Package ‘multivar’

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Title Penalized Estimation and Forecasting of Multiple Subject Vector Autoregressive (multi-V AR) Models

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Depends R (>= 2.10)

Imports stats, utils, MASS, Rcpp (>= 1.0.3)

License GPL (>= 2)

LazyData true

ByteCompile true

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NeedsCompilation yes

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LinkingTo Rcpp,RcppArmadillo

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multivar-package  A short title line describing what the package does

Description

A more detailed description of what the package does. A length of about one to five lines is recommended.

Details

This section should provide a more detailed overview of how to use the package, including the most important functions.

Author(s)

Your Name, email optional.
Maintainer: Your Name <your@email.com>

References

This optional section can contain literature or other references for background information.

See Also

Optional links to other man pages

Examples

```r
## Not run:
## Optional simple examples of the most important functions
## These can be in \dontrun{} and \donttest{} blocks.

## End(Not run)
```

fista_sparse  Estimate a Sparse Multiple-Subject Vector Autoregression (VAR) Model

Description

Function for estimating multiple-subject Vector Autoregression models using Fast Iterative Shrinkage-Thresholding Algorithm (FISTA; Beck and Teboulle, 2009)

Usage

```r
fista_sparse(A, b, lambda, x_true, niter, backtrack, w = NULL,
conv = 1e-10)
```
var_forecast

Arguments

A  An N x P design matrix.
b  An N x P outcome matrix.
lambda  Regularization parameter.
x_true  Numeric matrix containing the true transition matrix (if available).
niter  Integer giving the maximum number of iterations.
backtrack  Logical. If backtracking should be used in the FISTA algorithm.
w  Numeric matrix containing the weights (if available).
conv  Convergence criterion.

Details

Function Under Development

This is a prototype function and is currently under development.

References


Examples

\[
\begin{align*}
\text{theta} & \leftarrow \text{matrix}(\text{rnorm}(9),3,3) \\
\text{data} & \leftarrow \text{var_sim}(20, \text{theta}, \text{diag}(.1,3)) \\
\text{datalag} & \leftarrow \text{embed(data, 2)} \\
b & \leftarrow \text{datalag}[1:3] \\
A & \leftarrow \text{datalag}[4:6] \\
\text{fista_sparse}(A, b, 1, \text{theta}, \text{niter} = 1, \text{backtrack} = \text{TRUE})
\end{align*}
\]

---

var_forecast  Estimate h-step ahead forecasts based on the recovered transition matrix.

Description

Estimate h-step ahead forecasts based on the recovered transition matrix.

Usage

\text{var_forecast}(yf, h, A)
Arguments

- \( yf \) A \( d \times T \) data matrix where \( d \) is the number of observed variables and \( T \) is the number of timepoints.
- \( h \) An integer indicating the forecast horizon.
- \( A \) A \( d \times d \) transition matrix.

Examples

```r
theta <- diag(c(.7, .8, .9, .6, .7, .9))
data <- t(var_sim(100, theta, diag(.1, 6)))
datalag <- embed(data, 2)
b <- datalag[,1:6]
A <- datalag[,7:12]
A_est <- fista_sparse(A, b, 1, theta, niter = 10, backtrack = TRUE)$out.x
var_forecast(t(b), 2, A_est)
```

---

**var_sim**

*Simulate a stationary Vector Autoregressive (VAR) time series.*

Description

Simulate a stationary Vector Autoregressive (VAR) time series.

Usage

```r
var_sim(T, A, Sigma)
```

Arguments

- \( T \) An integer giving the number of timepoints.
- \( A \) A \( d \times d \) transition matrix.
- \( Sigma \) A \( d \times d \) innovation covariance matrix.

Examples

```r
theta <- diag(c(.7, .8, .9, .6, .7, .9))
data <- t(var_sim(100, theta, diag(.1, 6)))
datalag <- embed(data, 2)
b <- datalag[,1:6]
A <- datalag[,7:12]
A_est <- fista_sparse(A, b, 1, theta, niter = 10, backtrack = TRUE)$out.x
var_forecast(t(b), 2, A_est)
```
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