

# Package ‘sleepr’

September 19, 2017

**Title** Analyse Activity and Sleep Behaviour

**Date** 2017-08-17

**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 . . . . .	2
motion_detectors . . . . .	3
sleep_annotation . . . . .	4
<b>Index</b>	<b>6</b>

---

bout_analysis	<i>Find "bouts" in categorical time series</i>
---------------	--

---

## 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	<a href="#">data.table</a> containing behavioural variable from or one multiple animals. When it has a key, unique values, are assumed to represent unique individuals (e.g. in a <a href="#">behavr</a> table). Otherwise, it analysis the data as coming 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	<i>Motion detector for Ethoscope data</i>
------------------	---

---

## 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	<a href="#">data.table::data.table</a> containing behavioural variables of <i>a single animal</i> (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 requires a motion detector

---

sleep_annotation	<i>Score sleep behaviour from immobility</i>
------------------	--

---

**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**

<code>data</code>	<code>data.table</code> containing behavioural variable from or one multiple animals. When it has a key, unique values, are assumed to represent unique individuals (e.g. in a <code>behavr</code> table). Otherwise, it analysis the data as coming from a single animal. data must have a column <code>t</code> representing time.
<code>time_window_length</code>	number of seconds to be used by the motion classifier. This corresponds to the sampling period of the output data.
<code>min_time_immobile</code>	Minimal duration (in s) of a sleep bout. Immobility bouts longer or equal to this value are considered as sleep.
<code>motion_detector_FUN</code>	function used to classify movement
<code>...</code>	extra arguments to be passed to <code>motion_classifier_FUN</code> .

**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
```

# Index

behavr, [2](#), [4](#), [5](#)  
behavr::behavr, [2](#), [4](#)  
bout\_analysis, [2](#), [5](#)  
  
data.table, [2](#), [4](#)  
data.table::data.table, [2-4](#)  
  
max\_velocity\_detector, [3](#)  
max\_velocity\_detector  
    (motion\_detectors), [3](#)  
max\_velocity\_detector\_legacy, [3](#)  
max\_velocity\_detector\_legacy  
    (motion\_detectors), [3](#)  
motion\_detectors, [3](#), [5](#)  
  
sleep\_annotation, [3](#), [4](#), [4](#)  
sleep\_dam\_annotation  
    (sleep\_annotation), [4](#)  
  
virtual\_beam\_cross\_detector, [3](#)  
virtual\_beam\_cross\_detector  
    (motion\_detectors), [3](#)