Package 'studentlife'

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URL https://github.com/Frycast/studentlife

BugReports https://github.com/Frycast/studentlife/issues

Type Package

Title Tidy Handling and Navigation of the Student-Life Dataset

Version 1.1.0

Description Download, navigate and analyse the Student-Life dataset.
The Student-Life dataset contains passive and automatic sensing data
from the phones of a class of 48 Dartmouth college students.
It was collected over a 10 week term. Additionally, the dataset contains ecological
momentary assessment results along with pre-study and post-study mental
health surveys. The intended use is to assess
mental health, academic performance and behavioral trends.
The raw dataset and additional information is
available at <https://studentlife.cs.dartmouth.edu/>.

Depends R (>= 3.4.0)

License GPL-3

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Author Daniel Fryer [aut, cre] (ORCID:
<https://orcid.org/0000-0001-6032-0522>),
Hien Nguyen [aut] (ORCID: <https://orcid.org/0000-0002-9958-432X>),
Pierre Orban [aut]

Maintainer Daniel Fryer <d.fryer@latrobe.edu.au>

Repository CRAN

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Contents

`add_block_labels` *add_block_labels*

Description

Classify observations from an `SL_tibble` into block labels using available date-time information. See more information about "blocks" under the details section. Daylight savings is ignored, and started on 31st March 2013.

Usage

```
add_block_labels(
  tab,
  type = c("hour_in_day", "epoch", "day", "week", "weekday", "month", "date"),
  interval = "start",
  warning = TRUE,
  start_date = getOption("SL_start"),
  epoch_levels = getOption("SL_epoch_levels"),
  epoch_ubs = getOption("SL_epoch_ubs"),
  unsafe = F
)
```

Arguments

tab	An SL_tibble as returned by the function load_SL_tibble.
type	A character vector of block label types to include. Can be one or more of "epoch", "day", "week", "weekday", "month" and "date". Any block label types that are not inferrable from the available date-time data are ignored.
interval	A character string that decides how block membership is decided when tab is of class interval_SL_tibble. Can be either "start" (use start_timestamp), "end" (use end_timestamp) or "middle" (use the midpoint between start_timestamp and end_timestamp).
warning	Logical. If TRUE then a warning is produced whenever a block label type is not inferrable from the available date-time data.
start_date	Date. The date that the StudentLife study started.
epoch_levels	A character vector of epoch levels.
epoch_ubs	An integer vector that defines the hour that is the upper boundary of each epoch.
unsafe	A logical. Default is FALSE. If this is set to TRUE then less checks will be performed.

Details

Block label types can be one or more of "epoch" (giving labels morning, evening, afternoon and night), "day" (giving number of days since the start_date of the StudentLife study), "week" (giving integer number of weeks since the first week of the StudentLife study, rounded downs), "weekday" (giving the day of the week), "month" (giving integer number of months since the start of the StudentLife study, rounded down) and "date".

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab <- load_SL_tibble(
  loc = d, schema = "sensing", table = "activity", csv_nrows = 10)

b_tab <- add_block_labels(tab)
b_tab
```

---

download_studentlife *download_studentlife*

Description

Download the entire StudentLife dataset or a smaller sample dataset for testing.

Usage

```
download_studentlife(
  url = "dartmouth",
  location = ".",
  unzip = TRUE,
  untar = TRUE
)
```

Arguments

url	A character string. Either "rdata" for the URL to the (more efficient) RData format version hosted on Zenodo, or "dartmouth" for the (original) Dartmouth URL, or "testdata" for a small sample dataset. Otherwise a full URL of your choice can be specified leading to the StudentLife dataset as a `.tar.gz` file.
location	The destination path. If the path does not exist it is created with `dir.create`
unzip	Logical. If `TRUE` then the dataset will be unzipped with `bunzip2`. Leave as default unless you plan to do it manually.
untar	Logical. If `TRUE` then the dataset will be untarred with `untar`. Leave as default unless you plan to do it manually.

Details

If `url = "rdata"` then data will be downloaded from <https://zenodo.org/record/3529253> If `url = "dartmouth"` then data will be downloaded from <https://studentlife.cs.dartmouth.edu/dataset/dataset.tar.bz2> If `url = "testdata"` then data will be downloaded from the test data at the studentlife GitHub repository <https://github.com/frycast/studentlife>

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

## Not run:
## With menu
load_SL_tibble(location = d)

## End(Not run)

## Without menu
SL_tables
load_SL_tibble(schema = "EMA", table = "PAM", location = d)
```

get_EMA_questions *get_EMA_questions*

Description

Get the EMA questions from a StudentLife tibble whose schema is "EMA".

Usage

```
get_EMA_questions(x)
```

Arguments

x	A StudentLife tibble whose schema is EMA, as output by the function load_SL_tibble.

Value

The EMA_questions attribute of x

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

# Returns "PAM"
get_EMA_questions(tab_PAM)
```

get_schema *get_schema*

Description

Retrieve the schema name from a StudentLife tibble

Usage

```
get_schema(x)
```

Arguments

x	An object of class StudentLife tibble (SL_tbl), as produced by the function load_SL_tibble.

Value

A character string indicating the schema name

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

# Returns "EMA"
get_schema(tab_PAM)
```

`get_table` *get_table*

Description

Retrieve the table name from a StudentLife tibble

Usage

```
get_table(x)
```

Arguments

`x`	An object of class StudentLife tibble (`SL_tbl`), as produced by the function `load_SL_tibble`.

Value

A character string indicating the table name

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

# Returns "PAM"
get_table(tab_PAM)
```

is_dateless_SL_tibble *is_dateless_SL_tibble*

Description

Confirm that an object is a dateless StudentLife tibble

Usage

```
is_dateless_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_S <- load_SL_tibble(
  schema = "survey", table = "BigFive", location = d)

# Returns TRUE
is_dateless_SL_tibble(tab_S)
```

is_dateonly_SL_tibble *is_dateonly_SL_tibble*

Description

Confirm that an object is a date-only StudentLife tibble

Usage

```
is_dateonly_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_DL <- load_SL_tibble(
  schema = "education", table = "deadlines", location = d)

# Returns TRUE
is_dateonly_SL_tibble(tab_DL)
```

---

is_interval_SL_tibble *is_interval_SL_tibble*

Description

Confirm that an object is an interval StudentLife tibble

Usage

```
is_interval_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_con <- load_SL_tibble(
  schema = "sensing", table = "conversation", location = d, csv_nrow = 10)

# Returns TRUE
is_interval_SL_tibble(tab_con)
```

is_reg_SL_tibble *is_reg_SL_tibble*

Description

Confirm that an object is a regularised StudentLife tibble

Usage

```
is_reg_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

reg_PAM <- regularise_time(
  tab_PAM, blocks = c("day", "epoch"), m = mean(picture_idx, na.rm = TRUE))

# Returns TRUE
is_reg_SL_tibble(reg_PAM)
```

is_SL_tibble *is_SL_tibble*

Description

Confirm that an object is a StudentLife tibble

Usage

```
is_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

# Returns TRUE
is_SL_tibble(tab_PAM)
```

`is_timestamp_SL_tibble` *is_timestamp_SL_tibble*

Description

Confirm that an object is a timestamped StudentLife tibble

Usage

```
is_timestamp_SL_tibble(x)
```

Arguments

x	Any object

Value

Logical

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

# Returns TRUE
is_timestamp_SL_tibble(tab_PAM)
```

load_SL_tibble *load_SL_tibble*

Description

Import a chosen StudentLife table as a tibble. Leave `schema` and `table` unspecified to choose interactively via a menu. This function is only intended for use with the studentlife dataset in it's original format, with the original directory structure. See the examples below for the recommended alternative approach to loading tables when the RData format is used.

Usage

```
load_SL_tibble(
  schema,
  table,
  location = ".",
  time_options = c("interval", "timestamp", "dateonly", "dateless"),
  vars,
  csv_nrows,
  datafolder = "dataset",
  uid_range = getOption("SL_uids")
)
```

Arguments

`schema`	A character string. The menu 1 choice. Leave blank to choose interactively.
`table`	A character string. The menu 2 choice. Leave blank to choose interactively.
`location`	The path to a copy of the StudentLife dataset.
`time_options`	A character vector specifying which table types (out of "interval", "timestamp", "dateonly" and "dateless") to include in the menu. This allows you to restrict menu options according to the amount of date-time information present in the data. The default includes all data. Note this parameter only has an effect when used with the interactive menu.
`vars`	Character vector of variable names to import for all students. Leave blank and this will be chosen interactively if necesssary. If `vars` contains "timestamp" then effort will be made to convert "timestamp" to appropriate variable name(s) for the target table.
`csv_nrows`	An integer specifying the number of rows to read per student if the target is a csv. The largest files in StudentLife are csv files, so this allows code testing with less overhead.
`datafolder`	Specifies the subfolder of `location` that contains the relevant data. This should normally be left as the default.
`uid_range`	An integer vector. The range of uids in the StudentLife study.

Value

An object of class `SL_tibble` is returned. These inherit properties from class `tibble` and class `data.frame`. Depending on the date-time information available, the object may also be a `timestamp_SL_tibble`, `interval_SL_tibble` or `dateonly_SL_tibble` (which are all subclasses of `SL_tibble`).

Examples

```
## Example that uses RData format to efficiently
## download and load tables, as an alternative
## to using this function.
## Not run:
d <- tempdir()
download_studentlife(location = d, url = "rdata")

# Choose the schema and table from the list SL_tables:
SL_tables

# Example with activity table from sensing schema
schema <- "sensing"
table <- "activity"
act <- readRDS(paste0(d, "/dataset_rds/", schema, "/", table, ".Rds"))
act

## End(Not run)

## Example that uses the studentlife dataset in
## its original format.

# Use url = "dartmouth" for the full original dataset
d <- tempdir()
download_studentlife(location = d, url = "testdata")

## Not run:
## With menu
load_SL_tibble(location = d)

## End(Not run)

## Without menu
SL_tables
PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

## Load less data for testing with less overhead
act <- load_SL_tibble(schema = "sensing", table = "activity",
                      location = d, csv_nrows = 10)

## Not run:
## Browse all tables with timestamps (non-interval)
load_SL_tibble(location = d, time_options = "timestamp")

## Browse all tables with intervals
load_SL_tibble(location = d, time_options = "interval")
```

```
## Browse all dateless tables
load_SL_tibble(location = d, time_options = "dateless")

## End(Not run)
```

PAM_categorise *PAM_categorise*

Description

Categorise Photographic Affect Meter (PAM) scores into 4 categories by either PAM Quadrant, Valence or Arousal (or multiple of these).

Usage

```
PAM_categorise(
  tab,
  pam_name = "picture_idx",
  types = c("quadrant", "valence", "arousal")
)
```

Arguments

tab	A data.frame (or tibble) with a column representing Photographic Affect Meter (PAM) score.
pam_name	Character. The name of the column representing PAM.
types	Character vector containing the categories, one or more of "quadrant", "valence" and "arousal" into which to code PAM scores.

Details

The 4 Quadrant categories are as follows: Quadrant 1: negative valence, low arousal. Quadrant 2: negative valence, high arousal. Quadrant 3: positive valence, low arousal. Quadrant 4: positive valence, high arousal.

Valence and arousal are traditionally scores from -2 to 2, measuring displeasure to pleasure, and state of activation respectively. However, here we map those scores to positive numbers so (-2,-1,1,2) -> (1,2,3,4).

Value

The data.frame (or tibble) tab with extra columns pam_q, pam_v, and pam_a for quadrant, valence and arousal respectively.

References

Pollak, J. P., Adams, P., & Gay, G. (2011, May). PAM: a photographic affect meter for frequent, in situ measurement of affect. In Proceedings of the SIGCHI conference on Human factors in computing systems (pp. 725-734). ACM.

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab <- load_SL_tibble(
  loc = d, schema = "EMA", table = "PAM", csv_nrows = 10)

PAM_categorise(tab)
```

`regularise_time` *regularise_time*

Description

Transform an `SL_tibble` (as produced by `load_SL_tibble`) in such a way that the observations are aggregated in equal length intervals called 'blocks' (for more information on blocks see `add_block_labels`).

Usage

```
regularise_time(
  tab,
  ...,
  blocks = c("epoch", "day"),
  add_NAs = TRUE,
  unsafe = F,
  study_duration = getOption("SL_duration"),
  start_date = getOption("SL_start"),
  epoch_levels = getOption("SL_epoch_levels"),
  epoch_ubs = getOption("SL_epoch_ubs"),
  uid_range = getOption("SL_uids"),
  date_range = seq(from = start_date, by = 1, length.out = study_duration)
)
```

Arguments

`tab`	An `SL_tibble` as returned by the function `load_SL_tibble`. The `SL_tibble` must have some date-time information.
`...`	Arguments passed to `summarise`, used to aggregate values when multiple observations are encountered in a block. Any columns not specified here or under `blocks` will be dropped.
`blocks`	A character vector naming one or more of the block options "hour_in_day", "epoch", "day", "week", "weekday", "month" or "date". If not present as column names in `tab`, an attempt will be made to infer the blocks from existing time information with `add_block_labels`. The returned `data.frame` will have one observation (possibly `NA`) for each block.

add_NAs	A logical. If TRUE then NAs will be introduced to fill missing blocks.
unsafe	A logical. Default is FALSE. If this is set to TRUE then less checks will be performed.
study_duration	Integer. The duration of the StudentLife study in days. This parameter does nothing if limit_date_range it TRUE.
start_date	Date. The date that the StudentLife study started.
epoch_levels	A character vector of epoch labels.
epoch_ubs	An integer vector that defines the hour that is the upper boundary of each epoch.
uid_range	An integer vector. The range of uids in the StudentLife study.
date_range	A vector of dates to be used if limit_date_range is FALSE.

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab <- load_SL_tibble(
  loc = d, schema = "sensing", table = "activity", csv_nrows = 10)

r_tab <- regularise_time(
  tab, blocks = c("day","weekday"),
  act_inf = max(activity_inference), add_NAs = FALSE)

r_tab
```

---

response_hour_hist *response_hour_hist*

Description

This function produces a histogram that visualizes the frequencies of observations within hourly blocks, or blocks of multiple hours.

Usage

```
response_hour_hist(
  tab,
  break_hours = 10,
  xlab = "Hours into study",
  main = paste0("Distribution of ", attr(tab, "table"), " response times"),
  ...
)
```

Arguments

tab	A StudentLife tibble with time information, (i.e., and object of class timestamp_SL_tbl or interval_SL_tbl) as can be returned by the function load_SL_tibble.
break_hours	Specify the width in hours of each histogram bin.
xlab	Argument passed to hist.
main	Argument passed to hist.
...	Arguments passed to hist.

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

response_hour_hist(tab_PAM)
```

SL_tables *List of all the tables available in the StudentLife dataset.*

Description

This command returns a 5 element list. Each of the five elements are given names corresponding to the schema names of the studentlife data set. Each element is a vector of strings, where each string corresponds to the name of a table within the respective schema.

Usage

```
SL_tables
```

Format

An object of class list of length 5.

Source

https://studentlife.cs.dartmouth.edu/

`studentlife` *Tidy Handling and Navigation of the Student-Life Dataset*

Description

Download, navigate and analyse the Student-Life dataset. The Student-Life dataset contains passive and automatic sensing data from the phones of a class of 48 de-identified Dartmouth college students. It was collected over a 10 week term. Additionally, the dataset contains Ecological Momentary Assessment results along with pre- and post-study mental health surveys, such as the PHQ-9. The intended use is to assess mental health, academic performance and behavioral trends. The raw dataset and additional information is available at <https://studentlife.cs.dartmouth.edu/>.

Details

Details on the Student-Life dataset as well as the dataset itself are available at https://studentlife.cs.dartmouth.edu/.

Update

Current updates are available through URL: https://github.com/frycast/studentlife

BugReports

https://github.com/frycast/studentlife/issues

Author(s)

Daniel Fryer <d.fryer@latrobe.edu.au>

`vis_NAs` *vis_NAs*

Description

Produce a visualisation of the number of missing values among each student in a regularised SL_tbl.

Usage

```
vis_NAs(
  tab,
  response,
  main = paste0("Missing values by student (", attr(tab, "table"), ") (blocks: ",
    paste0(attr(tab, "blocks"), collapse = ", "), ")"),
  show_perc_col = FALSE,
  ...
)
```

Arguments

tab	A regularised StudentLife tibble (i.e., an object of class reg_SL_tbl) as produced by the function regularise_time.
response	A character string naming one of the columns in tab that is not in attr(tab, "blocks"). If missing then this defaults to the first such column name.
main	The plot title, passed to ggtitle.
show_perc_col	Logical passed to vis_miss. TRUE adds in the percentage of missing data in each column into the x axis.
...	Arguments passed to vis_miss.

Value

A ggplot object.

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

reg_PAM <- regularise_time(
  tab_PAM, blocks = c("day", "epoch"), m = mean(picture_idx, na.rm = TRUE))

vis_NAs(reg_PAM, response = "m")
```

---

vis_response_counts *vis_response_counts*

Description

Produce an ordered bar plot of the total number of responses for each student in a regularised SL_tbl.

Usage

```
vis_response_counts(
  tab,
  response,
  main = paste0("Total responses by student (", attr(tab, "table"), ")"),
  xlab = "Student UID",
  ylab = "Response count",
  ...
)
```

Arguments

tab	A regularised StudentLife tibble (i.e., an object of class reg_SL_tbl) as produced by the function regularise_time.
response	A character string naming one of the columns in tab that is not in attr(tab, "blocks"). If missing then this defaults to the first such column name.
main	The plot title, passed to barplot.
xlab	The x axis label, passed to barplot.
ylab	The y axis label, passed to barplot.
...	Arguments passed to barplot.

Value

A named numeric vector of response counts, sorted in descending order.

Examples

```
d <- tempdir()
download_studentlife(location = d, url = "testdata")

tab_PAM <- load_SL_tibble(schema = "EMA", table = "PAM", location = d)

reg_PAM <- regularise_time(
  tab_PAM, blocks = c("day", "epoch"), m = mean(picture_idx, na.rm = TRUE))

vis_response_counts(reg_PAM, response = "m")
```

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