

# Package ‘corbouli’

June 3, 2025

**Type** Package

**Title** Corbae-Ouliaris Frequency Domain Filtering

**Version** 0.1.5

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**Description** Corbae-Ouliaris frequency domain filtering. According to Corbae and Ouliaris (2006) <[doi:10.1017/CBO9781139164863.008](https://doi.org/10.1017/CBO9781139164863.008)>, this is a solution for extracting cycles from time series, like business cycles etc. when filtering. This method is valid for both stationary and non-stationary time series.

**License** GPL-3

**Encoding** UTF-8

**URL** <https://github.com/cadam00/corbouli>,  
<https://cadam00.github.io/corbouli/>

**BugReports** <https://github.com/cadam00/corbouli/issues>

**LazyData** true

**Imports** stats

**Suggests** Rfast, Rfast2, knitr, rmarkdown, testthat (>= 3.0.0)

**VignetteBuilder** knitr, rmarkdown

**Config/testthat/edition** 3

**NeedsCompilation** no

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**Repository** CRAN

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|                 |                        |
|-----------------|------------------------|
| corbae_ouliaris | <i>Corbae-Ouliaris</i> |
|-----------------|------------------------|

Description

Corbae-Ouliaris (2006) Frequency Domain Filter

Usage

corbae\_ouliaris(x, low\_freq = NULL, high\_freq = NULL)

Arguments

|           |   |
|-----------|---|
| x         | Vector, data.frame, matrix or any similar 1D/2D object containing values for filtering.   |
| low_freq  | Number indicating the lowest period of oscillation as fractions of $\pi$ . If low_freq > 1, indicating that the direct frequency of the data is provided, this is transformed internally into 2 / high_freq. The default is NULL, meaning that the ifelse(freq > 1, trunc(freq * 1.5), 2) will be used. |
| high_freq | Number indicating the highest period of oscillation as radians of $\pi$ . If high_freq > 1, indicating that the direct frequency of the data is provided, this is transformed internally into 2 / low_freq. The default is NULL, meaning that the trunc(freq * 8) will be used.                         |

Details

This is a pure R implementation of the filtering algorithm. low\_freq and high\_freq are connected with characteristics of the series, for example the business cycle. low\_freq and high\_freq must be both either between 0 and 1, meaning that they are frequencies of the period as radians, or both >1, indicating that both are starting and ending periods of the cycle.

low\_freq and high\_freq are used for keeping the relevant frequencies. These are meant to be the ones inside the range [low\_freq, high\_freq]. Therefore, values outside this range are removed.

For 2-dimensional objects x, filtering per column is applied.

Value

Filtered object with the same length/dimensions and class as the input x.

References

Corbae, D., Ouliaris, S., & Phillips, P. (2002), Band Spectral Regression with Trending-Data. *Econometrica* **70**(3), pp. 1067-1109.

Corbae, D. & Ouliaris, S. (2006), Extracting Cycles from Nonstationary Data, in Corbae D., Durlauf S.N., & Hansen B.E. (eds.). *Econometric Theory and Practice: Frontiers of Analysis and Applied Research*. Cambridge: Cambridge University Press, pp. 167–177. doi:10.1017/CBO9781139164863.008.

Shaw, E.S. (1947), Burns and Mitchell on Business Cycles. *Journal of Political Economy*, **55**(4): pp. 281-298. doi:10.1086/256533.

See Also

[dftse](#)

Examples

```
# Apply on ts
data(USgdp)
res <- corbae_ouliaris(USgdp, low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on vector
data(USgdp)
res <- corbae_ouliaris(USgdp, low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on matrix per column
mat <- matrix(USgdp, ncol = 4)
res <- corbae_ouliaris(mat, low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on data.frame per column
dfmat <- as.data.frame(mat)
res <- corbae_ouliaris(dfmat, low_freq = 0.0625, high_freq = 0.3333)
head(res)
```

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|       |                                      |
|-------|--------------------------------------|
| dftse | <i>Remove irrelevant frequencies</i> |
|-------|--------------------------------------|

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Description

Remove irrelevant frequencies

Usage

```
dftse(x, low_freq = NULL, high_freq = NULL)
```

Arguments

|           |   |
|-----------|---|
| x         | Vector, data.frame, matrix or any similar 1D/2D object containing values for filtering.   |
| low_freq  | Number indicating the lowest period of oscillation as fractions of $\pi$ . If low_freq > 1, indicating that the direct frequency of the data is provided, this is transformed internally into 2 / high_freq. The default is NULL, meaning that the ifelse(freq > 1, trunc(freq * 1.5), 2) will be used. |
| high_freq | Number indicating the highest period of oscillation as radians of $\pi$ . If high_freq > 1, indicating that the direct frequency of the data is provided, this is transformed internally into 2 / low_freq. The default is NULL, meaning that the trunc(freq * 8) will be used.                         |

## Details

This is a pure R implementation of removing the irrelevant frequencies. First, DFT is applied on the data and this result is filtered according to `low_freq` and `high_freq`. Finally, an inverse DFT is performed on these relevant frequencies. Both `low_freq` and `high_freq` must be either between 0 and 1, meaning that they are frequencies of the period as radians, or both  $>1$ , indicating that both are starting and ending periods of the cycle.

`low_freq` and `high_freq` are used for keeping the relevant frequencies. These are meant to be the ones inside the range  $[low\_freq, high\_freq]$ . Therefore, values outside this range are removed.

For 2-dimensional objects `x`, this transformation is applied per column.

## Value

Filtered object with length/dimensions same with the input `x`. Note that for inputs with dimensions (e.g. `matrix`, `data.frame`) a `matrix` object will be returned.

## References

- Corbae, D., Ouliaris, S., & Phillips, P. (2002), Band Spectral Regression with Trending-Data. *Econometrica* **70**(3), pp. 1067-1109.
- Corbae, D. & Ouliaris, S. (2006), Extracting Cycles from Nonstationary Data, in Corbae D., Durlauf S.N., & Hansen B.E. (eds.). *Econometric Theory and Practice: Frontiers of Analysis and Applied Research*. Cambridge: Cambridge University Press, pp. 167–177. doi:10.1017/CBO9781139164863.008.
- Shaw, E.S. (1947), Burns and Mitchell on Business Cycles. *Journal of Political Economy*, **55**(4): pp. 281-298. doi:10.1086/256533.

## See Also

[corbae\\_ouliaris](#)

## Examples

```
# Apply on ts object
data(USgdp)
res <- dftse(USgdp, low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on vector
res <- dftse(c(USgdp), low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on matrix per column
mat <- matrix(USgdp, ncol = 4)
res <- dftse(mat, low_freq = 0.0625, high_freq = 0.3333)
head(res)

# Apply on data.frame per column
dfmat <- as.data.frame(mat)
res <- dftse(dfmat, low_freq = 0.0625, high_freq = 0.3333)
head(res)
```

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USgdp

*USgdp*

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**Description**

Quarterly US GDP in billions of chained 2017 dollars (Seasonally adjusted) series from 1947.1 to 2019.4.

*number of observations* : 292

*observation* : country

*country* : United States

**Usage**

```
data(USgdp)
```

**Format**

A monthly time series, in billions of chained 2017 dollars.

**Value**

A ts object.

**Source**

Bureau of Economic Analysis.

**References**

U.S. Bureau of Economic Analysis. (2024). Current-dollar and “real” GDP. Retrieved from BEA website. <https://www.bea.gov/>

**Examples**

```
# Apply on vector  
data(USgdp)  
USgdp
```

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