

Package ‘VARcheck’

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Type Package

Title Visual Diagnostic Checks for Vector Autoregressive Models

Version 0.1.1

Description Provides model-agnostic visual diagnostics for vector autoregressive (VAR) models. Given empirical data, model predictions, residuals, and optionally simulated data, the package assembles a multi-panel diagnostic grid: empirical vs. predicted time series, residual inspection, residuals vs. predictions scatter, and posterior predictive style checks via simulated trajectories. Output is a 'patchwork' object composed of 'ggplot2' plots, allowing further customisation via standard 'ggplot2' theme calls. Follows the approach described in Haslbeck et al. (2026) <doi:10.31234/osf.io/k6uz4_v3>.

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Encoding UTF-8

URL <https://github.com/bsiepe/VARcheck>,
<https://bsiepe.github.io/VARcheck/>

BugReports <https://github.com/bsiepe/VARcheck/issues>

Imports ggplot2 (>= 3.4.0), patchwork, stats, utils

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

Config/testthat/edition 3

VignetteBuilder knitr

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NeedsCompilation no

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new_var_data	Create a VAR data object
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Description

Constructs a ‘var_data’ object used as input to [plot_var_check()]. Each component is either a single ‘T x p’ numeric matrix (single subject) or a list of ‘T_i x p’ matrices (multiple subjects). Single matrices are coerced to a length-1 list automatically.

Usage

```
new_var_data(  
  empirical,  
  predicted,  
  residuals,  
  simulated = NULL,  
  var_names = NULL  
)  
  
## S3 method for class 'var_data'  
print(x, ...)
```

Arguments

empirical	Numeric matrix or list of matrices. Observed values.
predicted	Numeric matrix or list of matrices. Model predictions.
residuals	Numeric matrix or list of matrices. Residuals (‘empirical - predicted’).
simulated	Optional numeric matrix or list of matrices. Data simulated from the fitted model. Required only when plotting the “simulated” panel.
var_names	Optional character vector of length ‘p’ with variable names used as plot labels. Defaults to “V1”, “V2”, etc.
x	A ‘var_data’ object.
...	Not used; present for S3 method compatibility.

Value

An object of class ‘var_data’.

Examples

```
set.seed(1)
emp <- matrix(rnorm(200), nrow = 100, ncol = 2)
pred <- emp + matrix(rnorm(200, sd = 0.3), 100, 2)
res <- emp - pred
sim <- matrix(rnorm(200), 100, 2)
vd <- new_var_data(emp, pred, res, sim, var_names = c("Mood", "Energy"))
```

plot_var_check

Plot VAR model diagnostics

Description

Creates a multi-panel diagnostic grid for a fitted VAR model. Each row corresponds to one variable; columns show (a) empirical data vs. predictions, (b) residuals over time, (c) residuals vs. predictions scatter, and (d) data simulated from the estimated model. Each time-series panel is accompanied by a marginal histogram with a Gaussian overlay.

Usage

```
plot_var_check(
  data,
  subject = 1,
  vars = NULL,
  panels = c("data", "residuals", "scatter", "simulated"),
  colors = list(),
  theme = NULL,
  ylim_data = NULL,
  ylim_res = NULL,
  title = NULL
)
```

Arguments

data	A ‘var_data’ object created with [new_var_data()].
subject	Integer. Index of the subject to plot. Defaults to ‘1’.
vars	Character or integer vector selecting variables to include. Defaults to all variables.
panels	Character vector controlling which columns are shown. Any subset of ‘c("data", "residuals", "scatter", "simulated")’, in that order. Defaults to all four.
colors	Named list controlling line colours. Recognised elements: ‘empirical’ (default “black”) and ‘predicted’ (default “darkorange2”). Partial lists are merged with the defaults.
theme	A ‘ggplot2::theme()’ object added on top of [theme_varcheck()]. Use this to override individual theme elements.

<code>ylim_data</code>	Numeric vector of length 2. Shared y-limits for the data-scale panels (empirical/predicted/simulated). Auto-computed from the data if 'NULL'.
<code>ylim_res</code>	Numeric vector of length 2. Shared y-limits for the residual panels. Auto-computed from the residuals if 'NULL'.
<code>title</code>	Optional character string added as an overall plot title via <code>[patchwork::plot_annotation()]</code> . Useful when calling <code>'plot_var_check()'</code> in a loop over subjects.

Value

A 'patchwork' object.

Examples

```
set.seed(1)
emp <- matrix(rnorm(300), nrow = 100, ncol = 3)
pred <- emp + matrix(rnorm(300, sd = 0.3), 100, 3)
res <- emp - pred
sim <- matrix(rnorm(300), 100, 3)
vd <- new_var_data(emp, pred, res, sim, var_names = c("X1", "X2", "X3"))

plot_var_check(vd)
```

theme_varcheck	<i>Default VARcheck ggplot2 theme</i>
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Description

A minimal theme used as the default style for all VARcheck plots. Pass a 'ggplot2::theme()' object to the 'theme' argument of `[plot_var_check()]` to override individual elements on top of this base.

Usage

```
theme_varcheck()
```

Value

A 'ggplot2' theme object.

Examples

```
theme_varcheck()
```

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