

Package ‘typical.sleep’

May 24, 2024

Type Package

Title Finds the typical sleep period for Fitbit sleep data

Version 0.1.0

Author Jeffrey Annis

Maintainer Jeffrey Annis <jeffrey.s.annis@vumc.org>

Description Finds the typical sleep period in three steps:

1. Finds relevant sleep logs are those that fall within +/-8 hours of the midsleep point.
2. Determines the median bedtime and waketime from the relevant logs.
3. Labels each sleep log as either part of the typical sleep period or not by filtering out those that are outside of the bedtime/waketime interval.

License GPL-3

Encoding UTF-8

LazyData true

RoxygenNote 7.3.1

Imports data.table,
lubridate,
jsonlite,
hms

R topics documented:

compute_sleep_metrics	1
parse_fitbit_json	3
typical_sleep	3

compute_sleep_metrics	<i>Compute sleep metrics. All metrics are computed for each person_id and date.</i>
-----------------------	-------------------------------------------------------------------------------------

Description

Compute sleep metrics. All metrics are computed for each person_id and date.

Usage

```
compute_sleep_metrics(sleep_data, date_col)
```

Arguments

sleep_data	sleep-levels dataset containing the following columns: person_id, date, start_time, level, duration, and is_main_sleep.
date_col	name of date column

Value

A dataframe with the following columns:

sleep_onset	The start datetime of the first sleep segment, where sleep segment levels are not wake, awake, or restless.
sleep_offset	The end datetime of the last sleep segment, where sleep segment levels are not wake, awake, or restless. The end datetime is computed by adding sleep duration to start_datetime.
sleep_duration	Duration of sleep in minutes. $(\text{sleep offset} - \text{sleep onset}) / 60$
midsleep_point	Midpoint between sleep_onset and sleep_offset. $(\text{sleep onset} + \text{sleep offset}) / 2$
total_sleep_time	Sum of all sleep segment durations, where level is not awake, wake, or restless.
rem_duration	Sum of all sleep segment durations, where level is rem.
deep_duration	Sum of all sleep segment durations, where level is deep.
light_duration	Sum of all sleep segment durations, where level is light.
pct_rem	Percentage of rem sleep duration. Denominator is the sum of all sleep segment durations whose level is not awake, wake, or restless. If no rem levels exist, then pct_rem is NA.
pct_deep	Percentage of deep sleep duration. Denominator is the sum of all sleep segment durations whose level is not awake, wake, or restless. If no deep levels exist, then pct_deep is NA.
pct_light	Percentage of light sleep duration. Denominator is the sum of all sleep segment durations whose level is not awake, wake, or restless. If no light levels exist, then pct_light is NA.
pct_asleep	Percentage of asleep sleep levels. Denominator is the sum of all sleep segment durations whose level is not awake, wake, or restless. If no asleep levels exist, then pct_asleep is NA.
awake_duration	Total duration of all sleep segments whose level is awake.
wake_duration	Total duration of all sleep segments whose level is wake.
restless_duration	Total duration of all sleep segments whose level is restless.
pct_restless	Percentage of restless sleep levels. Denominator is the sum of all sleep segment durations.
pct_awake	Percentage of awake sleep levels. Denominator is the sum of all sleep segment durations.
pct_wake	Percentage of wake sleep levels. Denominator is the sum of all sleep segment durations.
bedtime	start_datetime of first sleep segment.
waketime	The end datetime of the final sleep segment.
time_in_bed	Time in bed in minutes. $(\text{bedtime} - \text{waketime}) / 60$.

num_awakenings Number of contiguous sleep segments indicating an awakening. Segments of differing levels will be combined to form a single contiguous sleep segment given the level is one of awake, wake, or restless.

num_long_awakenings Number of wake levels \geq 30 minutes.

longest_wake_duration Longest wake duration in minutes.

wake_after_sleep_onset Duration in minutes of contiguous segments of awake, wake, and/or restless following at least one segment of sleep.

wake_to_end_of_log_latency Duration in minutes of last awake, wake, or restless segment.

Examples

```
## Not run:
# If parsing from JSON format
dat <- parse_fitbit_json("sleep_data.json")
metrics <- compute_sleep_metrics(dat)

## End(Not run)
```

parse_fitbit_json	<i>Parses the JSON object returned from the Fitbit API</i>
-------------------	------------------------------------------------------------

Description

Parses the JSON object returned from the Fitbit API

Usage

```
parse_fitbit_json(input_file, person_id = 1)
```

Arguments

input_file	the Fitbit JSON object
person_id	optional person ID. Default is 1.

typical_sleep	<i>Typical sleep period</i>
---------------	-----------------------------

Description

The typical sleep period is computed in three steps: 1. Finds relevant sleep logs are those that fall within ± 8 hours of the midsleep point. 2. Determines the median bedtime and waketime from the relevant logs. 3. Labels each sleep log as either part of the typical sleep period or not by filtering out those that are outside of the bedtime/waketime interval.

Usage

```
typical_sleep(sleep_data)
```

Arguments

sleep_data sleep-levels dataset containing the following columns: `person_id`, `sleep_date`, `start_datetime`, `level`, `duration_in_min`, and `is_main_sleep`. This is the default schema from the All of Us `sleep_levels` table.

Value

Returns the original data with two appended columns, `sleep_date_new` and `tsp`. `sleep_date_new` is the recomputed date of sleep based on the typical sleep period. `tsp` is TRUE if the sleep log falls within the typical sleep period. Otherwise, it is false.