Package ‘PASenseWear’

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Title Summarize Daily Physical Activity from 'SenseWear' Accelerometer Data
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Depends R (>= 3.2.5), ggplot2
Description Provide summary table of daily physical activity and per-person/grouped heat map for accelerometer data from SenseWear Armband. See <https://templehealthcare.wordpress.com/the-sensewear-armband/> for more information about SenseWear Armband.
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Simulated Sample Demographic Data

Description
Demographic data for 4 random participants is provided.

Usage
data(demography)

Format
A data frame with 4 rows and 3 columns

Details
The variables are as follows:
- ID The ID of the participant
- Age The age of the participant
- Gender The gender of the participant

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Heatmap

Description
Generate a heatmap to show different activity intensities (in MET) at different time of different days.

Usage
Heatmap(data, a, category = FALSE)

Arguments
- data A csv file for one participant with multiple days’ activity records from SenseWear. Data format refers to provided sampledata.
- a The desired cutpoints of METs. Lower and upper limits must be specified. E.g. a=c(0,3,5,7). 0 and 7 are the lower and upper limit, respectively.
- category Default is FALSE which means treating METs as continuous. category=TRUE and a valid cutpoints a will categorize METs by a. If category=TRUE while no a is specified, METs will be treated as continuous.
multipleheatmap

**Value**

graph A heatmap generated by ggplot with x axis Time and y axis Date

**Examples**

```
# Continuous METs
Heatmap(sampledata);
# Categorical METs with cutpoint 0,3,5,7
Heatmap(sampledata,c(0,3,5,7),category=TRUE)
```

**Description**

Generate heatmap to show activity intensity (in MET) of multiple participants grouped by specified factor (age, gender, etc.).

**Usage**

```
multipleheatmap(data, demography, f, category = TRUE)
```

**Arguments**

- **data**
  Combined csv file from SenseWear with multiple participants, participants are distinguished by ID. Refer to sampledata_multiple.rda for sample format.

- **demography**
  Demographic data includes the required factor(s) (e.g. age and/or gender) of the corresponding participant.

- **f**
  The factor (age, gender, etc.) user wants to group data by.

- **category**
  TRUE or FALSE for categorical factor. Default is TRUE.

**Details**

The mean of METs of available days/groups are calculated and used in the heatmap.

**Value**

Graph A heatmap generated by ggplot with x axis Time and y axis factor.
Table A table summarizes the number of records of each participant on each day.

**Examples**

```
# Continuous factor example
multipleheatmap(sampledata_multiple,demography, Age, category=FALSE)
# Categorical factor example
multipleheatmap(sampledata_multiple,demography, Gender, category=TRUE)
```
PASenseWear

Summarize Daily Physical Activity from 'SenseWear' Accelerometer Data

Description

Package PASenseWear allows you to summarize SenseWear physical activity data and to plot heat map from different perspectives.

Details

Function `sensewear_report` produces participant's daily activity report.
Function `heatmap` plots heat map for a single participant. It shows the daily activity intensity change and makes it easy to compare activity intensity across different days.
Function `multipleheatmap` gives the availability of grouping participants as user defined categories. The heat map illustrates different daily activity intensities of different groups.
Sample datasets are provided for a reference of data format:
sampledata provides one participant’s sample activity data.
sampledata_multiple provides 4 participants’ combined sample activity data. An extra column ID helps to identify different participants.
demography records the age and gender of the above 4 participants for the use of plotting group heat map. Users can provide other demographic information for the corresponding usage in function `multipleheatmap`.

sampledata

Simulated Sample SenseWear Data

Description

Five consecutive days data is provided. The variables are as follows:

- **Time** The time of the record
- **Trans_accel_peaks** Transverse accel-peaks
- **Forw_accel_peaks** Forward accel-peaks
- **Longi_accel_peaks** Longitudinal accel-peaks
- **skin_temp_aver** Skin temp-average
- **GSR_aver** GSR-average
- **Trans_accel_aver** Transverse accel-average
- **Longi_accel_aver** Longitudinal accel-average
- **Near_body_temp_aver** Near-body temp-average
- **Trans_accel_MAD** Transverse accel-MAD
• Longi_accel_MAD Longitudinal accel-MAD
• Step_counter Step Counter
• Forw_accel_aver Forward accel-average
• Forw_accel_MAD Forward accel-MAD
• Lying_down Lying down
• Sleep Sleep
• Physical_Activity Physical Activity
• EE Energy Expenditure
• Sedentary Sedentary
• Mild Mild
• Moderate Moderate
• Vigorous Vigorous
• METs Metabolic Equivalent of Task
• Speed Speed
• Distance Distance
• Activity_Class 9-Sleeping, 4-Resting, 7-Motoring, 1-Walking, 2-Running, 10-Elliptical Training, 3-Stationary Biking, 8-Road Biking, 5-Resistance
• Sleep_Class 0-Awake, 2-Light Sleep, 4-Deep Sleep, 5-Very Deep Sleep
• Heat_flux_aver Heat flux - average

Usage
data(sampledata)

Format
A data frame with 6099 rows and 28 variables

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sampledata_multiple Simulated Sample SenseWear data with 4 participants combined

Description
Simulated SenseWear physical activity data for 4 random participants including METs and Time The variables are as follows:
• Time1 The time of the recorded activity
• METs The Metabolic Equivalent of Task of the recorded activity
• ID The ID of the participant

Usage
data(sampledata_multiple)
Format

A data frame with 22818 rows and 3 columns

Generate Report for SenseWear activity data.

Description

Summarize sedentary, mild, moderate, and MVPA related activity measures.

Usage

```
Sensewear_report(data)
```

Arguments

- `data` csv file from SenseWear

Details

MVPA long bout is defined as at least 10 consecutive minutes with METs>=3 (allowing 2 min below that threshold).

Value

- `year` The calendar year of recorded event
- `month` The calendar month of recorded event
- `day` The calendar day of recorded event
- `dayofweek` The day of that week
- `time_on_body_Hrs` Total time (hours) of SenseWear on body
- `time_waking_wearing_Hrs` Total waking time (hours) during wearing time
- `time_on_body_percent` Percent of wearing time of a day
- `steps` Total steps of the day
- `time_lying_Hrs` Total lying time (hours)
- `time.sleeping_Hrs` Total sleeping time (hours)
- `time.sed_Hrs` Total sedentary time (hours)
- `TEE_Kcal` Total energy expenditure (Kcal)
- `time_waking_Sedentary_Hrs` When the wearer is waking, the total sedentary time (hours)
- `Percent_waking_sed` When the wearer is waking, the percentage of sedentary time to wearing time
- `time_waking_Mild_Hrs` When the wearer is waking, the total mild time (hours)
- `Percent_waking_mild` When the wearer is waking, the percentage of mild time to wearing time
Time_waking_Moderate_Hrs When the wearer is waking, the total moderate time (hours)
Percent_waking_moderate When the wearer is waking, the percentage of moderate time to wearing time
Time_waking_MVPA_Hrs When the wearer is waking, the total MVPA time (hours)
Percent_waking_MVPA When the wearer is waking, the percentage of MVPA time to wearing time
Time_waking_Vigorous_Hrs When the wearer is waking, the total vigorous time (hours)
Percent_waking_vigorous When the wearer is waking, the percentage of vigorous time to wearing time
No_sed_breaks Number of sedentary breaks (at least one minute interruption counting as a break)
Time_all_break_length_Hrs Summation of time (hours) of breaks
Average_EE_break_kcal Average energy expenditure of breaks
Time_below_1_METS_Hrs Total time (hours) of MET less than 1
Time_btw_1_2_METS_Hrs Total time (hours) of MET between 1 and 2
Time_btw_2_3_METS_Hrs Total time (hours) of MET between 2 and 3
Time_btw_3_4_METS_Hrs Total time (hours) of MET between 3 and 4
Time_btw_4_5_METS_Hrs Total time (hours) of MET between 4 and 5
Time_btw_5_6_METS_Hrs Total time (hours) of MET between 5 and 6
Time_above_6_METS_Hrs Total time (hours) of MET over 6
Steps_above_1_5_METS Summation of step count when energy expenditure is >1.5 METs with step counts not equal to 0
EE_steps_above_1_5METS_kcal Summation of energy expenditure for in Kcal when energy expenditure is >1.5 METs with step counts not equal to 0
Steps_above_3_METS Summation of step count when energy expenditure is >3 METs with step counts not equal to 0
EE_steps_above_3METS_kcal Summation of energy expenditure for in Kcal when energy expenditure is >3 METs with step counts not equal to 0
Time_100_steps_per_day_Hrs Summation of time (hours) for Steps>=100 per minute
PAEE_above_1_5METS_kcal Summation of energy expenditure in Kcal when energy expenditure is >1.5 METs
Time_PAEE_1_5METS_Hrs Summation of time (hours) when energy expenditure is >1.5 METs
PAEE_above_3METS_kcal Summation of energy expenditure in Kcal when energy expenditure is >3 METs
Time_PAEE_3METS_Hrs Summation of time (hours) energy expenditure is >3 METs
No_unbouted_10min Summation of number of MVPA bout which energy expenditure is >3 METs and length is less than 10 minutes
EE_unbouted_10min_Kcal Summation of energy expenditure of bout which energy expenditure is >3 METs and length is less than 10 minutes
Time_unbouted_10min_Hrs Summation of time (hours) of bout which length is less than 10 minutes
No_Bout_10min Summation of number of bout which length is more than 10 minutes
EE_Bouted_10min_Kcal Summation of energy expenditure of MVPA bout which length is more than 10 minutes
Time_Bouted_10min_Hrs Summation of time (hours) of MVPA bout which length is more than 10 minutes
No_Bout_20min Summation of number of MVPA bout which length is more than 20 minutes
EE_Bouted_20min_Kcal Summation of number of MVPA bout which length is more than 20 minutes
Time_Bouted_20min_Hrs Summation of time (hours) of MVPA bout which length is more than 20 minutes
No_Bout_30min Summation of number of MVPA bout which length is more than 30 minutes
EE_Bouted_30min_Kcal Summation of energy expenditure of MVPA bout which length is more than 30 minutes
Time_Bouted_30min_Hrs Summation of time (hours) of MVPA bout which length is more than 30 minutes
Mean_bout_duration Mean MVPA bout duration which bout length is more than 10 minutes: Time_Bouted_10min_Hrs/No_Bout_10min
No_Bouts Extra Long_steps The number of bouts of 'extra long' (>500 steps) walks in each day
No_Bouts Long_steps The number of bouts of 'long' (100-499 steps) walks in each day
No_Bouts Moderate_steps The number of bouts of 'moderate' (20-99 steps) walks in each day
No_Bouts Short steps The number of bouts of 'short' walks (<20 steps) in each day
Mean_cadence extra long Mean cadence (steps/min) in 'extra long' bouts of walking
Mean_cadence Long Mean cadence (steps/min) in 'long' bouts of walking
Mean_cadence moderate Mean cadence (steps/min) in 'moderate' bouts of walking
Mean_cadence short Mean cadence (steps/min) in 'short' bouts of walking
Mean_cadence day Mean cadence (steps/min) in each day

Examples
Sensewear_report(sampledata)
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