

Package ‘metaVAR’

June 26, 2024

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>

License MIT + file LICENSE

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	2
FitDTVAR	3
Meta	4
Meta.default	5
Meta.metavarctvar	6
Meta.metavardtvar	7
print.metavarctvar	8
print.metavardtvar	8

print.metavarmeta	9
summary.metavarctvar	9
summary.metavardtvar	10
summary.metavarmeta	10

Index	11
--------------	-----------

FitCTVAR	<i>Fit First Order Continuous-Time Vector Autoregressive Model by ID</i>
----------	--

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 <code>OpenMx::mxTryHard()</code> .
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.

<code>beta_ubound</code>	Optional upper bound for <code>beta</code> .
<code>psi_start</code>	Optional starting values for <code>psi</code> .
<code>psi_lbound</code>	Optional lower bound for <code>psi</code> .
<code>psi_ubound</code>	Optional upper bound for <code>psi</code> .
<code>try</code>	Positive integer. Number of extra tries for <code>OpenMx::mxTryHard()</code> .
<code>ncores</code>	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

<code>y</code>	R object. <ul style="list-style-type: none"> • Object of class <code>metavarctvar</code>. • Object of class <code>metavardtvar</code>. • Object of class <code>list</code> each element of which is a numeric vector of estimated coefficients.
<code>...</code>	Additional arguments.

Details

For $i = \{1, \dots, n\}$, 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

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

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}(\mathbf{y}_i)$ 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

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

Details

For $i = \{1, \dots, n\}$, 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

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

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}(\mathbf{y}_i)$ 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	<i>Fit Multivariate Meta-Analysis</i>
-------------------	---------------------------------------

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

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

Details

For $i = \{1, \dots, n\}$, 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

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

where q is the number of unique elements in $\boldsymbol{\mu}$ and $\boldsymbol{\Sigma}$, and $\mathbb{V}(\mathbf{y}_i)$ 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	<i>Fit Multivariate Meta-Analysis</i>
-------------------	---------------------------------------

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 <code>metavardtvar</code> .
mu_start	Numeric matrix. Matrix of starting values of μ .
sigma_l_start	Numeric matrix. Matrix of starting values of $t(\text{chol}(\text{sigma}))$.
try	Positive integer. Number of extra tries for OpenMx::mxTryHard() .
ncores	Positive integer. Number of cores to use.
...	Additional arguments.

Details

For $i = \{1, \dots, n\}$, the objective function used to estimate the mean μ and covariance matrix Σ of the random coefficients y_i is given by

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

where q is the number of unique elements in μ and Σ , and $\mathbb{V}(y_i)$ is the sampling variance-covariance matrix of 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	<i>Print Method for Object of Class metavarmeta</i>
-------------------	---

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	<i>Summary Method for Object of Class metavarctvar</i>
----------------------	--

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

* Meta-Analysis of VAR Functions

FitCTVAR, [2](#)
FitDTVAR, [3](#)
Meta, [4](#)
Meta.default, [5](#)
Meta.metavarctvar, [6](#)
Meta.metavardtvar, [7](#)

* fit

FitCTVAR, [2](#)
FitDTVAR, [3](#)

* metaVAR

FitCTVAR, [2](#)
FitDTVAR, [3](#)
Meta, [4](#)
Meta.default, [5](#)
Meta.metavarctvar, [6](#)
Meta.metavardtvar, [7](#)

* meta

Meta, [4](#)
Meta.default, [5](#)
Meta.metavarctvar, [6](#)
Meta.metavardtvar, [7](#)

* methods

print.metavarctvar, [8](#)
print.metavardtvar, [8](#)
print.metavarmeta, [9](#)
summary.metavarctvar, [9](#)
summary.metavardtvar, [10](#)
summary.metavarmeta, [10](#)

FitCTVAR, [2](#), [4](#), [6](#), [7](#)
FitDTVAR, [3](#), [3](#), [4](#), [6](#), [7](#)

Meta, [3](#), [4](#), [4](#), [6](#), [7](#)
Meta.default, [3](#), [4](#), [5](#), [6](#), [7](#)
Meta.metavarctvar, [3](#), [4](#), [6](#), [6](#), [7](#)
Meta.metavardtvar, [3](#), [4](#), [6](#), [7](#)

OpenMx::mxTryHard(), [2](#), [3](#), [5–7](#)

print.metavarctvar, [8](#)

print.metavardtvar, [8](#)

print.metavarmeta, [9](#)

summary.metavarctvar, [9](#)
summary.metavardtvar, [10](#)
summary.metavarmeta, [10](#)