

Package ‘statioVAR’

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Type Package

Title Trend Removal for Vector Autoregressive Workflows

Version 0.1.2

Description Detrending multivariate time-series to approximate stationarity when dealing with intensive longitudinal data, prior to Vector Autoregressive (VAR) or multilevel-VAR estimation. Classical VAR assumes weak stationarity (constant first two moments), and deterministic trends inflate spurious autocorrelation, biasing Granger-causality and impulse-response analyses. All functions operate on raw panel data and write detrended columns back to the data set, but differ in the level at which the trend is estimated. See, for instance, Wang & Maxwell (2015) <[doi:10.1037/met0000030](https://doi.org/10.1037/met0000030)>; Burger et al. (2022) <[doi:10.4324/9781003111238-13](https://doi.org/10.4324/9781003111238-13)>; Epskamp et al. (2018) <[doi:10.1177/2167702617744325](https://doi.org/10.1177/2167702617744325)>.

URL <https://github.com/g-corbelli/statioVAR>

BugReports <https://github.com/g-corbelli/statioVAR/issues>

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Encoding UTF-8

Imports dplyr, rlang, stats

Suggests shiny, testthat (>= 3.0.0), knitr, rmarkdown

Language en-US

NeedsCompilation no

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detrender	<i>Within-person linear detrending for multilevel VAR analysis</i>
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Description

Remove individual-specific linear trends from panel data to approximate stationarity, preparing inputs for multilevel Vector Autoregressive (VAR) modeling (among others). For each subject and each selected variable, a linear regression of the variable on the time index is tested at significance level α ; if the slope is significant, the fitted trend is subtracted and the subject's mean is re-added to produce detrended series while preserving between-subject information.

Usage

```
detrender(
  df,
  id_var,
  time_var,
  vars_to_detrend,
  alpha = 0.05,
  min_obs = 3
)
```

Arguments

<code>df</code>	Data frame or tibble (long format).
<code>id_var</code>	Character string. Subject identifier column (required).
<code>time_var</code>	Character string. Numeric time index column (required).
<code>vars_to_detrend</code>	Character vector. Column names to detrend within each subject (required).
<code>alpha</code>	Numeric in (0,1). Significance threshold for retaining a non-zero time slope (default: 0.05).
<code>min_obs</code>	Integer >2. Minimum observations per subject-variable to attempt detrending (default: 3).

Value

A named list with:

`df` `Tibble`. The original dataset with additional detrended columns.

`n_clusters` `Integer`. Number of unique subjects (clusters) processed.

`total_trends` `Integer`. Total number of individual trends removed across all variables.

`summary` `Tibble`. Number of removed linear trends per variable, with columns `variable` and `removed_trends`.

Examples

```
df_example <- data.frame(  
  id = rep(1:2, each = 5),  
  time = rep(1:5, 2),  
  x = rep(1:5, 2) + rnorm(10)  
)  
res <- statioVAR::detrender(  
  df = df_example,  
  id_var = "id",  
  time_var = "time",  
  vars_to_detrend = "x",  
  alpha = 0.05,  
  min_obs = 3  
)  
res$df[7:9,]  
res$n_clusters  
res$total_trends  
res$summary
```

pooled

Pooled polynomial detrending for multivariate panel data

Description

Remove study-wide polynomial trend (up to cubic) plus optional cyclic effects from multivariate panel data by fitting a single OLS model on the pooled series. Trend terms up to the chosen degree are estimated; those whose two-sided t-tests are significant at `alpha` are retained, non-significant components are set to 0, and the resulting fitted values are subtracted from every observation of the raw series.

Usage

```
pooled(  
  df,  
  id_var,  
  time_var = NULL,
```

```

vars_to_detrend,
poly_order = 1,
cyc_vars = NULL,
alpha = 0.05,
miss_thresh = 0.30
)

```

Arguments

<code>df</code>	Data frame or tibble (long format).
<code>id_var</code>	Character string. Subject identifier column (required).
<code>time_var</code>	Character string. Numeric time index column (if NULL, then <code>cyc_vars</code> must be specified). If NULL, no polynomial time terms are included.
<code>vars_to_detrend</code>	Character vector. Column names to detrend (required).
<code>poly_order</code>	Integer in {1,2,3}. Maximum degree of the polynomial time trend tested (default: 1): <ul style="list-style-type: none"> • 1 = linear only, • 2 = linear + quadratic, • 3 = linear + quadratic + cubic.
<code>cyc_vars</code>	Character vector. Column names (e.g. "weekend") for categorical cyclicity variables (if NULL, then <code>time_var</code> must be specified).
<code>alpha</code>	Numeric in (0,1). Significance threshold for retaining polynomial terms (default 0.05).
<code>miss_thresh</code>	Numeric in (0,1). Maximum allowed proportion of missing data per variable (default: 0.30).

Value

A named list with:

`df` Tibble with added `<var>_detrended` columns.

`coef_tables` Named list of coefficient tables (one per variable), with columns predictor, estimate, Std. Error, *t*, *p*, and a logical flag kept.

`formula_str` Character string of the fitted model formula.

`n_clusters` Integer: number of unique subjects (clusters).

Examples

```

dat <- data.frame(
  id = rep(1:3, each=5),
  time = rep(1:5, 3),
  cyc = rep(c("A", "B"), length.out=15),
  y1 = rnorm(15, sd = 0.5) + seq(1,15)*1.0
)
res <- statioVAR::pooled(
  df = dat,

```

```
id_var = "id",
time_var = "time",
vars_to_detrend = "y1",
poly_order = 2,
cyc_vars = "cyc",
alpha = 0.05,
miss_thresh = 0.30
)
```

statioVAR

Trend Removal for Vector Autoregressive Workflows

Description

Detrending multivariate time-series to approximate stationarity when dealing with intensive longitudinal data, prior to Vector Autoregressive (VAR) or multilevel-VAR estimation. Classical VAR assumes weak stationarity (constant first two moments), and deterministic trends inflate spurious autocorrelation, biasing Granger-causality and impulse-response analyses. All functions operate on raw panel data and write detrended columns back to the data set, but differ in the level at which the trend is estimated.

Details

The functions are:

- **detrender**: within-person linear detrending, which fits and removes a separate linear trend for each subject on each selected variable.
- **pooled**: pooled polynomial detrending, which fits and removes a global polynomial trend (up to cubic) and optional cyclic effects across all subjects.

Note

The development of this package was inspired by, and is deeply indebted to, the works of Eiko Fried, Jonas Haslbeck, Sasha Epskamp, Ria Hoekstra and Alessandra Mansueto, among others. This software is provided 'as is', without any express or implied warranties of accuracy or reliability. For suggestions or to report any issue, please contact the author.

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See Also

Useful links:

- <https://github.com/g-corbelli/statioVAR>
- Report bugs at <https://github.com/g-corbelli/statioVAR/issues>

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