Package 'typical.sleep'

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Type Package

Title Finds the typical sleep period for Fitbit sleep data

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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:

`.tsp` *Typical sleep algorithm*

Description

Typical sleep algorithm

Usage

```
.tsp(all_sleep_dat)
```

Arguments

`all_sleep_dat`	sleep-levels dataset containing the following columns: person_id, sleep_date, start_datetime, level, duration_in_min, and is_main_sleep.

`center` *Center the time over midnight*

Description

Centers on midnight such that Noon to 11:59 has negative sign.
Midnight to Noon as positive sign.
Minutes are mapped thusly:
720:1439 -¿ -720:-1
0:720 -¿ 0:720

Usage

```
center(x)
```

Arguments

`x`	integer on the interval [0,1439]

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

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. (sleep offset - sleep onset) / 60

midsleep_point Midpoint between sleep_onset and sleep_offset. (sleep onset + 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. (bedtime - waketime) / 60.

num_awakenings Number of contiguous sleep segments indcating 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 ¿= 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)
```

---

find_relevant_sleep *Find relevant sleep logs*

Description

finds relevant sleep logs by computing the median sleep point when is_main_sleep is TRUE and filtering out sleep logs that are outside of that interval.

Usage

```
find_relevant_sleep(all_sleep_dat)
```

Arguments

all_sleep_dat	sleep-levels dataset containing the following columns: person_id, date, start_time, level, duration, and is_main_sleep.

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get_naps *Function for determining nap counts and duration. Not exported.*

Description

Function for determining nap counts and duration. Not exported.

Usage

```
get_naps(all_sleep_dat, date_col)
```

Arguments

all_sleep_dat	Dataset containing sleep segments. Must contain person_id, is_main_sleep, date_col, level, and start_datetime.
date_col	name of date column

Value

dataframe with person_id, date_col, nap_count, and nap_length

---

parse_fitbit_json *Parses the JSON object returned from the Fitbit API*

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.

---

prepare_data *Prepares raw data for later processing*

Description

Prepares raw data for later processing

Usage

```
prepare_data(all_sleep_dat)
```

Arguments

all_sleep_dat	sleep-levels dataset. Only the person_id and start_time are needed, but the full dataset is usually passed in containing person_id, sleep_date, start_datetime, levels, duration_in_min, and is_main_sleep.

time_to_minute *Converts time to minute*

Description

Converts time to minute

Usage

```
time_to_minute(x)
```

Arguments

x	datetime object

typical.sleep *Typical sleep period*

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.

`uncenter` *Reverses center*

Description

Reverses center

Usage

```
uncenter(x)
```

Arguments

`x`	integer on the interval [-720,720]