Package 'metaVAR'

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Title Multivariate Meta-Analysis of Vector Autoregressive Model Coefficients

Version 0.9.1

Description Estimates the mean vector and covariance matrix of the multivariate meta-analysis of vector autoregressive model coefficients.

URL https://github.com/jeksterslab/metaVAR, https://jeksterslab.github.io/metaVAR/

BugReports https://github.com/jeksterslab/metaVAR/issues

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Encoding UTF-8

Roxygen list(markdown = TRUE)

Depends R (>= 3.5.0)

Imports OpenMx, numDeriv, Matrix

Suggests knitr, rmarkdown, testthat, simStateSpace

RoxygenNote 7.3.1

NeedsCompilation no

Author Ivan Jacob Agaloos Pesigan [aut, cre, cph] (<https://orcid.org/0000-0003-4818-8420>)

Maintainer Ivan Jacob Agaloos Pesigan <r.jeksterslab@gmail.com>

Contents

`FitCTVAR` *Fit First Order Continuous-Time Vector Autoregressive Model by ID*

Description

Fit First Order Continuous-Time Vector Autoregressive Model by ID

Usage

```
FitCTVAR(
  data,
  observed,
  id,
  time,
  phi_start = NULL,
  phi_lbound = NULL,
  phi_ubound = NULL,
  sigma_start = NULL,
  sigma_lbound = NULL,
  sigma_ubound = NULL,
  try = 1000,
  ncores = NULL
)
```

Arguments

`data`	Data frame. A data frame object of data for potentially multiple subjects that contain a column of subject ID numbers (i.e., an ID variable), and at least one column of observed values.
`observed`	Character vector. A vector of character strings of the names of the observed variables in the data.
`id`	Character string. A character string of the name of the ID variable in the data.
`time`	Character string. A character string of the name of the TIME variable in the data.
`phi_start`	Optional starting values for `phi`.
`phi_lbound`	Optional lower bound for `phi`.
`phi_ubound`	Optional upper bound for `phi`.
`sigma_start`	Optional starting values for `sigma`.
`sigma_lbound`	Optional lower bound for `sigma`.

sigma_ubound	Optional upper bound for sigma.
try	Positive integer. Number of extra tries for OpenMx::mxTryHard().
ncores	Positive integer. Number of cores to use.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: FitDTVAR(), Meta(), Meta.default(), Meta.metavarctvar(), Meta.metavardtvar()

FitDTVAR *Fit First Order Discrete-Time Vector Autoregressive Model by ID*

Description

Fit First Order Discrete-Time Vector Autoregressive Model by ID

Usage

```
FitDTVAR(
  data,
  observed,
  id,
  beta_start = NULL,
  beta_lbound = NULL,
  beta_ubound = NULL,
  psi_start = NULL,
  psi_lbound = NULL,
  psi_ubound = NULL,
  try = 1000,
  ncores = NULL
)
```

Arguments

data	Data frame. A data frame object of data for potentially multiple subjects that contain a column of subject ID numbers (i.e., an ID variable), and at least one column of observed values.
observed	Character vector. A vector of character strings of the names of the observed variables in the data.
id	Character string. A character string of the name of the ID variable in the data.
beta_start	Optional starting values for beta.
beta_lbound	Optional lower bound for beta.

beta_ubound	Optional upper bound for beta.
psi_start	Optional starting values for psi.
psi_lbound	Optional lower bound for psi.
psi_ubound	Optional upper bound for psi.
try	Positive integer. Number of extra tries for OpenMx::mxTryHard().
ncores	Positive integer. Number of cores to use.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: FitCTVAR(), Meta(), Meta.default(), Meta.metavarctvar(), Meta.metavardtvar()

Meta *Fit Multivariate Meta-Analysis*

Description

This function estimates the mean and covariance matrix of a vector of coefficients using the estimated coefficients and sampling variance-covariance matrix from each individual.

Usage

```
Meta(y, ...)
```

Arguments

y	R object. • Object of class metavarctvar. • Object of class metavardtvar. • Object of class list each element of which is a numeric vector of estimated coefficients.
...	Additional arguments.

Details

For $i = \{1, \cdots, n\}$, the objective function used to estimate the mean $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$ of the random coefficients $\mathbf{y}_i$ is given by

$$\ell\left(\boldsymbol{\mu}, \boldsymbol{\Sigma} \mid \mathbf{y}_i, \mathbb{V}\left(\mathbf{y}_i\right)\right) = -\frac{1}{2}\left[q \log\left(2\pi\right) + \log\left(\left|\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right|\right) + \left(\mathbf{y}_i - \boldsymbol{\mu}\right)' \left(\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right)^{-1} \left(\mathbf{y}_i - \boldsymbol{\mu}\right)\right]$$

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}\left(\mathbf{y}_i\right)$ is the sampling variance-covariance matrix of $\mathbf{y}_i$.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: `FitCTVAR()`, `FitDTVAR()`, `Meta.default()`, `Meta.metavarctvar()`, `Meta.metavardtvar()`

`Meta.default` *Fit Multivariate Meta-Analysis*

Description

This function estimates the mean and covariance matrix of a vector of coefficients using the estimated coefficients and sampling variance-covariance matrix from each individual.

Usage

```
## Default S3 method:
Meta(
  y,
  vcov_y = NULL,
  mu_start = NULL,
  sigma_l_start = NULL,
  try = 1000,
  ncores = NULL,
  ...
)
```

Arguments

`y`	Object of class list. Each element of the list is a numeric vector of estimated coefficients.
`vcov_y`	List. Each element of the list is a sampling variance-covariance matrix of `y`.
`mu_start`	Numeric matrix. Matrix of starting values of `mu`.
`sigma_l_start`	Numeric matrix. Matrix of starting values of `t(chol(sigma))`.
`try`	Positive integer. Number of extra tries for `OpenMx::mxTryHard()`.
`ncores`	Positive integer. Number of cores to use.
`...`	Additional arguments.

Details

For $i = \{1, \cdots, n\}$, the objective function used to estimate the mean $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$ of the random coefficients $\mathbf{y}_i$ is given by

$$\ell\left(\boldsymbol{\mu}, \boldsymbol{\Sigma} \mid \mathbf{y}_i, \mathbb{V}\left(\mathbf{y}_i\right)\right) = -\frac{1}{2}\left[q \log\left(2\pi\right) + \log\left(\left|\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right|\right) + \left(\mathbf{y}_i - \boldsymbol{\mu}\right)' \left(\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right)^{-1} \left(\mathbf{y}_i - \boldsymbol{\mu}\right)\right]$$

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}\left(\mathbf{y}_i\right)$ is the sampling variance-covariance matrix of $\mathbf{y}_i$.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: `FitCTVAR()`, `FitDTVAR()`, `Meta()`, `Meta.metavarctvar()`, `Meta.metavardtvar()`

`Meta.metavarctvar` *Fit Multivariate Meta-Analysis*

Description

This function estimates the mean and covariance matrix of a vector of coefficients using the estimated coefficients and sampling variance-covariance matrix from each individual.

Usage

```
## S3 method for class 'metavarctvar'
Meta(y, mu_start = NULL, sigma_l_start = NULL, try = 1000, ncores = NULL, ...)
```

Arguments

`y`	Object of class `metavarctvar`.
`mu_start`	Numeric matrix. Matrix of starting values of `mu`.
`sigma_l_start`	Numeric matrix. Matrix of starting values of `t(chol(sigma))`.
`try`	Positive integer. Number of extra tries for `OpenMx::mxTryHard()`.
`ncores`	Positive integer. Number of cores to use.
`...`	Additional arguments.

Details

For $i = \{1, \cdots, n\}$, the objective function used to estimate the mean $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$ of the random coefficients $\mathbf{y}_i$ is given by

$$\ell\left(\boldsymbol{\mu}, \boldsymbol{\Sigma} \mid \mathbf{y}_i, \mathbb{V}\left(\mathbf{y}_i\right)\right) = -\frac{1}{2}\left[q \log\left(2\pi\right) + \log\left(\left|\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right|\right) + \left(\mathbf{y}_i - \boldsymbol{\mu}\right)' \left(\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right)^{-1} \left(\mathbf{y}_i - \boldsymbol{\mu}\right)\right]$$

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}\left(\mathbf{y}_i\right)$ is the sampling variance-covariance matrix of $\mathbf{y}_i$.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: `FitCTVAR()`, `FitDTVAR()`, `Meta()`, `Meta.default()`, `Meta.metavardtvar()`

`Meta.metavardtvar` *Fit Multivariate Meta-Analysis*

Description

This function estimates the mean and covariance matrix of a vector of coefficients using the estimated coefficients and sampling variance-covariance matrix from each individual.

Usage

```
## S3 method for class 'metavardtvar'
Meta(y, mu_start = NULL, sigma_l_start = NULL, try = 1000, ncores = NULL, ...)
```

Arguments

`y`	Object of class `metavardtvar`.
`mu_start`	Numeric matrix. Matrix of starting values of `mu`.
`sigma_l_start`	Numeric matrix. Matrix of starting values of `t(chol(sigma))`.
`try`	Positive integer. Number of extra tries for `OpenMx::mxTryHard()`.
`ncores`	Positive integer. Number of cores to use.
`...`	Additional arguments.

Details

For $i = \{1, \cdots, n\}$, the objective function used to estimate the mean $\boldsymbol{\mu}$ and covariance matrix $\boldsymbol{\Sigma}$ of the random coefficients $\mathbf{y}_i$ is given by

$$\ell\left(\boldsymbol{\mu}, \boldsymbol{\Sigma} \mid \mathbf{y}_i, \mathbb{V}\left(\mathbf{y}_i\right)\right) = -\frac{1}{2}\left[q \log\left(2\pi\right) + \log\left(\left|\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right|\right) + \left(\mathbf{y}_i - \boldsymbol{\mu}\right)' \left(\mathbb{V}\left(\mathbf{y}_i\right) - \boldsymbol{\Sigma}\right)^{-1} \left(\mathbf{y}_i - \boldsymbol{\mu}\right)\right]$$

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}\left(\mathbf{y}_i\right)$ is the sampling variance-covariance matrix of $\mathbf{y}_i$.

Author(s)

Ivan Jacob Agaloos Pesigan

See Also

Other Meta-Analysis of VAR Functions: `FitCTVAR()`, `FitDTVAR()`, `Meta()`, `Meta.default()`, `Meta.metavarctvar()`

print.metavarctvar *Print Method for Object of Class* metavarctvar

Description

Print Method for Object of Class metavarctvar

Usage

```
## S3 method for class 'metavarctvar'
print(x, means = TRUE, ...)
```

Arguments

x	an object of class metavarctvar.
means	Logical. If means = TRUE, return means. Otherwise, the function returns raw estimates.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

print.metavardtvar *Print Method for Object of Class* metavardtvar

Description

Print Method for Object of Class metavardtvar

Usage

```
## S3 method for class 'metavardtvar'
print(x, means = TRUE, ...)
```

Arguments

x	an object of class metavardtvar.
means	Logical. If means = TRUE, return means. Otherwise, the function returns raw estimates.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

print.metavarmeta *Print Method for Object of Class* metavarmeta

Description

Print Method for Object of Class metavarmeta

Usage

```
## S3 method for class 'metavarmeta'
print(x, alpha = 0.05, digits = 4, ...)
```

Arguments

x	an object of class metavarmeta.
alpha	Numeric vector. Significance level α.
digits	Integer indicating the number of decimal places to display.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

summary.metavarctvar *Summary Method for Object of Class* metavarctvar

Description

Summary Method for Object of Class metavarctvar

Usage

```
## S3 method for class 'metavarctvar'
summary(object, means = TRUE, ...)
```

Arguments

object	an object of class metavarctvar.
means	Logical. If means = TRUE, return means. Otherwise, the function returns raw estimates.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

summary.metavardtvar *Summary Method for Object of Class* metavardtvar

Description

Summary Method for Object of Class metavardtvar

Usage

```
## S3 method for class 'metavardtvar'
summary(object, means = TRUE, ...)
```

Arguments

object	an object of class metavardtvar.
means	Logical. If means = TRUE, return means. Otherwise, the function returns raw estimates.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

summary.metavarmeta *Summary Method for Object of Class* metavarmeta

Description

Summary Method for Object of Class metavarmeta

Usage

```
## S3 method for class 'metavarmeta'
summary(object, alpha = 0.05, digits = 4, ...)
```

Arguments

object	an object of class metavarmeta.
alpha	Numeric vector. Significance level α.
digits	Integer indicating the number of decimal places to display.
...	further arguments.

Author(s)

Ivan Jacob Agaloos Pesigan

Index