Package 'sleepr'

November 15, 2017

Title Analyse Activity and Sleep Behaviour

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Version 0.0.0.9000

Description Use behavioural variables to score activity and infer sleep from bouts of immobility.

Depends R (>= 3.00),
    behavr

Imports data.table

Suggests testthat,
    covr,
    knitr

License GPL-3

Encoding UTF-8

LazyData true

URL https://github.com/rethomics/sleepr

BugReports https://github.com/rethomics/sleepr/issues

RoxygenNote 6.0.1

Roxygen list(markdown = TRUE)

R topics documented:

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bout_analysis *Find "bouts" in categorical time series*

Description

This function is used to find contiguous regions of unique value in a – potentially irregular/heterogeneous – univariate categorical time series.

Usage

```
bout_analysis(var, data)
```

Arguments

var   name of the variable to use from data

data   [data.table](#) containing behavioural variable from or one multiple animals. When it has a key, unique values, are assumed to represent unique inviduals (e.g. in a [behavr](#) table). Otherwise, it analysis the data as comming from a single animal. data must have a column t representing time.

Value

an object of the same type as data (i.e. [data.table::data.table](#) or [behavr::behavr](#)). Each row is a specific bout characterised by three columns.

- t – its *onset*
- duration – its length
- <var> – a column with the same name as var. The value of var for this bout.

See Also

todo

Examples

```
#TODO
```

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motion_detectors   *Motion detector for Ethocope data*

Description

Defines whether a *single animal* is moving according to:

Usage

```
max_velocity_detector(data, time_window_length,
  velocity_correction_coef = 0.003, masking_duration = 6)

max_velocity_detector_legacy(data, velocity_threshold = 0.006)

virtual_beam_cross_detector(data, time_window_length)
```

Arguments

data   [data.table::data.table](#) containing behavioural variables of *a single animal* (no id).
                    It must have the columns xy_dist_log10x1000(for computing subpixel veloc-
                    ity), x(beam cross), t and has_interacted (whether a stimulus was delivered).

time_window_length

                    number of seconds to be used by the motion classifier. This corresponds to the
                    sampling period of the output data.

velocity_correction_coef

                    an empirical coefficient to correct velocity with respect to variable framerate.

masking_duration

                    number of second during which any movement is ignored (velocity is set to 0)
                    after a stimulus is delivered (aka interaction).

velocity_threshold

                    uncorrected velocity above which an animal is classified as 'moving' (for the
                    legacy version).

Details

- Validated and corrected subpixel velocity ([max_velocity_detector](#)), the most rigorous

- Uncorrected subpixel velocity ([max_velocity_detector_legacy](#))

- Crossing a virtual beam in the middle of the region of interest ([virtual_beam_cross_detector](#))

[max_velocity_detector](#) is the default movement classification for real-time ethoscope experiments.
It is benchmarked against human-generated ground truth.

These functions are *rarely called directly*, but typically used is in the context of [sleep_annotation](#).

Value

an object of the same type as data (i.e. data.table::data.table or behavr::behavr) with additional
columns:

- moving Logical, TRUE iff. motion was detected.
- beam_crosses The number of beam crosses (when the animal crosses x = 0.5 – that is the
  midpoint of the region of interest) within the time window
- max_velocity The maximal velocity within the time window. The resulting data is sampled
  at a period equals to time_window_length.

See Also

TODO

- sleep_annotation – which requieres a motion detector

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sleep_annotation   *Score sleep behaviour from immobility*

Description

This function first uses a motion classifier to decide whether an animal is moving during a given
time window. Then, it defines sleep as contiguous immobility for a minimal duration.

Usage

```
sleep_annotation(data, time_window_length = 10, min_time_immobile = 300,
  motion_detector_FUN = max_velocity_detector, ...)

sleep_dam_annotation(data, time_window_length = 60, min_time_immobile = 300)
```

Arguments

data   data.table containing behavioural variable from or one multiple animals. When
                   it has a key, unique values, are assumed to represent unique inviduals (e.g. in a
                   behavr table). Otherwise, it analysis the data as comming from a single animal.
                   data must have a column t representing time.

time_window_length
                   number of seconds to be used by the motion classifier. This corresponds to the
                   sampling period of the output data.

min_time_immobile
                   Minimal duration (in s) of a sleep bout. Immobility bouts longer or equal to this
                   value are considered as sleep.

motion_detector_FUN
                   function used to classify movement

...   extra arguments to be passed to motion_classifier_FUN.

Details

The default `time_window_length` is 300 seconds also known as the "5 minute rule". `sleep_annotation` is typically used for ethoscope data, whilst `sleep_dam_annotation` only works on DAM2 data. These functions are *rarely used directly*, but rather passed as an argument to a data loading function, so that analysis can be performed on the go.

Value

a behavr table similar to `data` with additional variables/annotations (i.e. `moving` and `asleep`). The resulting data will only have one data point every `time_window_length` seconds.

See Also

- motion_detectors – options for the `motion_detector_FUN` argument
- bout_analysis – to further analyse sleep bouts in terms of onset and length

Examples

```
#todo
```

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