Package 'wqc'

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Title Wavelet Quantile Correlation Analysis

Version 0.1.2

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Description Estimate and plot wavelet quantile correlations(Kumar and Padakandla,2022) between two time series. Wavelet quantile correlation is used to capture the dependency between two time series across quantiles and different frequencies. This method is useful in identifying potential hedges and safe-haven instruments for investment purposes. See Kumar and Padakandla(2022) <doi:10.1016/j.frl.2022.102707> for further details.

Depends R (>= 4.0)

Imports waveslim, QCSIS, stats, lattice, grid, viridisLite

License GPL-3

Encoding UTF-8

RoxygenNote 7.3.2

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

VignetteBuilder knitr

Config/testthat/edition 3

NeedsCompilation no

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`apply_quantile_correlation` *Apply Quantile Correlation Analysis*

Description

Apply Quantile Correlation Analysis

Usage

```
apply_quantile_correlation(data, quantiles, wf = "la8", J = 8, n_sim = 1000)
```

Arguments

`data`	Data frame containing the time series data. The first column is the reference series; subsequent columns are the target series.
`quantiles`	Numeric vector of quantiles.
`wf`	Wavelet family name.
`J`	Decomposition level.
`n_sim`	Number of simulations for confidence intervals.

Value

A combined data.frame of quantile correlation results, with one row per level-quantile-series combination.

Examples

```
data <- data.frame(x = rnorm(1000), y = rnorm(1000), z = rnorm(1000))
quantiles <- c(0.05, 0.5, 0.95)
res_df <- apply_quantile_correlation(data, quantiles,n_sim=10)
head(res_df)
```

`plot_quantile_heatmap` *Plot Wavelet Quantile Correlation Heatmap*

Description

Create a heatmap of estimated quantile-wavelet correlations with white borders for cells where the estimate lies outside its 95% confidence interval.

Usage

```
plot_quantile_heatmap(
  df,
  label_levels = TRUE,
  palette = viridisLite::viridis(100)
)
```

Arguments

df	Data frame with columns Level, Quantile, Estimated_QC, CI_Lower, and CI_Upper.
label_levels	Logical; if TRUE, label the y-axis with level numbers.
palette	Color palette vector for col.regions; default uses viridisLite::viridis(100).

Value

A lattice levelplot object (invisibly).

Examples

```
df <- data.frame(
  Level        = rep(1:2, each = 3),
  Quantile     = rep(c(0.1, 0.5, 0.9), times = 2),
  Estimated_QC = runif(6, -1, 1),
  CI_Lower     = rep(-0.5, 6),
  CI_Upper     = rep(0.5, 6)
)
# Use :: for namespace clarity, avoid library() calls
plot_quantile_heatmap(df, label_levels = TRUE, palette = viridisLite::viridis(100))
```

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quantile_correlation_analysis

Quantile Correlation Analysis

Description

Quantile Correlation Analysis

Usage

```
quantile_correlation_analysis(x, y, quantiles, wf = "la8", J = 8, n_sim = 1000)
```

Arguments

x	Numeric vector for the first time series.
y	Numeric vector for the second time series.
quantiles	Numeric vector of quantiles.
wf	Wavelet family name.
J	Decomposition level.
n_sim	Number of simulations for confidence intervals.

Value

Data frame with quantile correlation estimates and confidence intervals for one pair of series.

Examples

```
data <- data.frame(x = rnorm(1000), y = rnorm(1000))
quantiles <- c(0.05, 0.5, 0.95)
result <- quantile_correlation_analysis(data$x, data$y, quantiles,n_sim=10)
head(result)
```

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