Package 'nonParQuantileCausality'

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Type Package

Title Nonparametric Causality in Quantiles Test

Version 0.1.0

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Description Implements the nonparametric causality-in-quantiles test (in mean or variance), returning a test object with an S3 plot() method. The current implementation uses one lag of each series (first-order Granger causality setup). Methodology is based on Balcilar, Gupta, and Pierdzioch (2016a) <doi:10.1016/j.resourpol.2016.04.004> and Balcilar et al. (2016) <doi:10.1007/s11079-016-9388-x>.

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URL https://www.mbalcilar.net,
https://github.com/mbalcilar/nonParQuantileCausality

Encoding UTF-8

LazyData true

LazyDataCompression bzip2

RoxygenNote 7.3.2

Depends R (>= 3.6)

Imports stats, ggplot2, quantreg, KernSmooth

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation no

Repository CRAN

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Contents

`gold_oil` *Monthly Gold and Oil Returns*

Description

A small example dataset used to illustrate the nonparametric causality-in-quantiles test.

Usage

```
gold_oil
```

Format

A data frame with two numeric columns:

Gold numeric: gold series

Oil numeric: oil series

Details

Columns are generic numeric series (already aligned and cleaned) suitable for the examples in `np_quantile_causality`.

Source

Provided by Mehmet Balcilar.

`np_quantile_causality` *Nonparametric Causality-in-Quantiles Test*

Description

Computes the Balcilar-Jeong-Nishiyama style nonparametric quantile Granger-causality test for first-order lags. Methodology is based on Balcilar, Gupta, and Pierdzioch (2016, doi:10.1016/j.resourpol.2016.04.004) and Balcilar et al. (2016, doi:10.1007/s110790169388x).

Usage

```
np_quantile_causality(x, y, type = c("mean", "variance"), q = NULL, hm = NULL)
```

Arguments

`x`	numeric vector; candidate cause (independent) variable. The test internally uses the **first lag** of x (one-lag Granger causality setup).
`y`	numeric vector; effect (dependent) variable. The test internally uses the **first lag** of y (one-lag Granger causality setup).
`type`	character; "mean" or "variance" (causality in mean or variance).
`q`	numeric vector of quantiles in (0,1). Default is seq(0.01, 0.99, 0.01).
`hm`	optional numeric bandwidth; if `NULL`, uses Yu & Jones (1998) style plug-in via `KernSmooth::dpill` on the mean-regression proxy.

Details

Uses local polynomial quantile regression at each quantile with kernel weights, constructs the Song et al. (2012) style quadratic form, and rescales to the asymptotic standard-normal statistic.

Value

An object of class `np_quantile_causality` with elements:

- `statistic`: numeric vector of test statistics by quantile
- `quantiles`: numeric vector of quantiles tested
- `bandwidth`: scalar base bandwidth used before quantile adjustment
- `type`: "mean" or "variance"
- `n`: effective sample size
- `call`: the matched call

Lag order (important)

The current implementation **uses one lag** of each series only: x_{t-1} and y_{t-1} (first-order Granger setup). Extending to higher lags requires changing the internal embedding (currently `stats::embed(*, 2)`) and the kernel construction to handle multivariate lag vectors (e.g., a product kernel over all lag coordinates or a multivariate Gaussian kernel).

References

- Balcilar, M., Gupta, R., & Pierdzioch, C. (2016). Does uncertainty move the gold price? New evidence from a nonparametric causality-in-quantiles test. *Resources Policy*, 49, 74–80. doi:10.1016/j.resourpol.2016.04.004
- Balcilar, M., Gupta, R., Kyei, C., & Wohar, M. E. (2016). Does economic policy uncertainty predict exchange rate returns and volatility? Evidence from a nonparametric causality-in-quantiles test. *Open Economies Review*, 27(2), 229–250. doi:10.1007/s110790169388x

Note

This function tests whether x_{t-1} Granger-causes y_t in quantile θ (and, with `type = "variance"`, whether x_{t-1}^2 causes y_t^2). Higher-order lags are **not** supported in this release.

Examples

```
set.seed(1234)
x <- arima.sim(n = 600, list(ar = 0.4))
y <- 0.5*lag(x, -1) + rnorm(600)  # x Granger-causes y
y[is.na(y)] <- mean(y, na.rm = TRUE)
obj <- np_quantile_causality(x, y, type = "mean", q = seq(0.1, 0.9, 0.1))
plot(obj)  # test statistic vs quantiles with 5% CV line

# Example with bundled dataset (Gold causes Gold or Oil depending on call)
data(gold_oil)
# use first 500 days
gold_oil <- gold_oil[1:501,]
q_grid <- seq(0.25, 0.75, by = 0.25)

# Causality in conditional mean (does Oil_t-1 cause Gold_t?)
res_mean <- np_quantile_causality(
  x = gold_oil$Oil,
  y = gold_oil$Gold,
  type = "mean",
  q = q_grid
)
res_mean

# Causality in conditional variance
res_var <- np_quantile_causality(
  x = gold_oil$Oil,
  y = gold_oil$Gold,
  type = "variance",
  q = q_grid
)
res_var

# Plot (with 5% critical value line); returns a ggplot object invisibly
plot(res_mean)
plot(res_var)
```

plot.np_quantile_causality *Plot method for np_quantile_causality objects*

Description

Plot method for np_quantile_causality objects

Usage

```
## S3 method for class 'np_quantile_causality'
plot(x, cv = 1.96, title = NULL, ...)
```

Arguments

x	an object of class np_quantile_causality
cv	numeric; a reference critical value line (default 1.96 for ~5%)
title	optional plot title; default is constructed from x$type
...	unused (for S3 compatibility)

Value

A ggplot object (invisibly).

References

- Balcilar, M., Gupta, R., & Pierdzioch, C. (2016). Does uncertainty move the gold price? New evidence from a nonparametric causality-in-quantiles test. *Resources Policy*, 49, 74–80.
- Balcilar, M., Gupta, R., Kyei, C., & Wohar, M. E. (2016). Does economic policy uncertainty predict exchange rate returns and volatility? Evidence from a nonparametric causality-in-quantiles test. *Open Economies Review*, 27(2), 229–250.

YourPackageName *YourPackageName: Nonparametric Causality-in-Quantiles*

Description

Tools for nonparametric causality-in-quantiles in mean and variance.

References

- Balcilar, M., Gupta, R., & Pierdzioch, C. (2016). Does uncertainty move the gold price? New evidence from a nonparametric causality-in-quantiles test. *Resources Policy*, 49, 74–80.
- Balcilar, M., Gupta, R., Kyei, C., & Wohar, M. E. (2016). Does economic policy uncertainty predict exchange rate returns and volatility? Evidence from a nonparametric causality-in-quantiles test. *Open Economies Review*, 27(2), 229–250.

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