Package 'sleepr'

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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:

`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
```

`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 velocity), `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

`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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