

Package ‘nparACT’

December 16, 2025

Title Non-Parametric Measures of Actigraphy Data

Version 0.9.1

Description Computes interdaily stability (IS), intradaily variability (IV) & the relative amplitude (RA) from actigraphy data as described in Blume et al. (2016) <[doi:10.1016/j.mex.2016.05.006](https://doi.org/10.1016/j.mex.2016.05.006)> and van Someren et al. (1999) <[doi:10.3109/07420529908](https://doi.org/10.3109/07420529908)> Additionally, it also computes L5 (i.e. the 5 hours with lowest average actigraphy amplitude) and M10 (the 10 hours with highest average amplitude) as well as the respective start times. The flex versions will also compute the L-value for a user-defined number of minutes. IS describes the strength of coupling of a rhythm to supposedly stable zeitgebers. It varies between 0 (Gaussian Noise) and 1 for perfect IS. IV describes the fragmentation of a rhythm, i.e. the frequency and extent of transitions between rest and activity. It is near 0 for a perfect sine wave, about 2 for Gaussian noise and may be even higher when a definite ultradian period of about 2 hrs is present. RA is the relative amplitude of a rhythm. Note that to obtain reliable results, actigraphy data should cover a reasonable number of days.

License GPL-3

Imports ggplot2, grid, stringr, zoo, tools

Language en-GB

LazyData true

RoxygenNote 7.3.2

Encoding UTF-8

Depends R (>= 3.5)

Suggests knitr, rmarkdown, roxygen2

VignetteBuilder knitr

NeedsCompilation no

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nparACT	<i>nparACT: Non-parametric analysis of actigraphy data</i>
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Description

Tools for computing classic non-parametric actigraphy measures, including interdaily stability (IS), intradaily variability (IV), relative amplitude (RA), as well as the L5 and M10 values and their respective start times.

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nparACT_base	<i>Compute classic non-parametric actigraphy measures</i>
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Description

Computes the classic non-parametric actigraphy measures interdaily stability (IS), intradaily variability (IV), relative amplitude (RA), as well as the L5 and M10 values and their respective start times, for a single actigraphy file.

Usage

nparACT_base(name, SR, cutoff = 1, plot = T, fulldays = T)

Arguments

name	Character string giving the name of the object in the workspace that contains the actigraphy data.
SR	Numeric. Sampling rate in Hertz (samples per second).
cutoff	Numeric. Activity threshold used to classify movement. Defaults to 1.
plot	Logical. If TRUE, diagnostic plots of the hourly and minute-wise activity profiles are generated. Defaults to TRUE.
fulldays	Logical. If TRUE, data are truncated to include only complete 24-hour periods. Defaults to TRUE.

Details

The function expects the actigraphy data to be available in the workspace under the name provided via name. Data are internally pre-processed, optionally restricted to complete 24-hour periods, and analysed using standard non-parametric actigraphy algorithms.

The input data may contain either two columns (time, activity) or three columns (date, time, activity). Time variables are internally converted to POSIXct. Missing values in the activity signal are not permitted.

The computation of IS and IV is based on hourly averaged activity data. Relative amplitude (RA) is derived from the difference between the most active 10-hour period (M10) and the least active 5-hour period (L5).

Value

A data frame with one row and the following columns:

IS Interdaily stability

IV Intradaily variability

RA Relative amplitude

L5 Mean activity during the least active 5-hour period

L5_starttime Start time of the L5 period

M10 Mean activity during the most active 10-hour period

M10_starttime Start time of the M10 period

nparACT_base_loop	<i>Compute classic non-parametric actigraphy measures for multiple files</i>
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Description

Computes the classic non-parametric actigraphy measures: interdaily stability (IS), intradaily variability (IV), relative amplitude (RA), as well as the L5 and M10 values and their respective start times for all actigraphy files in a specified folder.

Usage

```
nparACT_base_loop(path, SR, cutoff = 1, plot = TRUE, fulldays = TRUE)
```

Arguments

path	Character string. Path to the folder containing actigraphy files.
SR	Numeric. Sampling rate in Hertz (samples per second).
cutoff	Numeric. Activity threshold used to classify movement. Defaults to 1.
plot	Logical. If TRUE, generates diagnostic plots of the hourly grand-average activity profiles. Defaults to TRUE.
fulldays	Logical. If TRUE, data are truncated to include only complete 24-hour periods. Defaults to TRUE.

Details

Each file is expected to contain either two columns (time, activity) or three columns (date, time, activity). Time variables are internally converted to POSIXct. Missing values in the activity signal are not permitted.

Each file should contain either two columns (time, activity) or three columns (date, time, activity). Time variables are converted to POSIXct. Missing activity values are not allowed. The function filters activity, computes minute/hourly averages, calculates IS/IV/RA, and optionally plots grand-average activity profiles.

Value

A data frame with one row per file and the following columns:

IS Interdaily stability

IV Intradaily variability

RA Relative amplitude

L5 Mean activity during the least active 5-hour period

L5_starttime Start time of the L5 period

M10 Mean activity during the most active 10-hour period

M10_starttime Start time of the M10 period

nparACT_flex	<i>Compute non-parametric actigraphy measures with a flexible low-activity window</i>
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Description

Computes the classic non-parametric actigraphy measures interdaily stability (IS), intradaily variability (IV), and relative amplitude (RA), as well as the L5 and M10 values and their respective start times. In addition, the function computes a flexible low-activity period (Lflex) of user-defined duration and its start time for a single actigraphy file.

Usage

```
nparACT_flex(name, SR, cutoff = 1, minutes, plot = T, fulldays = T)
```

Arguments

name	Character string giving the name of the object in the workspace that contains the actigraphy data.
SR	Numeric. Sampling rate in Hertz (samples per second).
cutoff	Numeric. Activity threshold used to classify movement. Defaults to 1.
minutes	Numeric. Length of the flexible low-activity window (Lflex) in minutes.
plot	Logical. If TRUE, diagnostic plots of the hourly and minute-wise activity profiles are generated. Defaults to TRUE.
fulldays	Logical. If TRUE, data are truncated to include only complete 24-hour periods. Defaults to TRUE.

Details

The function expects the actigraphy data to be available in the workspace under the name provided via name. Data are internally pre-processed, optionally restricted to complete 24-hour periods, and analysed using standard non-parametric actigraphy algorithms.

The input data may contain either two columns (time, activity) or three columns (date, time, activity). Time variables are internally converted to POSIXct. Missing values in the activity signal are not permitted.

Interdaily stability (IS) and intradaily variability (IV) are computed from hourly averaged activity data. Relative amplitude (RA) is derived from the difference between the most active 10-hour period (M10) and the least active 5-hour period (L5). The flexible low-activity measure (Lflex) represents the least active contiguous period of the duration specified by minutes.

Value

A data frame with one row and the following columns:

IS Interdaily stability

IV Intradaily variability

RA Relative amplitude

L5 Mean activity during the least active 5-hour period

L5_starttime Start time of the L5 period

M10 Mean activity during the most active 10-hour period

M10_starttime Start time of the M10 period

Lflex Mean activity during the least active flexible period

Lflex_starttime Start time of the Lflex period

nparACT_flex_loop	<i>Compute non-parametric actigraphy measures with a flexible low-activity window for multiple files</i>
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Description

Computes the classic non-parametric actigraphy measures interdaily stability (IS), intradaily variability (IV), and relative amplitude (RA), as well as the L5 and M10 values and their respective start times. In addition, the function computes a flexible low-activity period (Lflex) of user-defined duration and its start time, looping over all actigraphy files contained in a specified directory.

Usage

```
nparACT_flex_loop(path, SR, cutoff = 1, minutes, plot = T, fulldays = T)
```

Arguments

<code>path</code>	Character string specifying the path to a directory containing the actigraphy files to be analysed.
<code>SR</code>	Numeric. Sampling rate in Hertz (samples per second).
<code>cutoff</code>	Numeric. Activity threshold used to classify movement. Defaults to 1.
<code>minutes</code>	Numeric. Length of the flexible low-activity window (<code>Lflex</code>) in minutes.
<code>plot</code>	Logical. If TRUE, group-level diagnostic plots of hourly activity profiles are generated. Defaults to TRUE.
<code>fulldays</code>	Logical. If TRUE, data are truncated to include only complete 24-hour periods. Defaults to TRUE.

Details

Each file in the directory is processed independently using the same parameters. Results are returned as one row per file.

Files in `path` are expected to be plain text or CSV files with either two columns (time, activity) or three columns (date, time, activity). Time variables are internally converted to POSIXct. Missing values in the activity signal are not permitted.

Interdaily stability (IS) and intradaily variability (IV) are computed from hourly averaged activity data. Relative amplitude (RA) is derived from the difference between the most active 10-hour period (M10) and the least active 5-hour period (L5). The flexible low-activity measure (`Lflex`) represents the least active contiguous period of the duration specified by `minutes`.

If `plot = TRUE`, an aggregated (grand average) hourly activity profile across all files is generated.

Value

A data frame with one row per processed file and the following columns:

IS Interdaily stability

IV Intradaily variability

RA Relative amplitude

L5 Mean activity during the least active 5-hour period

L5_starttime Start time of the L5 period

M10 Mean activity during the most active 10-hour period

M10_starttime Start time of the M10 period

Lflex Mean activity during the least active flexible period

Lflex_starttime Start time of the Lflex period

sleepstudy*Actigraphy results from a participant.*

Description

A dataset containing actimetry results for one participant. Data points have been collected every 15 sec and span approx. 3.5 days. The variables are as follows:

Usage

sleepstudy

Format

A txt file with 20000 rows and 2 variables:

Type Time stamp

Description Gives the activity measured with actigraphy (arbitrary number)

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