti containing the fitted ctsem model of each primary study
- `activeDirectory`: the directory where to save results (if not specified, it is taken from ctmaInitFit)
**ctmaCombPRaw**

PETPEESEalpha # probability level (condition) below which to switch from PET to PEESE (Stanley, 2017, SPPS, p. 582, below Eq. 2; (default p = .10)
activateRPB if TRUE, messages (warning, finishes) could be send to smart phone (default = FALSE)
digits rounding (default = 4)

**Value**
returns a CoTiMA fit object with results of publication bias analysis, fixed and random effect analysis, Egger’s tests, PET-PEESE corrections.

---

**ctmaCombPRaw**

**Description**
Combine Pseudo Raw Data (extract them from 'CoTiMAFit object'$studyFitList)

**Usage**
ctmaCombPRaw(listOfStudyFits = NULL, moderatorValues = NULL)

**Arguments**
- listOfStudyFits
  - "Listobject of Studyfits"
- moderatorValues
  - "Moderators"

**Value**
returns a pseudo raw data set that combines pseudo raw data and moderators of primary studies

---

**ctmaCompFit**

**Description**
Performs log-likelihood ratio tests to compare the fit of 2 models (CoTiMAFit objects created with ctmaFit or ctmaEqual), i.e., the difference between the two -2 times LLs between the first model and the more constrained second model. The nested structure of the two models is assumed to be given and not checked.

**Usage**
ctmaCompFit(model1 = NULL, model2 = NULL)
**ctmaCorRel**

**Arguments**

- `model1`  
  Model 1
- `model2`  
  Model 2

**Value**

Returns the difference between the two -2 times LLs (Diff_Minus2LL), the associated difference in degrees of freedom (Diff_df (= Diff_n.params)), and the probability (prob).

**Examples**

```r
minus2llDiffTest <- ctmaCompFit(CoTiMAFullInv23Fit_6,
                                CoTiMAFullInvEq23Fit_6)
summary(minus2llDiffTest)
```

**ctmaCorRel**

**Description**

Disattenuates the entries in a correlation matrix using a vector of reliabilities.

**Usage**

```r
cdmaCorRel(empcov = NULL, alphas = NULL)
```

**Arguments**

- `empcov`  
  Empirical correlation matrix
- `alphas`  
  Vector reliabilities

**Value**

A corrected correlation matrix (corEmpcov). Corrections leading to $r > 1.0$ are set to 1.0.

**Examples**

```r
empcov313new <- ctmaCorRel(empcov=empcov313, alphas=alphas313)
```
Description

changes a full covariance matrix by selecting target variables, recoding them, combining them (compute the mean of two or more variables), and by adding rows/columns with NA if focal variables are not available.

Usage

cctmaEmpCov(
    targetVariables = NULL,
    recodeVariables = c(),
    combineVariables = c(),
    combineVariablesNames = c(),
    missingVariables = c(),
    nlatents = NULL,
    Tpoints = NULL,
    sampleSize = NULL,
    pairwiseN = NULL,
    empcov = NULL
)

Arguments

  targetVariables
    (col-/row-) number or names of the target variables

  recodeVariables
    (col-/row-) number or names of the target variables require inverse coding

  combineVariables
    list of vectors, which put together the targeted variables that should be used for composite variables

  combineVariablesNames
    new names for combined variables - not really important

  missingVariables
    missing variables

  nlatents
    number of (latent) variables - actually it is the number of all variables

  Tpoints
    number of time points.

  sampleSize
    sample size

  pairwiseN
    matrix of same dimensions as empcov containing possible pairwiseN.

  empcov
    empirical correlation matrix
returns a list with two elements. The first element (results$r) contains the adapted correlation matrix, and the second element (results$pairwiseNNew) an adapted version of a matrix of pairwise N if pairwiseN was provided for the original correlation matrix supplied.

Examples

```r
source17 <- c()
delta_t17 <- c(12)
sampleSize17 <- 440
empcov17 <- matrix(
  c( 1.00, -0.60, -0.36, 0.20, 0.62, -0.47, -0.18, 0.20, 
    -0.60, 1.00, 0.55, -0.38, -0.43, 0.52, 0.27, -0.21, 
    -0.36, 0.55, 1.00, -0.47, -0.26, 0.37, 0.51, -0.28, 
    0.20, -0.38, -0.47, 1.00, 0.15, -0.28, -0.35, 0.56, 
    -0.62, -0.43, -0.26, 0.15, 1.00, -0.63, -0.30, 0.27, 
    -0.47, 0.52, 0.37, -0.28, -0.63, 1.00, 0.55, -0.37, 
    -0.18, 0.27, 0.51, -0.35, -0.30, 0.55, 1.00, -0.51, 
    0.20, -0.21, -0.28, 0.56, 0.27, -0.37, -0.51, 1.00),
  nrow=8, ncol=8)
moderator17 <- c(3, 2)
rownames(empcov17) <- colnames(empcov17) <-
c("Workload_1", "Exhaustion_1", "Cynicism_1", "Values_1", 
  "Workload_2", "Exhaustion_2", "Cynicism_2", "Values_2")
targetVariables17 <-
c("Workload_1", "Exhaustion_1", "Cynicism_1", 
  "Workload_2", "Exhaustion_2", "Cynicism_2")
recodeVariables17 <- c("Workload_1", "Workload_2")
combineVariables17 <- list("Workload_1", "Workload_2")
combineVariablesNames17 <- c("Demands_1", "Burnout_1", 
  "Demands_2", "Burnout_2")
missingVariables17 <- c();
results17 <- ctmaEmpCov(targetVariables = targetVariables17, 
  recodeVariables = recodeVariables17, 
  combineVariables = combineVariables17, 
  combineVariablesNames = combineVariablesNames17, 
  missingVariables = missingVariables17, 
  nlatents = 2, sampleSize = sampleSize17, 
  Tpoints = 2, emp cov = emp cov17)
empcov17 <- results17$r
```

Description
test if the two or more invariant drift parameters in the CoTiMAFit object supplied are equal. The supplied CoTiMA fit-object (ctmaInvariantFit) has to be a model fitted with ctmaFit where at least
two parameters were set invariant across primary studies (e.g., 2 cross effects). All parameters that are set invariant in the supplied model are then constrained to be equal by ctmaEqual (no user action required), the model is fitted, and a log-likelihood ratio test is performed informing about the probability that equality applies.

Usage

cDMAEqual(
  ctMAInvariantFit = NULL,
  activeDirectory = NULL,  
  activateRPB = FALSE,
  digits = 4,
  coresToUse = 1
)

Arguments

cDMAInvariantFit
  object to which a CoTiMA fit has been assigned to (i.e., what has been returned by ctMAFit). In most cases probably a model in which (only) two effects were specified with invariantDrift.

activeDirectory
  defines another active directory than the one used in ctMAInvariantFit

activateRPB
  set to TRUE to receive push messages with CoTiMA notifications on your phone

digits
  Number of digits used for rounding (in outputs)

coresToUse
  If neg., the value is subtracted from available cores, else value = cores to use

Value

returns a model where two or more parameters were set equal across primary studies and a log-likelihood difference test informing about the probability that the equality assumption is correct.

Examples

# Fit a CoTiMA with a set of parameters set equal that were set
# invariant in a previous model (of which the fit object is
# supplied in argument ctMAInvariantFit)
## Not run:
CoTiMAFullInv23Fit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullInvEq23Fit_6 <- ctMAEqual(ctMAInvariantFit=CoTiMAFullInv23Fit_6)

## End(Not run)
ctmaFit

Description

Fits a ctsem model with invariant drift effects across primary studies, possible multiple moderators (but all of them of the the same type, either "cont" or "cat"), and possible cluster (e.g., countries where primary studies were conducted).

Usage

ctmaFit(
  ctmaInitFit = NULL,
  primaryStudyList = NULL,
  cluster = NULL,
  activeDirectory = NULL,
  activateRPB = FALSE,
  digits = 4,
  drift = NULL,
  invariantDrift = NULL,
  moderatedDrift = NULL,
  equalDrift = NULL,
  mod.number = NULL,
  mod.type = "cont",
  mod.names = NULL,
  indVarying = FALSE,
  coresToUse = c(1),
  scaleTI = NULL,
  scaleMod = NULL,
  scaleClus = NULL,
  scaleTime = NULL,
  optimize = TRUE,
  nopriors = TRUE,
  finishsamples = NULL,
  iter = NULL,
  chains = NULL,
  verbose = NULL,
  allInvModel = FALSE,
  customPar = TRUE,
  inits = NULL
)

Arguments

ctmaInitFit object to which all single ctsem fits of primary studies has been assigned to (i.e., what has been returned by ctmaInit)
ctmaFit

primaryStudyList

could be a list of primary studies compiled with ctmaPrep that defines the subset of studies in ctmaInitFit that should actually be used.

cluster

vector with cluster variables (e.g., countries). Has to be set up carefully. Will be included in ctmaPrep in later ‘CoTiMA’ versions.

activeDirectory

defines another active directory than the one used in ctmaInitFit.

activateRPB

set to TRUE to receive push messages with ‘CoTiMA’ notifications on your phone.

digits

Number of digits used for rounding (in outputs).

drift

labels for drift effects. Have to be either of the type ‘V1toV2’ or ‘0’ for effects to be excluded.

invariantDrift

drift labels for drift effects that are set invariant across primary studies (default = all drift effects).

moderatedDrift

labels for drift effects that are moderated (default = all drift effects).

equalDrift

Not enabled.

mod.number

which in the vector of moderator values shall be used (e.g., 2 for a single moderator or 1:3 for 3 moderators simultaneously).

mod.type

‘cont’ or ‘cat’ (mixing them in a single model not yet possible).

mod.names

vector of names for moderators used in output.

indVarying

allows continuous time intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity).

coresToUse

if negative, the value is subtracted from available cores, else value = cores to use.

scaleTI

scale TI predictors - not recommended if TI are dummies representing primary studies, which would be the usual case.

scaleMod

scale moderator variables - FALSE (default) highly recommended for categorical moderators, TRUE highly recommended for continuous moderators.

scaleClus

scale vector of cluster indicators - TRUE (default) yields avg. drift estimates, FALSE yields drift estimates of last cluster.

scaleTime

scale time (interval) - sometimes desirable to improve fitting.

optimize

if set to FALSE, Stan’s Hamiltonian Monte Carlo sampler is used (default = TRUE = maximum a posteriori / importance sampling).

nopriors

if TRUE, any priors are disabled – sometimes desirable for optimization.

finishesamples

number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).

iter

number of iterations (default = 1000). Sometimes larger values could be required from Bayesian estimation.

chains

number of chains to sample, during HMC or post-optimization importance sampling.

verbose

integer from 0 to 2. Higher values print more information during model fit – for debugging.
allInvModel estimates a model with all parameters invariant (DRIFT, DIFFUSION, T0VAR) if set TRUE (default = FALSE)
customPar logical. Leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (could help with ctsem > 3.4)

Value

cdmaFit returns a list containing some arguments supplied, the fitted model, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, moderator names (mod.names), and moderator type (mod.type). Further arguments, which are just copied from the init-fit object supplied, are n.latent, studyList, parameterNames, and statisticsList. The fitted model is found in studyFitList, which is a large list with many elements (e.g., the ctsem model specified by CoTiMA, the rstan model created by ctsem, the fitted rstan model etc.). Further results returned are n.studies = 1 (required for proper plotting), data (created pseudo raw data), and a list with modelResults (i.e., DRIFT=model_Drift_Coef, DIFFUSION=model_Diffusion_Coef, T0VAR=model_T0var_Coef, CINT=model_Cint_Coef, MOD=modelTI_Coeff, and CLUS=clusTI_Coeff). Possible invariance constraints are included in invariantDrift. The number of moderators simultaneously analyzed are included in n.moderators. The most important new results are returned as the list element "summary", which is printed if the summary function is applied to the returned object. The summary list element comprises "estimates" (the aggregated effects), possible randomEffects (not yet fully working), the minus2ll value and its n.parameters, the opt.lag sensu Dormann & Grif- fin (2015) and the max.effects that occur at the opt.lag, clus.effects and mod.effects, and possible warning messages (message). Plot type is plot.type=c("drift") and model.type="stanct" ("omx" was deprecated).

Examples

# Example 1. Fit a CoTiMA to all primary studies previously fitted one by one
# with the fits assigned to CoTiMAInitFit_6
CoTiMAFullFit_6 <- cdmaFit(ctmaInitFit=CoTiMAInitFit_6)
summary(CoTiMAFullFit_6)

## Not run:
# Example 2. Fit a CoTiMA with only 2 cross effects invariant (not the auto # effects) to all primary studies previously fitted one by one with the fits # assigned to CoTiMAInitFit_6
CoTiMAInitFit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullInv23Fit_6 <- cdmaFit(ctmaInitFit=CoTiMAInitFit_6, # invariantDrift=c("V1toV2", "V2toV1"))
summary(CoTiMAFullInv23Fit_6)

## End(Not run)

## Not run:
# Example 3. Fit a moderated CoTiMA
CoTiMAInitFit_6$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAMod1onFullFit_6 <- ctmaFit(ctmaInitFit=CoTiMAInitFit_6,
mod.number=1, mod.type="cont",
mod.names=c("Control"))

summary(CoTiMAMod1onFullFit_6)

## End(Not run)

---

ctmaFitList

### Description

Combines CoTiMAFit objects into a list with class CoTiMAFit to inform generic functions what to do

### Usage

ctmaFitList(...)

### Arguments

... any number of CoTiMAFit objects

### Value

a list that combines all objects supplied and is assigned the class ‘CoTiMAFit’

### Examples

## Not run:
CoTiMAInitFit_3$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAFullFit_3$activeDirectory <- "/Users/tmp/" # adapt!
plot(ctmaFitList(CoTiMAInitFit_3, CoTiMAFullFit_3),
     timeUnit="Months",
     timeRange=c(1, 144, 1))

## End(Not run)
Description

Extracts information from fitted CoTiMA objects to (re-)create list of primary studies originally created with \texttt{ctmaPrep}.

Usage

\texttt{ctmaFitToPrep(\texttt{ctmaFitObject} = NULL)}

Arguments

- \texttt{ctmaFitObject}  \texttt{ctmaFitObject}

Value

list that could be used for fitting new CoTiMA models with \texttt{ctmaInit} or \texttt{ctmaFit}.

Examples

\begin{verbatim}
newStudyList <- ctmaFitToPrep(CoTiMAInitFit_3)
\end{verbatim}

Description

Retrieves publication and citation information from google scholar based on the supplied author names and their google ID (user).

Usage

\texttt{ctmaGetPub(\texttt{authorList} = NULL, \texttt{flush} = FALSE, \texttt{yearsToExclude} = NULL)}

Arguments

- \texttt{authorList} list of authors and google scholar addresses
- \texttt{flush} if TRUE, the cache will be cleared and the data reloaded from Google.
- \texttt{yearsToExclude} the years to be excluded (default = current year)

Value

list with (cumulative) frequencies and (cumulative) citations in google scholar.
Note

Set flush=TRUE only if retrieving is necessary (e.g., first retrieval on a day)

Examples

```r
pubList_8 <- ctmaGetPub(authorList = list( c("J; de Jonge", 
          "https://scholar.google.de/citations?hl=de&user=0q271ckAAAAJ"),
          c("Arnold B.; Bakker", "user=FTl3bwUAAAAJ"),
          c("Evangelia; Demerouti", "user=9mj5LvMAAAAJ"),
          c("Joachim; Stoeber", "user=T9xdVusAAAAJ"),
          c("Claude; Fernet", "user=KwzjP4sAAAAJ"),
          c("Frederic; Guay", "user=99vnhX4AAAAJ"),
          c("Caroline; Senecal", "user=64ArFWQAAAAJ"),
          c("StÃ‐phanie; Austin", "user=PPyTI7EAAAAJ")),
          flush=FALSE)

summary(pubList_8)
```

Description

Fits ctsem models to each primary study in the supplied list of primary studies prepared by ctmaPrep.

Usage

```r
tcmaInit(
    primaryStudies = NULL,
    activeDirectory = NULL,
    activateRPB = FALSE,
    checkSingleStudyResults = TRUE,
    digits = 4,
    n.latent = NULL,
    n.manifest = 0,
    lambda = NULL,
    manifestVars = NULL,
    drift = NULL,
    indVarying = FALSE,
    saveRawData = list(),
    coresToUse = c(1),
    silentOverwrite = FALSE,
    saveSingleStudyModelFit = c(),
    loadSingleStudyModelFit = c(),
    scaleTI = NULL,
    scaleTime = NULL,
```

optimize = TRUE,
nopriors = TRUE,
finishsamples = NULL,
chains = NULL,
iter = NULL,
verbose = NULL,
customPar = TRUE,
doPar = 1,
useSV = TRUE
)

Arguments

primaryStudies  list of primary study information created with ctmaPrep
activeDirectory defines another active directory than the one used in ctmaPrep
activateRPB set to TRUE to receive push messages with ‘CoTiMA‘ notifications on your phone
checkSingleStudyResults Displays estimates from single study ctsem models and waits for user input to continue. Useful to check estimates before they are saved.
digits number of digits used for rounding (in outputs)
n.latent number of latent variables of the model (hast to be specified)!
n.manifest number of manifest variables of the model (if left empty it will assumed to be identical with n.latent).
lambda R-type matrix with pattern of fixed (=1) or free (any string) loadings.
manifestVars define the error variances of the manifests with a single time point using R-type matrix with nrow=n.manifest & ncol=n.manifest.
drift labels for drift effects. Have to be either of the type V1toV2 or 0 for effects to be excluded, which is usually not recommended)
indVarying control for unobserved heterogeneity by having randomly (inter-individually) varying manifest means
saveRawData save (created pseudo) raw date. List: saveRawData$studyNumbers, $fileName, $row.names, col.names, $sep, $dec
coresToUse if neg., the value is subtracted from available cores, else value = cores to use
silentOverwrite overwrite old files without asking
saveSingleStudyModelFit save the fit of single study ctsem models (could save a lot of time afterwards if the fit is loaded)
loadSingleStudyModelFit load the fit of single study ctsem models
scaleTI scale TI predictors
scaleTime scale time (interval) - sometimes desirable to improve fitting
optimize if set to FALSE, Stan’s Hamiltonian Monte Carlo sampler is used (default = TRUE = maximum a posteriori / importance sampling).

nopriors if TRUE, any priors are disabled - sometimes desirable for optimization

finishsamples number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).

chains number of chains to sample, during HMC or post-optimization importance sampling.

iter number of interation (default = 1000). Sometimes larger values could be required from Bayesian estimation

verbose integer from 0 to 2. Higher values print more information during model fit - for debugging

customPar logical. Leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (could help with ctsem > 3.4)

doPar parallel and multiple fitting if single studies

useSV if TRUE (default) start values will be used if provided in the list of primary studies

Value

ctmaFit returns a list containing some arguments supplied, the fitted models, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, n.latent, n.manifest, and primaryStudyList. The study count is returned as n.studies, the created matrix of loadings of manifest on latent factors is returned as lambda, and a re-organized list of primary studies with some information omitted is returned as studyList. The fitted models for each primary study are found in studyFitList, which is a large list with many elements (e.g., the ctssem model specified by CoTiMA, the rstan model created by ctssem, the fitted rstan model etc.). Further results returned are emprawList (containing the pseudo raw data created), statisticsList (comprising basic stats such as average sample size, no. of measurement points, etc.), a list with modelResults (i.e., DRIFT=model_Drift_Coef, DIFFUSION=model_Diffusion_Coef, T0VAR=model_T0var_Coef, CINT=model_Cint_Coef), and the parameter names internally used. The summary list, which is printed if the summary function is applied to the returned object, comprises "estimates" (the aggregated effects), possible randomEffects (not yet fully working), confidenceIntervals, the minus2ll value and its n.parameters, and possible warning messages (message). Plot type is plot.type="drift" and model.type="stanct" ("omx" was deprecated).

Examples

# Fit a ctssem model to all three primary studies summarized in
# CoTiMAstudyList_3 and save the three fitted models
## Not run:
CoTiMAInitFit_3 <- ctmaInit(primaryStudies=CoTiMAstudyList_3,
n.latent=2,
checkSingleStudyResults=FALSE,
activeDirectory="/Users/tmp") # adapt!
summary(CoTiMAInitFit_3)
Description

used for consistent labeling of names and parameters

Usage

ctmaLabels(
  n.latent = NULL,
  n.manifest = 0,
  lambda = NULL,
  manifestVar = NULL,
  drift = NULL,
  invariantDrift = NULL,
  moderatedDrift = NULL,
  equalDrift = NULL
)

Arguments

  n.latent       n.latent
  n.manifest     n.manifest
  lambda         lambda
  manifestVar    manifestVar
  drift          drift
  invariantDrift invariantDrift
  moderatedDrift moderatedDrift
  equalDrift     equalDrift

Value

returns consistently named parameters (e.g., "V1toV2") as well as their symbolic values, which are used to fix or free parameters when fitting a ‘CoTiMA’ model
ctmaOptimizeInit

Description

Initial fitting (i.e., applies ctmaInit) to a primary study reFit times to capitalize on chance for obtaining a hard-to-find optimal fit. This could be very helpful if a primary yields out-of-range estimates, which could happen if the fitting algorithm unfortunately used random start values that resulted in a locally but not globally optimal fit. Essentially, using ctmaOptimizeInit is like gambling, hoping that at least one set of starting values (the number is tries is specified in the reFits argument) enables finding the global optimal fit. On unix-like machines (e.g. MacOS), this could be done in parallel mode if coresToUse > 1.

Usage

ctmaOptimizeInit(
  primaryStudies = NULL,
  activeDirectory = NULL,
  problemStudy = NULL,
  reFits = NULL,
  n.latent = NULL,
  coresToUse = c(1),
  activateRPB = FALSE,
  checkSingleStudyResults = FALSE,
  customPar = FALSE
)

Arguments

primaryStudies  list of primary study information created with ctmaPrep or ctmaFitToPrep
activeDirectory  activeDirectory
problemStudy  number (position in list) where the problem study in primaryStudies is found
reFits  how many reFits should be done
n.latent  number of latent variables of the model (has to be specified)!
coresToUse  if neg., the value is subtracted from available cores, else value = cores to use
activateRPB  set to TRUE to receive push messages with ‘CoTiMA’ notifications on your phone
checkSingleStudyResults  displays estimates from single study ’ctsem’ models and waits for user input to continue. Useful to check estimates before they are saved.
customPar  logical. Leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (could help with ctsem > 3.4)
Value

returns a list with bestFit (= the best fit achieved), all_minus2ll (= all -2ll values for all fitted models), and summary, which is printed if the summary function is applied to the returned object, and which shows the summary information of the ctsem model with the best fit.

Note

All but one of multiple cores are used on unix-type machines for parallel fitting. During fitting, no output is generated. Be patient.

Examples

```r
## Not run:
optimFit313 <- ctmaOptimizeInit(primaryStudies=CoTiMAstudyList_3,
    activeDirectory="/Users/tmp/", # adapt!
    problemStudy=which(CoTiMAstudyList_3$studyNumbers == 313),
    refits=10,
    n.latent=2)
summary(optimFit313)
## End(Not run)
```

ctmaPlot

**ctmaPlot**

Description

Forest plot, funnel plots, plots of discrete time cross-lagged and autoregressive effect, and plots of required sample sizes

Usage

```r
cdmaPlot(
    ctmaFitObject = NULL,
    activeDirectory = NULL,
    saveFilePrefix = "ctmaPlot",
    activateRPB = FALSE,
    plotCrossEffects = TRUE,
    plotAutoEffects = TRUE,
    timeUnit = "timeUnit (not specified)",
    timeRange = c(),
    yLimitsForEffects = c(),
    mod.values = -2:2,
    aggregateLabel = "",
    xLabels = NULL,
    ...
)
```

Arguments

cmaFitObject 'CoTiMA' Fit object
activeDirectory defines another active directory than the one used in cmaInitFit
saveFilePrefix Prefix used for saved plots
activateRBP set to TRUE to receive push messages with 'CoTiMA' notifications on your phone
plotCrossEffects logical
plotAutoEffects logical
timeUnit label for x-axis when plotting discrete time plots
timeRange vector describing the time range for x-axis as sequence from/to/stepSize (e.g., c(1, 144, 1))
yLimitsForEffects range for y-axis
mod.values moderator values that should be used for plots
aggregateLabel label to indicate aggregated discrete time effects
xLabels labels used for x-axis
... arguments passed through to plot()

Value

depending on the CoTiMA fit object supplied, generates funnel plots, forest plots, discrete time plots of autoregressive and cross-lagged effects, plots of required samples sizes across a range of discrete time intervals to achieve desired levels of statistical power, and post hoc power of primary studies. Plots are saved to disk.

Examples

## Not run:
# cannot run without proper activeDirectory specified. Adapt!
CoTiMAFullFit_3$activeDirectory <- "/Users/tmp/" # adapt!
plot(cmaFitList(CoTiMAInitFit_3, CoTiMAFullFit_3),
     timeUnit="Months", timeRange=c(1, 144, 1),
     plotAutoEffects=FALSE)

## End(Not run)

## Not run:
# cannot run without proper activeDirectory specified. Adapt!
CoTiMABiG_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
plot(CoTiMABiG_D_BO)

## End(Not run)
Description

Fits a full invariant model to a list of primary studies and performs analyses of expected (post hoc) power and required sample sizes.

Usage

```r
ctmaPower(
  ctmaInitFit = NULL,
  activeDirectory = NULL,
  statisticalPower = c(),
  failSafeN = NULL,
  failSafeP = NULL,
  timeRange = NULL,
  useMBESS = FALSE,
  coresToUse = 1,
  digits = 4,
  indVarying = FALSE,
  activateRPB = FALSE,
  silentOverwrite = FALSE,
  loadAllInvFit = c(),
  saveAllInvFit = c(),
  loadAllInvWOSingFit = c(),
  saveAllInvWOSingFit = c(),
  skipScaling = TRUE,
  useSampleFraction = NULL,
  optimize = TRUE,
  nopriors = TRUE,
  finishsamples = NULL,
  iter = NULL,
  chains = NULL,
  verbose = NULL,
  customPar = TRUE
)
```

Arguments

- `ctmaInitFit` object to which all single 'ctsem' fits of primary studies has been assigned to (i.e., what has been returned by `ctmaInit`)
- `activeDirectory` defines another active directory than the one used in `ctmaInit`
- `statisticalPower` vector of requested statistical power values
<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>failSafeN</td>
<td>Sample size used to determine across which time intervals effects become non-significant</td>
</tr>
<tr>
<td>failSafeP</td>
<td>P-value used to determine across which time intervals effects become non-significant</td>
</tr>
<tr>
<td>timeRange</td>
<td>Vector describing the time range for x-axis as sequence from/to/stepSize (e.g., c(1, 144, 1))</td>
</tr>
<tr>
<td>useMBESS</td>
<td>Use 'MBESS' package to calculate statistical power (slower)</td>
</tr>
<tr>
<td>coresToUse</td>
<td>Vector describing the time range for x-axis as sequence from/to/stepSize (e.g., c(1, 144, 1))</td>
</tr>
<tr>
<td>digits</td>
<td>Number of digits used for rounding (in outputs)</td>
</tr>
<tr>
<td>indVarying</td>
<td>Allows continuous time intercepts to vary at the individual level (random effects model, accounts for unobserved heterogeneity)</td>
</tr>
<tr>
<td>activateRPB</td>
<td>Set to TRUE to receive push messages with 'CoTiMA' notifications on your phone</td>
</tr>
<tr>
<td>silentOverwrite</td>
<td>Overwrite old files without asking</td>
</tr>
<tr>
<td>loadAllInvFit</td>
<td>Load the fit of fully constrained 'CoTiMA' model</td>
</tr>
<tr>
<td>saveAllInvFit</td>
<td>Save the fit of fully constrained 'CoTiMA' model</td>
</tr>
<tr>
<td>loadAllInvWOSingFit</td>
<td>Load series of fits of fully constrained 'CoTiMA' model with single cross effects excluded, respectively</td>
</tr>
<tr>
<td>saveAllInvWOSingFit</td>
<td>Save series of fits of fully constrained 'CoTiMA' model with single cross effects excluded, respectively</td>
</tr>
<tr>
<td>skipScaling</td>
<td>Does not (re-)scale raw data (re-scaling of imported pseudo raw data achieves correlations = 1)</td>
</tr>
<tr>
<td>useSampleFraction</td>
<td>To speed up debugging. Provided as fraction (e.g., 1/10)</td>
</tr>
<tr>
<td>optimize</td>
<td>If set to FALSE, Stan's Hamiltonian Monte Carlo sampler is used (default = TRUE = maximum a posteriori / importance sampling)</td>
</tr>
<tr>
<td>nopriors</td>
<td>If TRUE, any priors are disabled – sometimes desirable for optimization</td>
</tr>
<tr>
<td>finishsamples</td>
<td>Number of samples to draw (either from hessian based covariance or posterior distribution) for final results computation (default = 1000).</td>
</tr>
<tr>
<td>iter</td>
<td>Number of iterations (default = 1000). Sometimes larger values could be required from Bayesian estimation</td>
</tr>
<tr>
<td>chains</td>
<td>Number of chains to sample, during HMC or post-optimization importance sampling</td>
</tr>
<tr>
<td>verbose</td>
<td>Integer from 0 to 2. Higher values print more information during model fit – for debugging</td>
</tr>
<tr>
<td>customPar</td>
<td>Logical. Leverages the first pass using priors and ensure that the drift diagonal cannot easily go too negative (could help with ctsem &gt; 3.4)</td>
</tr>
</tbody>
</table>
ctmaPower returns a list containing some arguments supplied, a fitted model with all (!) parameters invariant across primary studies, different elements summarizing the main results, model type, and the type of plot that could be performed with the returned object. The arguments in the returned object are activeDirectory, coresToUse, n.latent, n.manifest, and primaryStudyList. A further result returned is n.studies = 1 (required for proper plotting). Further arguments, which are just copied from the init-fit object supplied, are, n.latent, studyList, and the statisticsList. The fitted model is found in studyFitList, which is a large list with many elements (e.g., the ctsem model specified by CoTiMA, the rstan model created by ctsem, the fitted rstan model etc.). Further results returned are a list with modelResults (i.e., DRIFT=DRIFT, DIFFUSION=DIFFUSION, T0VAR=T0VAR, CINT=NULL) and the parameter names internally used. The summary list, which is printed if the summary function is applied to the returned object, contains "estimates", which is itself a list comprising "Estimates of Model with all Effects Invariant", "Requested Statistical Power" (which just returns the argument statisticalPower), "Power (post hoc) for Drift Effects", "Required Sample Sizes", "Effect Sizes (based on discrete-time calcs; used for power calcs.)", and "Range of significant effects" (across which intervals effects were significant). Plot type is plot.type=c("power") and model.type="stanct" ("omx" was deprecated).

Examples

```r
## Not run:
CoTiMAInitFit_D_BO$activeDirectory <- "/Users/tmp/" # adapt!
CoTiMAPower_D_BO <- ctmaPower(ctmaInitFit=CoTiMAInitFit_D_BO,
                             statisticalPower = c(.50, .80, .95),
                             finishesamples = 10000)
summary(CoTiMAPower_D_BO)
## End(Not run)
```

ctmaPRaw

Description

Converts empirical correlation matrices to pseudo raw data (i.e. random data, that perfectly reproduce the correlations)

Usage

```r
cdmaPRaw(
    empCovMat = NULL,
    empNMat = matrix(0, 0, 0),
    empN = NULL,
    studyNumber = NULL,
    empMeanVector = NULL,
    empVarVector = NULL,
    activateRPB = FALSE
)
```
Arguments

- **empCovMat**: empirical primary study covariance matrix
- **empNMat**: matrix of (possibly pairwise) N
- **empN**: N (in case of listwise N)
- **studyNumber**: internal number
- **empMeanVector**: vector of means for all variables, usually 0
- **empVarVector**: vector of variances for all variables, usually 1
- **activateRPB**: set TRUE to receive push messages with 'CoTiMA' notifications on your phone

Description

Combines information of primary studies into a list object and returns this list. This list is then used as input to fit 'ctsem' models. Primary study information is expected to be assigned to 'numbered' objects. Some of these objects are pre-defined (e.g., 'empcov', 'ageM'). Most of the pre-defined objects could be empty, or they could be dropped by entering their names in the excludedElements-object (e.g., excludedElements = c('ageM')), but dropping them is not really necessary. Additional elements could also be added, which could be useful to put together all information about primary studies at the convenience of the researcher.

Usage

```r
ctmaPrep(
  selectedStudies = NULL,
  excludedElements = NULL,
  addElements = NULL,
  digits = 4,
  moderatorLabels = NULL,
  moderatorValues = NULL
)
```

Arguments

- **selectedStudies**: Vector of primary study numbers (numeric values with no leading 0; e.g., '2' but not '02')
- **excludedElements**: Vector of predefined objects used to code primary study information. Some predefined objects are strongly defined; they have to be used in a special way because they are actually used in subsequent analyses. Some other objects could be used at the researcher's convenience (information is just collected). Strongly predefined objects are 'delta_t' (vector of time intervals; the only mandatory
ctmaPrep

requirement; should be of the type c(NA, NA) in cases when raw data are provided), 'sampleSize' (single number), 'pairwiseN' (matrix of pairwise N; could be used if correlation matrix is based on pairwise N), 'empcov' (correlation matrix), 'moderator' (vector of numbers; could be continuous or categorical), 'startValues' (vector of start values), 'rawData' (information about file name and structure of raw data), 'empMeans' (means for variables; usually 0), and 'empVars' (variances for variables; usually 1). Weakly predefined objects are 'studyNumber' (intended as a special number used for the outputs of subsequently fitted CoTiMA models), 'source' (intended as vector of authors' names and publication year), 'ageM' (intended as value indicating the mean age of participants in a primary study), 'malePercent' (intended as value indicating the percentage of male participants in a primary study), 'occupation' (intended as vector of character strings representing the occupations of participants in a primary study), 'country' (intended as single character string representing the country in which a primary study was conducted), 'alphas' (intended as vector of Cronbach’s alphas of the variables of a primary study; not yet functional), and 'targetVariables' (intended as vector of character strings representing information about the variables used).

addElements User-added objects that are handled as the weakly predefined objects. The major purpose is to collect information a researcher regards as important.

digits Rounding used for summary function

moderatorLabels character vector of names

moderatorValues list of character vectors

Value

List of primary studies and parameters for the following CoTiMA (plus StudyInformation which could be saved to Excel)

Note

The following example shows information a researcher has about three studies, which have the numbers '2', '4' and '17'. All information about these studies are stored in objects ending with '2', '4', and '17', respectively. In most instances, one relevant piece of information is the empirical correlation (or covariance) matrix reported in this study, which is stored in the objects 'empcov2', 'empcov4', and 'empcov17'. Note that full and symmetric matrices are required for ctmaPrep. Usually, sample sizes ('sampleSize2', 'sampleSize4', & 'sampleSize17') and time lags ('delta_t2', 'delta_t4', & 'delta_t17'), are required, too.

Examples

# First Study
empcov2 <- matrix(c(1.00, 0.45, 0.57, 0.18,
                   0.45, 1.00, 0.31, 0.66,
                   0.57, 0.31, 1.00, 0.40,
                   0.18, 0.66, 0.40, 1.00), nrow=4, ncol=4)
delta_t2 <- 12
sampleSize2 <- 148
mmoderator2 <- c(1, 0.72)
source2 <- c("Houkes, I,", "Janssen, P, P, M,", "de Jonge, J,"
           
           "& Bakker, A, B", "Study1", "2003")
addedByResearcher2 <- "something you want to add"

# Second Study
empcov3 <- matrix(c(1.00, 0.43, 0.71, 0.37,
                    0.43, 1.00, 0.34, 0.69,
                    0.71, 0.34, 1.00, 0.50,
                    0.37, 0.69, 0.50, 1.00), nrow=4, ncol=4)
delta_t3 <- 12
sampleSize3 <- 88
moderator3 <- c(1, 0.72)
source3 <- c("Houkes, I,", "Janssen, P, P, M,", "de Jonge, J,"
           
           "& Bakker, A, B", "Study2", "2003")
addedByResearcher3 <- ""

# Third Study
empcov313 <- matrix(c(1.00, 0.38, 0.54, 0.34, 0.60, 0.28,
                       0.38, 1.00, 0.34, 0.68, 0.28, 0.68,
                       0.54, 0.34, 1.00, 0.47, 0.66, 0.39,
                       0.34, 0.68, 0.47, 1.00, 0.38, 0.72,
                       0.60, 0.28, 0.66, 0.38, 1.00, 0.38,
                       0.28, 0.68, 0.39, 0.72, 0.38, 1.00), nrow=6, ncol=6)
delta_t313 <- c(1.5, 1.5)
sampleSize313 <- 335
moderator313 <- c(0.8,2.47)
source313 <- c("Demerouti", "Bakker", "& Bulters", "2004")
addedByResearcher313 <- "check correlation matrix"

# Add Labels and Values for Moderators (just for optional excel tables)
moderatorLabels <- c("Control", "Social Support")
moderatorValues <- list("continuous", 
                        
                        c("1 = very low", "2 = low",
                        
                        "3 = medium", "4 = high", "5 = very high"))

CoTiMAstudyList_3 <- ctmaPrep(selectedStudies = c(2, 3, 313),
                             excludedElements = "ageM",
                             addElements = "addedByResearcher",
                             moderatorLabels=moderatorLabels,
                             moderatorValues=moderatorValues)

Description

Compute publication and citation scores for studies based on the (team of) authors’ publication scores.
Usage

\texttt{ctmaPub(}
  \texttt{getPubObj = NULL,}
  \texttt{primaryStudyList = NULL,}
  \texttt{yearsToExclude = 0,}
  \texttt{recency = 5,}
  \texttt{targetYear = NULL,}
  \texttt{indFUN = "sum",}
  \texttt{colFUN = "mean",}
  \texttt{addAsMod = FALSE}
\texttt{)}

Arguments

\texttt{getPubObj} publication information compiled with \texttt{ctmaGetPub}
\texttt{primaryStudyList} vector with numbers of studies (e.g., c(1,3); requires source1 and source3 to be available)
\texttt{yearsToExclude} years to exclude from publications
\texttt{recency} years before targetYear that are considered for recency analysis
\texttt{targetYear} year (default = last year) after which publications are ignored
\texttt{indFUN} function (default = sum) how publications of each author within a collective (team) are summarized
\texttt{colFUN} function (default = mean) how publications all authors of collective (team) are summarized
\texttt{addAsMod} currently disabled. Add to existing moderator objects (or create them) in primaryStudyList, which is part of the returned object

Value

returns NEPP (= the \texttt{number} of studies published by the authors of the primary studies supplied UNTIL the year when the primary study was published), NEPPRecency (like NEPP, but limited to the number of years before the publication as specified with the recency argument), "Meaning of NEPP" and "Meaning of NEPPRecency" which explain what \texttt{number} exactly means (e.g., could be the mean of the sum of each author’s publication, or the sum of the maximum publications per year of the authors), and "primaryStudyList(full)", which just returns the primaryStudyList supplied.

Examples

\texttt{pubResults_6 \leftarrow ctmaPub(getPubObj=pubList_8,}
  \texttt{primaryStudyList=CoTiMAsstudyList_6)}
\texttt{summary(pubResults_6)
Description

Internal function to save files

Usage

ctmaSaveFile(
  activateRPB,
  activeDirectory = activeDirectory,
  SaveObject,
  FileName,
  Directory,
  silentOverwrite = FALSE
)

Arguments

activateRPB set TRUE to receive push messages with 'CoTiMA' notifications on your phone
activeDirectory directory name
SaveObject object to save
FileName filename
Directory directory to save file in
silentOverwrite override old files without asking

Value

No return value. Just saves files

Description

re-sample from a fitted stanct model to achieve desired number of finishesamples (could be useful to prevent exhausted memory)

Usage

ctmaStanResample(ctmaFittedModel = NULL, nsamples = 25, overallSamples = 500)
**ctmaSV**

### Arguments

- **ctmaFittedModel**
  - a 'CoTiMA' fit object, usually with few 'finishsamples' to prevent memory exhaustion
- **nsamples**
  - sample size per run
- **overallSamples**
  - overall samples size to be achieved

### Value

returns a CoTiMA fit object with an increased number of finish samples

---

### Description

derives start values by average discrete time SEM effects, converting them to continuous time, and inversely apply transformations used by 'ctsem'

### Usage

```r
cdmaSV(ctmaInitFit = NULL, activeDirectory = NULL, coresToUse = 1)
```

### Arguments

- **ctmaInitFit**
  - object to which all single 'ctsem' fits of primary studies has been assigned to (i.e., what has been returned by **ctmaInit**)
- **activeDirectory**
  - defines another active directory than the one used in **ctmaInit**
- **coresToUse**
  - if negative, the value is subtracted from available cores, else value = cores to use

### Value

returns a modified list of primary studies with starting values added or replaced

### Examples

```r
## Not run:
newPrimaryStudyList <- cdmaSV(ctmaInitFit=CoTiMAInitFit_6)

## End(Not run)
```
**delta_t128**

**delta_t128 example vector**

**Description**

delta_t128 example vector

**Usage**

delta_t128

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**delta_t18**

**delta_t18 example vector**

**Description**

delta_t18 example vector

**Usage**

delta_t18

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### delta_t2

**Description**

delta_t2 example vector

**Usage**

delta_t2

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

### delta_t3

**Description**

delta_t3 example vector

**Usage**

delta_t3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### delta_t313

**delta_t313 example vector**

#### Description

delta_t313 example vector

#### Usage

delta_t313

#### Format

An object of class `numeric` of length 2.

#### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### delta_t32

**delta_t32 example vector**

#### Description

delta_t32 example vector

#### Usage

delta_t32

#### Format

An object of class `numeric` of length 1.

#### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
demands128 example vector

Description

demands128 example vector

Usage

demands128

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

demands18 example vector

Description

demands18 example vector

Usage

demands18

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### demands2

**Description**

demands2 example vector

**Usage**

demands2

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

### demands3

**Description**

demands3 example vector

**Usage**

demands3

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
demands313 example vector

Description

demands313 example vector

Usage

demands313

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

demands32 example vector

Description

demands32 example vector

Usage

demands32

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### dl_link

**Description**

dl_link example path

**Usage**

dl_link

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

### emp cov128

**Description**

emp cov128 example matrix

**Usage**

emp cov128

**Format**

An object of class list of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov18 example matrix

Description
empcov18 example matrix

Usage
empcov18

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

empcov2 example matrix

Description
empcov2 example matrix

Usage
empcov2

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov3  

empcov3 example matrix

Description
empcov3 example matrix

Usage
empcov3

Format
An object of class matrix (inherits from array) with 4 rows and 4 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

empcov313  

empcov313 example matrix

Description
empcov313 example matrix

Usage
empcov313

Format
An object of class matrix (inherits from array) with 6 rows and 6 columns.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
empcov32  example matrix

**Description**
empcov32 example matrix

**Usage**
empcov32

**Format**
An object of class character of length 4.

**Author(s)**
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

malePercent128  example vector

**Description**
malePercent128 example vector

**Usage**
malePercent128

**Format**
An object of class numeric of length 1.

**Author(s)**
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
malePercent18  

malePercent18 example vector

Description
malePercent18 example vector

Usage
malePercent18

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

malePercent2  

malePercent2 example vector

Description
malePercent2 example vector

Usage
malePercent2

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
malePercent313

malePercent313 example vector

Description
malePercent3 example vector

Usage
malePercent3

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

malePercent31313

malePercent3 example vector

Description
malePercent313 example vector

Usage
malePercent313

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**malePercent32**

*malePercent32 example vector*

**Description**

malePercent32 example vector

**Usage**

malePercent32

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**moderator128**

*moderator128 example vector*

**Description**

moderator128 example vector

**Usage**

moderator128

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**moderator18**

**Description**

moderator18 example vector

**Usage**

moderator18

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**moderator2**

**Description**

moderator2 example vector

**Usage**

moderator2

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**moderator3**

---

**Description**

moderator3 example vector

**Usage**

moderator3

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**moderator313**

---

**Description**

moderator313 example vector

**Usage**

moderator313

**Format**

An object of class numeric of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
moderator32

moderator32 example vector

Description
moderator32 example vector

Usage
moderator32

Format
An object of class numeric of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

moderatorLabels

moderatorLabels example vector

Description
moderatorLabels example vector

Usage
moderatorLabels

Format
An object of class character of length 2.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
moderatorValues

**Description**

moderatorValues example vector

**Usage**

moderatorValues

**Format**

An object of class `list` of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

occupation128

**Description**

occupation128 example vector

**Usage**

occupation128

**Format**

An object of class `character` of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
occupation18

**Description**

occupation18 example vector

**Usage**

occupation18

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

occupation2

**Description**

occupation2 example vector

**Usage**

occupation2

**Format**

An object of class character of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### Description

occupation3 example vector

### Usage

occupation3

### Format

An object of class character of length 1.

### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### Description

occupation313 example vector

### Usage

occupation313

### Format

An object of class character of length 1.

### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
occupation32 example vector

Description

occupation32 example vector

Usage

occupation32

Format

An object of class character of length 1.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

optimFit313 example vector

Description

optimFit313 example vector

Usage

optimFit313

Format

An object of class CoTiMAfit of length 3.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**pairwiseN128**  

pairwiseN128 example vector

**Description**

pairwiseN128 example vector

**Usage**

pairwiseN128

**Format**

An object of class list of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

**plot.CoTiMAFit**  

**Description**

call `ctmaPlot` if a CoTiMAFit object is supplied to `plot()`

**Usage**

```r
## S3 method for class 'CoTiMAFit'
plot(x, ...)
```

**Arguments**

- `x`: list
- `...`: further arguments to be passed through to `summary()`

**Value**

returns a call to `ctmaPlot`, which is used to plot CoTiMA fit objects
Description

pubList_8 example list

Usage

pubList_8

Format

An object of class CoTiMAFit of length 10.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description

pubResults_6 example list

Usage

pubResults_6

Format

An object of class CoTiMAFit of length 6.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

rawData128 example list

**Usage**

rawData128

**Format**

An object of class list of length 7.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

recodeVariables128 example vector

**Usage**

recodeVariables128

**Format**

An object of class character of length 2.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
results128  

**Description**  
results128 example list  

**Usage**  
results128  

**Format**  
An object of class list of length 2.

**Author(s)**  
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

sampleSize128  

**Description**  

sampleSize128 example vector  

**Usage**  

sampleSize128  

**Format**  
An object of class NULL of length 0.

**Author(s)**  

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
Description
sampleSize18 example vector

Usage
sampleSize18

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

Description
sampleSize2 example vector

Usage
sampleSize2

Format
An object of class numeric of length 1.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**sampleSize3**

**sampleSize3 example vector**

**Description**

sampleSize3 example vector

**Usage**

sampleSize3

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**sampleSize313**

**sampleSize313 example vector**

**Description**

sampleSize313 example vector

**Usage**

sampleSize313

**Format**

An object of class numeric of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
### sampleSize32

**Description**

sampleSize32 example vector

**Usage**

```r
sampleSize32
```

**Format**

An object of class `numeric` of length 1.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

### source128

**Description**

source128 example vector

**Usage**

```r
source128
```

**Format**

An object of class `character` of length 4.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
source2 example vector

Description
source2 example vector

Usage
source2

Format
An object of class character of length 6.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

source3 example vector

Description
source3 example vector

Usage
source3

Format
An object of class character of length 6.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
source313

example vector

---

### Description

source313 example vector

### Usage

source313

### Format

An object of class character of length 4.

### Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

### Description

defines summary for 'CoTiMA' fit objects

### Usage

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

### Arguments

- `object` one CoTiMAFit object or more as ctmaFitList(object1, object2, ...)
- `...` further arguments to be passed through to `summary()`

### Value

returns a printed summary of a 'CoTiMA' fit object
targetVariables128 example vector

Description

targetVariables128 example vector

Usage

targetVariables128

Format

An object of class character of length 7.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

targetVariables2 example vector

Description

targetVariables2 example vector

Usage

targetVariables2

Format

An object of class character of length 4.

Author(s)

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
**Description**

targetVariables3 example vector

**Usage**

targetVariables3

**Format**

An object of class character of length 4.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>

---

**Description**

targetVariables313 example vector

**Usage**

targetVariables313

**Format**

An object of class character of length 6.

**Author(s)**

C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
variableNames128 example vector

Description
variableNames128 example vector

Usage
variableNames128

Format
An object of class character of length 9.

Author(s)
C. Dormann & M. Homburg <CoTiMA@uni-mainz.org>
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