# Package 'metaVAR'

June 19, 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), OpenMx

**Imports** numDeriv, Matrix

**Suggests** knitr, rmarkdown, testthat, simStateSpace

**RoxygenNote** 7.3.1

**NeedsCompilation** no

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

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### 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()`

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

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### 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()

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Meta *Fit Multivariate Meta-Analysis*

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## 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(object, mu_start = NULL, sigma_l_start = NULL, try = 1000, ncores = NULL)
```

## Arguments

| | |
|---|---|
| object | Object of class metavardtvar, that is, the output of FitDTVAR(). |
| 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. |

## 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 $\mathbf{y}_i$.

## Value

Returns an object of class metavarmeta which is a list with the following elements:

**call** Function call.

**args** Function arguments.

**fun** Function used ("Meta").

**output** Fitted model.

**transform** Transformed estimates.

### Author(s)

Ivan Jacob Agaloos Pesigan

### See Also

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

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

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### 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 $\alpha$. |
| digits | Integer indicating the number of decimal places to display. |
| ... | further arguments. |

### Author(s)

Ivan Jacob Agaloos Pesigan

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

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### 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 $\alpha$. |
| `digits` | Integer indicating the number of decimal places to display. |
| `...` | further arguments. |

## Author(s)

Ivan Jacob Agaloos Pesigan

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