Package: spectr (via r-universe)

August 22, 2024

Type Package

Title Calculate the Periodogram of a Time-Course

Version 1.0.2

Description Provides a consistent interface to use various methods to calculate the periodogram and estimate the period of a rhythmic time-course. Methods include Lomb-Scargle, fast Fourier transform, and three versions of the chi-square periodogram. See Tackenberg and Hughey (2021) <doi:10.1371/journal.pcbi.1008567>.

URL https://spectr.hugheylab.org, https://github.com/hugheylab/spectr

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Encoding UTF-8

LazyData true

RoxygenNote 7.1.2

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Depends R (>= 3.6)

Imports data.table (>= 1.12.2), foreach (>= 1.5.0), lomb (>= 2.0)

Suggests doParallel (>= 1.0.15), knitr, qs (>= 0.24.1), rmarkdown, testthat (>= 3.0.3)

Config/testthat/edition 3

Repository https://hugheylab.r-universe.dev

RemoteUrl https://github.com/hugheylab/spectr

RemoteRef HEAD

RemoteSha 95d808932acd2741b8ae4e0c2bcb81d4ea5e4e42

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cspgram *Calculate periodogram*

Description

Calculate periodogram for a time-course using Lomb-Scargle, fast Fourier transform, or selected version of chi-square. The `spectr` function is a wrapper for the various methods. `lspgram` is in turn a wrapper for `lomb::lsp()`, and `fftpgram` a wrapper for `stats::spec.pgram()`. Among the versions of chi-square, it is highly recommended to use greedy, which has lower bias than standard and lower variance than conservative.

Usage

```
cspgram(
  x,
  deltat,
  periodRange = c(18, 32),
  method = c("greedy", "conservative", "standard"),
  na.action = stats::na.fail,
  dopar = FALSE
)

fftpgram(
  x,
  deltat,
  periodRange = c(18, 32),
  pad = 50,
  na.action = stats::na.fail,
  ...
)

lspgram(x, deltat, time, periodRange = c(18, 32), ofac = 50)

spectr(
  x,
  deltat,
  time,
  periodRange = c(18, 32),
 method = c("greedy_chisq", "conservative_chisq", "standard_chisq", "lombscargle",
    "fft"),
  ofac = 50,
  pad = 50,
  na.action = stats::na.fail,
  dopar = FALSE,
  ...
)
```

Arguments

x	Numeric vector of measurements.
deltat	Numeric value of the interval between time-points.
periodRange	Numeric vector of the minimum and maximum values of the period to consider, in the same units as deltat or time.
method	Character indicating which method to use. Can be an unambiguous substring of the full name.
na.action	Function specifying how to handle NA values in x. Default is stats::na.fail(), which gives an error if any values are missing. Ignored for Lomb-Scargle.
dopar	Logical indicating whether to run calculations in parallel if a parallel backend is already set up, e.g., using doParallel::registerDoParallel(). Only used for chi-square.
pad	Numeric value of the proportion of the length of x by which to pad x with zeros. Must be > 0. Only used for FFT.
...	Other arguments passed to stats::spec.pgram() for FFT.
time	Numeric vector of time-points. Can be specified instead of deltat for Lomb-Scargle.
ofac	Integer value of the oversampling factor. Must be >= 1. Only used for Lomb-Scargle.

Value

A data.table with various columns depending on the method. For any version of chi-square, columns will be period, chisq, df, and log_pval. The log p-value is more reliable than the p-value, since R has finite precision, so p-values less than about 5e-324 would be set to 0. For Lomb-Scargle and FFT, columns will be period and power.

Examples

```
library('data.table')

set.seed(1789)
deltat = 0.1
tau = 25
tt = seq(0, 24 * 3, deltat)
x = 3 * sin(tt / tau * 2 * pi) + rnorm(length(tt))

specCsp = spectr(x, deltat, method = 'greedy')
peakCsp = specCsp[which.min(log_pval)]

specLsp = spectr(x, deltat, method = 'lomb')
peakLsp = specLsp[which.max(power)]

specFft = spectr(x, deltat, method = 'fft')
peakFft = specFft[which.max(power)]
```

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