

Package ‘actibase’

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Type Package

Title Baseline Functions for Actigraphy and Activity Processing and Analysis

Version 0.2.0

Description Provides baseline functions for actigraphy and activity data.
This package is intended to be extended by downstream overlays such as 'actiread', 'actimetrics', and 'stepcount'.

License GPL-3

Depends R (>= 4.1.0)

Suggests testthat, utils, covr, knitr, readr

Encoding UTF-8

LazyData true

Imports magrittr, dplyr, lubridate, hms, tidyr, janitor, assertthat, vctrs

URL <https://github.com/jhuwit/actibase>,
<https://jhuwit.github.io/actibase/>

BugReports <https://github.com/jhuwit/actibase/issues>

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acti_fill_zeros	<i>Fill in Zeros</i>
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Description

Fill in Zeros

Usage

```
acti_fill_zeros(data)
acti_fill_zeroes(data)
```

Arguments

data a data frame containing columns time, X, Y, Z

Value

the modified data frame with zeros replaced by NA

Examples

```
acti_fill_zeros(acti_raw_data)
acti_fill_zeroes(acti_raw_data)
```

acti_raw_data	<i>Example Actigraphy/Activity Raw Data</i>
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Description

Example Actigraphy/Activity Raw Data

Usage

```
acti_raw_data
```

Format

A data.frame with the columns

time time column

X X-axis column

Y Y-axis column

Z Z-axis column

acti_resample	<i>Resample 3-axial input signal to a specific sampling rate</i>
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Description

Resample 3-axial input signal to a specific sampling rate

Usage

```
acti_resample(data, sample_rate, method = "linear", ...)
```

```
acti_resample_to_time(data, times, method = "linear", ...)
```

Arguments

data	A 'data.frame' with a column for time in 'POSIXct' (usually 'time'), and 'X', 'Y', 'Z'
sample_rate	sampling frequency, coercible to an integer. This is the sampling rate you're sampling the data *into*.
method	method for interpolation. Options are "linear"/"constant", which uses 'stats::approx', or one of "fmm", "periodic", "natural", "monoH.FC", "hyman", which uses 'stats::spline'
...	additional arguments to pass to [stats::approx()] or [stats::spline]
times	a vector of 'POSIXct' date/time values to interpolate the data to

Value

A 'data.frame'/'tibble' of 'time' and 'X', 'Y', 'Z'.

Examples

```
old = options(digits.secs = 3)
x = acti_raw_data
res = acti_resample(data = x, sample_rate = 80)
res = acti_resample(data = x, sample_rate = 100)
res = acti_resample(data = x, sample_rate = 1)
res = acti_resample_to_time(
  data = x,
  times = lubridate::floor_date(x$time, unit = "1 sec"),
)
res_nat = acti_resample_to_time(
  data = x,
  times = lubridate::floor_date(x$time, unit = "1 sec"),
  method = "natural"
)
options(old)
```

acti_separate_time *Separate Times into Date, Hour, and Minute*

Description

Separate Times into Date, Hour, and Minute

Usage

```
acti_separate_time(data)
acti_separate_times(data)
acti_create_date(data)
acti_create_hour(data)
acti_create_minute(data)
```

Arguments

data a 'data.frame' with a 'time' column

Value

A 'data.frame' with date, hour, minute, and day columns

Examples

```
library(actibase)
acti_separate_time(acti_raw_data)
acti_create_date(acti_raw_data)
acti_create_hour(acti_raw_data)
acti_create_minute(acti_raw_data)
```

acti_standardize_data *Standardize the Accelerometry Data*

Description

Standardize the Accelerometry Data

Usage

```
acti_standardize_data(  
  data,  
  subset_xyz = TRUE,  
  colname_time = "time",  
  check_xyz = TRUE  
)
```

```
acti_standardise_data(  
  data,  
  subset_xyz = TRUE,  
  colname_time = "time",  
  check_xyz = TRUE  
)
```

Arguments

data	A 'data.frame' with a column for time in 'POSIXct' (usually 'time'), and 'X', 'Y', 'Z'
subset_xyz	should only the 'time' (if available) and 'XYZ' be subset?
colname_time	column name of header for time
check_xyz	Check if X/Y/Z is in the data

Value

A 'data.frame' with 'X/Y/Z' and a time in 'time' (if available).

Examples

```
acti_standardize_data(acti_raw_data)
acti_standardise_data(acti_raw_data)
```

acti_tidy_axes *Tidy axes to a long format*

Description

Tidy axes to a long format

Usage

```
acti_tidy_axes(data, colname_time = "time")
```

Arguments

data An object with columns a time column 'X', 'Y', and 'Z' or an object of class 'AccData'

colname_time column name of header for time

Value

A long data set with 'time', 'axis', and 'value'

Examples

```
long = acti_tidy_axes(acti_raw_data)
```

as_convert_safe *Convert vectors ensuring no new NA*

Description

Convert vectors ensuring no new NA

Usage

```
as_convert_safe(x, ..., func = lubridate::as_datetime)
```

```
as_date_safe(x, ...)
```

```
as_datetime_safe(x, ...)
```

Arguments

x a vector

... additional arguments to pass to 'func'

func the function to use to transform the vector 'x'

Value

A converted 'vector' the same length as 'x' or errors if there are introduced NAs.

create_day_inclusion *Create Day-Level Inclusion information*

Description

Create Day-Level Inclusion information

Usage

```
create_day_inclusion(data, min_required = 1368L)
```

```
add_day_inclusion(data, ...)
```

Arguments

data	A 'data.frame' with the columns 'time'
min_required	Number of minutes required in a day to be called 'included'
...	arguments to pass to [create_day_inclusion] when using [add_day_inclusion]

Value

A 'data.frame' for each day with information of number of minutes observed and included

Examples

```
data = acti_raw_data |>
  dplyr::mutate(r = sqrt(X^2 + Y^2 + Z^2),
              time = lubridate::floor_date(time, "1 minute")) |>
  dplyr::group_by(time) |>
  dplyr::summarise(r = sum(r), .groups = "drop") |>
  dplyr::mutate(wear = r > 4000)

res = create_day_inclusion(data)
```

`flag_qc`*Flag Quality Control Values*

Description

Flag Quality Control Values

Usage

```
flag_qc(  
  df,  
  dynamic_range = NULL,  
  verbose = TRUE,  
  flags = c("all", "spike", "interval_jump", "spike_second", "same_value",  
           "device_limit", "all_zero", "impossible")  
)
```

```
flag_qc_all(  
  df,  
  dynamic_range = NULL,  
  verbose = TRUE,  
  flags = c("all", "spike", "interval_jump", "spike_second", "same_value",  
           "device_limit", "all_zero", "impossible")  
)
```

Arguments

<code>df</code>	A data set of actigraphy
<code>dynamic_range</code>	dynamic range of the device, used to find the device limit.
<code>verbose</code>	print diagnostic messages
<code>flags</code>	the flags to run for QC. If you set this to "all", then all flags are run, as the default.

Value

A data set with a 'flags' column ('flag_qc') or a number of columns starting with 'flag_*' ('flag_qc_all')

Examples

```
res = acti_raw_data  
out = flag_qc(res)
```

 flag_spike

Flag Spikes

Description

Flag Spikes

Usage

```
flag_spike(df, spike_size = 11)
```

```
flag_interval_jump(df, verbose = FALSE)
```

```
flag_spike_second(df, spike_size = 11)
```

```
flag_device_limit(df, dynamic_range = NULL, epsilon = 0.05)
```

```
flag_contiguous_device_limit(df, dynamic_range = NULL, epsilon = 0.05)
```

```
flag_same_value(df, min_length = 1)
```

```
flag_all_zero(df, min_length = 3)
```

```
flag_impossible(df, min_length = 6)
```

Arguments

df	A data set of actigraphy
spike_size	size of "spike" - which is the absolute difference in contiguous observations on a single axis
verbose	print diagnostic messages
dynamic_range	dynamic range of the device, used to find the device limit.
epsilon	A small adjustment so that if values are within the device limit, but minus epsilon, still flagged as hitting the limit. For example, if 'dynamic_range = c(-6, 6)' and 'epsilon = 0.05', then any value <= '-5.95' or '>= 5.95' gravity units will be flagged
min_length	minimum length of the condition for contiguous samples. If 'min_length = 3', then at least 3 'TRUE's in a row is required, any stretches of single 'TRUE' values or 2 'TRUE' followed by 'FALSE', will be set to 'FALSE'.

Value

A data set back

Note

'flag_spike' looks if 2 contiguous values, within each axis, are larger than a absolute size ('11' gravity units). The 'flag_spike_second' function groups the data by second, finds the range of values, within each axis, and determines if this range is greater than a specified size ('11' g).

Source

https://wwwn.cdc.gov/Nchs/Nhanes/2011-2012/PAXMIN_G.htm

Examples

```
res = acti_raw_data
res = flag_spike(res)
res = flag_interval_jump(res)
res = flag_spike_second(res)
res = flag_same_value(res)
res = flag_device_limit(res)
res = flag_all_zero(res)
res = flag_impossible(res)
```

get_dynamic_range	<i>Get Dynamic Range</i>
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Description

Get Dynamic Range

Usage

```
get_dynamic_range(data, dynamic_range = NULL)
```

Arguments

data	An AccData object from an actigraphy reader
dynamic_range	the dynamic range. If this is not NULL, then it will be guess from the header or the data

Value

A length-2 numeric vector, or the original dynamic range (no checking done)

get_sample_rate	<i>Get Sample Rate</i>
-----------------	------------------------

Description

Get Sample Rate

Usage

```
get_sample_rate(data, sample_rate = NULL)
```

Arguments

data	A data set of actigraphy/activity data
sample_rate	the sample rate. If this is not NULL, then it will be guess from the header or the data or the data separation

Value

A length-1 numeric vector

get_transformations	<i>Get Transformations</i>
---------------------	----------------------------

Description

Get Transformations

Usage

```
get_transformations(data)
prefix_transformations(transformations, prefix = NULL)
set_transformations(data, transformations, add = TRUE, prefix = NULL)
```

Arguments

data	data set of data, usually time and X/Y/Z.
transformations	character string of transformations
prefix	if not 'NULL', the prefix plus ':' would be pasted to the transformations.
add	Add the transformations to those already there in 'data'

Value

`set_transformations` returns the data, with the ‘transformations’ attribute updated and `set_transformations` returns the attribute ‘transformations’

<code>is.AccData</code>	<i>Is the object of class ‘AccData’</i>
-------------------------	---

Description

Is the object of class ‘AccData’

Usage

```
is.AccData(x)
```

Arguments

`x` object to test

Value

Logical(1)

Examples

```
is.AccData(mtcars)
```

<code>mark_condition</code>	<i>Mark a Condition of a Specified Minimum Length</i>
-----------------------------	---

Description

Mark a Condition of a Specified Minimum Length

Usage

```
mark_condition(x, min_length = 1)
```

Arguments

`x` A logical vector
`min_length` minimum length, contiguous TRUE values required

Value

A logical vector

Examples

```
x = c(FALSE, TRUE, TRUE, FALSE, FALSE, rep(TRUE, 10), FALSE, rep(TRUE, 20))
mark_condition(x)
mark_condition(x, 2)
mark_condition(x, 5)
mark_condition(x, 15)
```

strip_hour_shift	<i>Strip Hour Shift from Character Time Vector</i>
------------------	--

Description

Strip Hour Shift from Character Time Vector

Usage

```
strip_hour_shift(x, max_index = 2L)
```

Arguments

x	character vector with times that may include hour shifts (e.g., "2019-01-01 12:00+03:00")
max_index	maximum index to grab the shift from after splitting on spaces, default is 2 (e.g., "2019-01-01 12:00")

Value

A character vector with the '+'/'-' hour shift removed

Examples

```
strip_hour_shift(c("2019-01-01 12:00+03:00", "2019-01-01 12:00-04:00"))
```

xyz	<i>Vector of X, Y, Z, and maybe time</i>
-----	--

Description

Vector of X, Y, Z, and maybe time

Usage

```
xyz
xyzt
txyz
```

Format

A vector with 3 or 4 elements, which are:

X value to extract X column

Y value to extract Y column

Z value to extract Y column

time value to extract time column

An object of class character of length 4.

An object of class character of length 4.

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