Package ‘healthyR’

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Title Hospital Data Analysis Workflow Tools
Version 0.1.5
Description Hospital data analysis workflow tools, modeling, and automations. This library provides many useful tools to review common administrative hospital data. Some of these include average length of stay, readmission rates, average net pay amounts by service lines just to name a few. The aim is to provide a simple and consistent verb framework that takes the guesswork out of everything.
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category_counts_tbl  Counts by Category

Description

Get the counts of a column by a particular grouping if supplied, otherwise just get counts of a column.

Usage

category_counts_tbl(.data, .count_col, .arrange_value = TRUE, ...)

Arguments

.data The data.frame/tibble supplied.
.count_col The column that has the values you want to count.
.arrange_value Defaults to true, this will arrange the resulting tibble in descending order by .count_col
... Place the values you want to pass in for grouping here.

Details

- Requires a data.frame/tibble.
- Requires a value column, a column that is going to counted.

Author(s)

Steven P. Sanderson II, MPH

Examples

library(healthyR.data)
library(dplyr)

healthyR_data %>%
category_counts_tbl(
  .count_col = payer_grouping,
  .arrange = TRUE,
  ip_op_flag
)

healthyR_data %>%
category_counts_tbl(
  .count_col = ip_op_flag,
  .arrange_value = TRUE,
  service_line
)

__dx_cc_mapping__

Diagnosis to Condition Code Mapping file

Description

A dataset containing the Diagnosis Code to AHRQ Condition Code Mapping that is used in helping to define service lines for inpatient discharges.

Usage

data(dx_cc_mapping)
Format

A data frame with 86852 rows and 5 variables

Details

- CC_Code. DX_1, DX_2, ..., DX_n
- CC_Desc. DX_1 = Conduction disorders, DX_n = description
- ICD_Ver_Flag. ICD Version 10 or 9
- ICDCode. ICD-9 or ICD-10 Code
- Diagnosis. Long QT Syndrome

gartner_magic_chart_plt

Gartner Magic Chart - Plotting of two continuous variables

Description

Plot a Gartner Magic Chart of two continuous variables

Usage

gartner_magic_chart_plt(
  .data,
  .x_col,
  .y_col,
  .y_lab,
  .x_lab,
  .plt_title,
  .tl_lbd,
  .tr_lbd,
  .br_lbd,
  .bl_lbd
)

Arguments

.data The data set you want to plot
.x_col The x-axis for the plot
.y_col The y-axis for the plot
.y_lab The y-axis label
.x_lab The x-axis label
.plt_title The title of the plot
.tl_lbd The top left label
.tr_lbd The top right label
.br_lbd The bottom right label
.bl_lbd The bottom left label
**kmeans_mapped_tbl**

**Details**

- Supply a data frame with at least two continuous variables to plot against each other

**Value**

A `ggplot` plot

**Examples**

```r
gartner_magic_chart_plt(
  .data = tibble::tibble(x = rnorm(100, 0, 1), y = rnorm(100,0,1))
  , .x_col = x
  , .y_col = y
  , .x_lab = "los"
  , .y_lab = "ra"
  , .plt_title = "tst"
  , .tr_lbl = "High RA-LOS"
  , .tl_lbl = "High RA"
  , .bl_lbl = "Leader"
  , .br_lbl = "High LOS"
)
```

---

**kmeans_mapped_tbl**  
*K-Means Mapper*

**Description**

Create a tibble that maps the `kmeans_obj()` using `purrr::map()` to create a nested data.frame/tibble that holds n centers. This tibble will be used to help create a scree plot.

**Usage**

```r
kmeans_mapped_tbl(.data, .centers = 15)
```

**Arguments**

- `.data` You must have a tibble in the working environment from the `kmeans_user_item_tbl()`
- `.centers` How many different centers do you want to try

**Details**

Takes in a single parameter of `.centers`. This is used to create the tibble and map the `kmeans_obj()` function down the list creating a nested tibble.

**Value**

A nested tibble
Author(s)
Steven P. Sanderson II, MPH

See Also
https://en.wikipedia.org/wiki/Scree_plot

Examples
library(healthyR.data)
library(dplyr)

data_tbl <- healthyR_data %>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

ui_tbl <- kmeans_user_item_tbl(
  .data = data_tbl
, .row_input = service_line
, .col_input = payer_grouping
, .record_input = record
)

kmeans_mapped_tbl(ui_tbl)

---

kmeans_obj  K-Means Functions

Description
Takes the output of the kmeans_user_item_tbl() function and applies the k-means algorithm to it using stats::kmeans()

Usage
kmeans_obj(.data, .centers = 5)

Arguments
.data The data that gets passed from kmeans_user_item_tbl()
.centers How many initial centers to start with
**Details**

Uses the `stats::kmeans()` function and creates a wrapper around it.

**Value**

A stats k-means object

**Author(s)**

Steven P. Sanderson II, MPH

**Examples**

```r
library(healthyR.data)
library(dplyr)

data_tbl <- healthyR_data %>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

kmeans_user_item_tbl(.data = data_tbl, .row_input = service_line, .col_input = payer_grouping, .record_input = record) %>%
  kmeans_obj()
```

---

**kmeans_scree_data_tbl  K-Means Scree Plot Data Table**

**Description**

Take data from the `kmeans_mapped_tbl()` and unnest it into a tibble for inspection and for use in the `kmeans_scree_plt()` function.

**Usage**

```r
kmeans_scree_data_tbl(.data)
```

**Arguments**

- `.data` You must have a tibble in the working environment from the `kmeans_mapped_tbl()`
**Details**

Takes in a single parameter of `.data` from `kmeans_mapped_tbl()` and transforms it into a tibble that is used for `kmeans_scree_plt()`. It will show the values (tot.withinss) at each center.

**Value**

A nested tibble

**Author(s)**

Steven P. Sanderson II, MPH

**Examples**

```r
library(healthyR.data)
library(dplyr)

data_tbl <- healthyR_data%>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

ui_tbl <- kmeans_user_item_tbl(
  .data = data_tbl
, .row_input = service_line
, .col_input = payer_grouping
, .record_input = record
)

kmm_tbl <- kmeans_mapped_tbl(ui_tbl)

kmeans_scree_data_tbl(kmm_tbl)
```

---

**kmeans_scree_plt**

*K-Means Scree Plot*

**Description**

Create a scree-plot from the `kmeans_mapped_tbl()` function.

**Usage**

`kmeans_scree_plt(.data)`
Arguments

.data The data from the kmeans_mapped_tbl() function

Details

Outputs a scree-plot

Value

A ggplot2 plot

Author(s)

Steven P. Sanderson II, MPH

See Also

https://en.wikipedia.org/wiki/Scree_plot

Examples

library(healthyR.data)
library(dplyr)
library(tidyquant)

data_tbl <- healthyR_data%>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

ui_tbl <- kmeans_user_item_tbl(
  .data = data_tbl
  , .row_input = service_line
  , .col_input = payer_grouping
  , .record_input = record
)

kmm_tbl <- kmeans_mapped_tbl(ui_tbl)

kmeans_scree_plt(.data = kmm_tbl)
kmeans_tidy_tbl | K-Means tidy Functions

Description
K-Means tidy functions

Usage
kmeans_tidy_tbl(.kmeans_obj, .data, .tidy_type = "tidy")

Arguments
.kmeans_obj A stats::kmeans() object
.data The user item tibble created from kmeans_user_item_tbl()
.tidy_type "tidy","glance", or "augment"

Details
Takes in a k-means object and its associated user item tibble and then returns one of the items asked for. Either: broom::tidy(), broom::glance() or broom::augment(). The function defaults to broom::tidy().

Value
A tibble

Author(s)
Steven P. Sanderson II, MPH

Examples
library(healthyR.data)
library(dplyr)
library(broom)

data_tbl <- healthyR_data%>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
as_tibble()

uit_tbl <- kmeans_user_item_tbl(
  .data = data_tbl
, .row_input = service_line
)
kmeans_user_item_tbl

:: col_input = payer_grouping
:: record_input = record

km_obj <- kmeans_obj(uit_tbl)

kmeans_tidy_tbl(
  .kmeans_obj = km_obj
  , .data = uit_tbl
  , .tidy_type = "augment"
)

kmeans_tidy_tbl(
  .kmeans_obj = km_obj
  , .data = uit_tbl
  , .tidy_type = "glance"
)

kmeans_tidy_tbl(
  .kmeans_obj = km_obj
  , .data = uit_tbl
  , .tidy_type = "tidy"
) %>%
glimpse()

---

kmeans_user_item_tbl  K-Means Functions

Description

Takes in a data.frame/tibble and transforms it into an aggregated/normalized user-item tibble of proportions. The user will need to input the parameters for the rows/user and the columns/items.

Usage

kmeans_user_item_tbl(.data, .row_input, .col_input, .record_input)

Arguments

.data  The data that you want to transform
.row_input  The column that is going to be the row (user)
.col_input  The column that is going to be the column (item)
.record_input  The column that is going to be summed up for the aggregation and normalization process.
Details

This function should be used before using a k-mean model. This is commonly referred to as a user item matrix because "users" tend to be on the rows and "items" (e.g. orders) on the columns. You must supply a column that can be summed for the aggregation and normalization process to occur.

Value

A aggregated/normalized user item tibble

Author(s)

Steven P. Sanderson II, MPH

Examples

```r
library(healthyR.data)
library(dplyr)

data_tbl <- healthyR_data%>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?" ) %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

kmeans_user_item_tbl(
  .data = data_tbl,
  .row_input = service_line,
  .col_input = payer_grouping,
  .record_input = record
)
```

Description

Plot the index of the length of stay and readmit rate against each other along with the variance

Usage

```r
los_ra_index_plt(.data)
```

Arguments

- `.data` The data supplied from `los_ra_index_summary_tbl()`
Details

- Expects a tibble
- Expects a Length of Stay and Readmit column, must be numeric
- Uses cowplot to stack plots

Value

A patchwork ggplot2 plot

Author(s)

Steven P. Sanderson II, MPH

Examples

```r
suppressPackageStartupMessages(library(dplyr))

data_tbl <- tibble(
  "alos" = runif(186, 1, 20),
  "elos" = runif(186, 1, 17),
  "readmit_rate" = runif(186, 0, .25),
  "readmit_rate_bench" = runif(186, 0, .2)
)

los_ra_index_summary_tbl(
  .data = data_tbl,
  .max_los = 15,
  .alos_col = alos,
  .elos_col = elos,
  .readmit_rate = readmit_rate,
  .readmit_bench = readmit_rate_bench
) %>%
  los_ra_index_plt()

los_ra_index_summary_tbl(
  .data = data_tbl,
  .max_los = 10,
  .alos_col = alos,
  .elos_col = elos,
  .readmit_rate = readmit_rate,
  .readmit_bench = readmit_rate_bench
) %>%
  los_ra_index_plt()
```
los_ra_index_summary_tbl

Make LOS and Readmit Index Summary Tibble

Description

Create the length of stay and readmit index summary tibble

Usage

los_ra_index_summary_tbl(
  .data,
  .max_los = 15,
  .alos_col,
  .elos_col,
  .readmit_rate,
  .readmit_bench
)

Arguments

.data The data you are going to analyze.
.max_los You can give a maximum LOS value. Lets say you typically do not see los over 15 days, you would then set .max_los to 15 and all values greater than .max_los will be grouped to .max_los
.alos_col The Average Length of Stay column
.elos_col The Expected Length of Stay column
.readmit_rate The Actual Readmit Rate column
.readmit_bench The Expected Readmit Rate column

Details

- Expects a tibble
- Expects the following columns and there should only be these 4
  - Length Of Stay Actual - Should be an integer
  - Length Of Stacy Benchmark - Should be an integer
  - Readmit Rate Actual - Should be 0/1 for each record, 1 = readmitted, 0 did not.
  - Readmit Rate Benchmark - Should be a percentage from the benchmark file.
- This will add a column called visits that will be the count of records per length of stay from 1 to .max_los
- The .max_los param can be left blank and the function will default to 15. If this is not a good default and you don’t know what it should be then set it to 75 percentile from the stats::quantile() function using the defaults, like so .max_los = stats::quantile(data_tbl$alos)[[4]]
• Uses all data to compute variance, if you want it for a particular time frame you will have to filter the data that goes into the .data argument. It is suggested to use `timetk::filter_by_time()`
• The index is computed as the excess of the length of stay or readmit rates over their respective expectations.

Value
A tibble

Author(s)
Steven P. Sanderson II, MPH

Examples

```r
suppressPackageStartupMessages(library(dplyr))

data_tbl <- tibble(
  "alos" = runif(186, 1, 20),
  "elos" = runif(186, 1, 17),
  "readmit_rate" = runif(186, 0, .25),
  "readmit_bench" = runif(186, 0, .2)
)

los_ra_index_summary_tbl(
  .data = data_tbl,
  .max_los = 15,
  .alos_col = alos,
  .elos_col = elos,
  .readmit_rate = readmit_rate,
  .readmit_bench = readmit_bench
)

los_ra_index_summary_tbl(
  .data = data_tbl, 
  .max_los = 10,
  .alos_col = alos,
  .elos_col = elos,
  .readmit_rate = readmit_rate,
  .readmit_bench = readmit_bench
)
```

---

**named_item_list**

**Tibble to named list**

**Description**

Takes in a data.frame/tibble and creates a named list from a supplied grouping variable. Can be used in conjunction with `save_to_excel()` to create a new sheet for each group of data.
Usage

    named_item_list(.data, .group_col)

Arguments

    .data          The data.frame/tibble.
    .group_col     The column that contains the groupings.

Details

    • Requires a data.frame/tibble and a grouping column.

Author(s)

    Steven P. Sanderson II, MPH

Examples

    library(healthyR.data)
    df <- healthyR_data
df_list <- named_item_list(.data = df, .group_col = service_line)
df_list

    opt_bin(.data, .value_col, .iters = 30)

Arguments

    .data          The data set in question
    .value_col     The column that holds the values
    .iters         How many times the cost function loop should run

Description

    Gives the optimal binwidth for a histogram given a data set, it’s value and the desired amount of bins

Usage

    opt_bin(.data, .value_col, .iters = 30)
Details

Modified from Hideaki Shimazaki Department of Physics, Kyoto University shimazaki at ton.scphys.kyoto-u.ac.jp Feel free to modify/distribute this program.

- Supply a data.frame/tibble with a value column. from this an optimal binwidth will be computed for the amount of bins desired

Value

A tibble of histogram breakpoints

Examples

```r
suppressPackageStartupMessages(library(purrr))
suppressPackageStartupMessages(library(dplyr))

df_tbl <- rnorm(n = 1000, mean = 0, sd = 1)
df_tbl <- df_tbl %>%
  as_tibble() %>%
  set_names("value")

df_tbl %>%
  opt_bin(
    .value_col = value
    , .iters = 100
  )
```

- `px_cc_mapping` Procedure to Condition Code Mapping file

Description

A dataset containing the Procedure Code to AHRQ Condition Code Mapping that is used in helping to define service lines for inpatient discharges.

Usage

`data(px_cc_mapping)`

Format

A data frame with 79721 rows and 5 variables
Details

- CC_Code. PX_1, PX_2, ..., PX_n
- CC_Desc. PX_1 = Genitourinary incontinence procedures
- ICD_Ver_Flag. 10 or 9
- ICDCode. ICD-9 or ICD-10 Code
- Procedure. Inject Implant Urethra

save_to_excel

Description

Save a tibble/data.frame to an excel .xlsx file. The file will automatically with a save_dtime in the format of 20201109_132416 for November 11th, 2020 at 1:24:16PM.

Usage

```r
save_to_excel(.data, .file_name)
```

Arguments

- `.data` The tibble/data.frame that you want to save as an .xlsx file.
- `.file_name` the name you want to give to the file.

Details

- Requires a tibble/data.frame to be passed to it.

Value

A saved excel file

Author(s)

Steven P. Sanderson II, MPH
sql_left

Use SQL LEFT type function

Description
Perform an SQL LEFT() type function on a piece of text

Usage
sql_left(.text, .num_char)

Arguments
- .text: A piece of text/string to be manipulated
- .num_char: How many characters do you want to grab

Details
- You must supply data that you want to manipulate.

Examples
sql_left("text", 3)

sql_mid

Use SQL MID type function

Description
Perform an SQL SUBSTRING type function

Usage
sql_mid(.text, .start_num, .num_char)

Arguments
- .text: A piece of text/string to be manipulated
- .start_num: What place to start at
- .num_char: How many characters do you want to grab

Details
- You must supply data that you want to manipulate.
Examples

```r
sql_mid("this is some text", 6, 2)
```

---

**sql_right**

*Use SQL RIGHT type functions*

**Description**

Perform an SQL RIGHT type function

**Usage**

```r
sql_right(.text, .num_char)
```

**Arguments**

- `.text`: A piece of text/string to be manipulated
- `.num_char`: How many characters do you want to grab

**Details**

- You must supply data that you want to manipulate.

**Examples**

```r
sql_right("this is some more text", 3)
```

---

**top_n_tbl**

*Top N tibble*

**Description**

Get a tibble returned with n records sorted either by descending order (default) or ascending order.

**Usage**

```r
top_n_tbl(.data, .n_records, .arrange_value = TRUE, ...)
```
Arguments

- `.data` The data you want to pass to the function
- `.n_records` How many records you want returned
- `.arrange_value` A boolean with TRUE as the default. TRUE sorts data in descending order
- ... The columns you want to pass to the function.

Details

- Requires a data.frame/tibble
- Requires at least one column to be chosen inside of the ...
- Will return the tibble in sorted order that is chosen with descending as the default

Author(s)

Steven P. Sanderson II, MPH

Examples

```r
library(healthyR.data)

df <- healthyR_data

df_tbl <- top_n_tbl(  
  .data = df  
  , .n_records = 3  
  , .arrange_value = TRUE  
  , service_line  
  , payer_grouping  
)

print(df_tbl)
```

---

**ts_alos_plt**

Plot ALOS - Average Length of Stay

Description

Plot ALOS - Average Length of Stay

Usage

ts_alos_plt(.data, .date_col, .value_col, .by_grouping, .interactive)
Arguments

- `.data` The time series data you need to pass
- `.date_col` The date column
- `.value_col` The value column
- `.by_grouping` How you want the data summarized - "sec", "min", "hour", "day", "week", "month", "quarter" or "year"
- `.interactive` TRUE or FALSE. TRUE returns a plotly plot and FALSE returns a static ggplot2 plot

Details

- Expects a tibble with a date time column and a value column
- Uses timetk for underlying summarization and plot
- If `.by_grouping` is missing it will default to "day"
- A static ggplot2 object is return if the `.interactive` function is FALSE otherwise a plotly plot is returned.

Value

A timetk time series plot

Author(s)

Steven P. Sanderson II, MPH

Examples

```r
library(healthyR)
library(healthyR.data)
library(timetk)
library(dplyr)
library(purrr)

# Make A Series of Dates ----
data_tbl <- healthyR_data
df_tbl <- data_tbl %>%
  filter(ip_op_flag == 'I') %>%
  select(visit_end_date_time, length_of_stay) %>%
  summarise_by_time(
    .date_var = visit_end_date_time,
    .by = "day",
    visits = mean(length_of_stay, na.rm = TRUE)
  ) %>%
  filter_by_time(
    .date_var = visit_end_date_time,
    .start_date = "2012",
    .end_date = "2019"
  )
```
ts_census_los_daily_tbl

```r
) %>%
    set_names("Date","Values")

ts_alos_plt(
    .data = df_tbl,
    .date_col = Date,
    .value_col = Values,
    .by = "month",
    .interactive = FALSE
)
```

---

**ts_census_los_daily_tbl**

*Time Series - Census and LOS by Day*

---

**Description**

Sometimes it is important to know what the census was on any given day, or what the average length of stay is on given day, including for those patients that are not yet discharged. This can be easily achieved. This will return one record for every account so the data will still need to be summarized.

**This function can take a little bit of time to run while the join comparison runs.**

**Usage**

```r
ts_census_los_daily_tbl(
    .data,
    .keep_nulls_only = FALSE,
    .start_date_col,
    .end_date_col,
    .by_time = "day"
)
```

**Arguments**

- `.data` The data you want to pass to the function
- `.keep_nulls_only` A boolean that will keep only those records that have a NULL end date, meaning the patient is still admitted. The default is FALSE which brings back all records.
- `.start_date_col` The column containing the start date for the record
- `.end_date_col` The column containing the end date for the record.
- `.by_time` How you want the data presented, defaults to day and should remain that way unless you need more granular data.
**Details**

- Requires a dataset that has at least a start date column and an end date column
- Takes a single boolean parameter

**Value**

A tibble object

**Author(s)**

Steven P. Sanderson II, MPH

**Examples**

```r
library(healthyR)
library(healthyR.data)
library(dplyr)

df <- healthyR_data
df_tbl <- df %>%
  filter(ip_op_flag == "I") %>%
  select(visit_start_date_time, visit_end_date_time) %>%
  timetk::filter_by_time(.date_var = visit_start_date_time, .start_date = "2020")

ts_census_los_daily_tbl(
  .data = df_tbl,
  .keep_nulls_only = FALSE,
  .start_date_col = visit_start_date_time,
  .end_date_col = visit_end_date_time
)
```

---

**Description**

Create a plot showing the excess of the median value

Plot out the excess +/- of the median value grouped by certain time parameters.

**Usage**

```r
ts_median_excess_plt(
  .data,
  .date_col,
  .value_col,
  .x_axis,
  .ggplot_group_var,
  .years_back
)
```
Arguments

.data  The data that is being analyzed, data must be a tibble/data.frame.
.date_col  The column of the tibble that holds the date.
.value_col  The column that holds the value of interest.
.x_axis  What is the be the x-axis, day, week, etc.
.ggplot_group_var  The variable to group the ggplot on.
.years_back  How many years back do you want to go in order to compute the median value.

Details

• Supply data that you want to view and you will see the excess +/- of the median values over a specified time series tibble.

Value

A ggplot2 plot

Examples

suppressPackageStartupMessages(library(timetk))

ts_signature_tbl(
  .data = m4_daily
,  .date_col = date
)

%>%
ts_median_excess_plt(
  .date_col = date
,  .value_col = value
,  .x_axis = week
,  .ggplot_group_var = year
,  .years_back = 4
)

Description

This is a wrapper function to the `timetk::plot_time_series()` function with a limited functionality parameter set. To see the full reference please visit the timetk package site.
Usage

```r
ts_plt(
  data,
  date_col,
  value_col,
  color_col = NULL,
  facet_col = NULL,
  facet_ncol = NULL,
  interactive = FALSE
)
```

Arguments

- **data**: The data to pass to the function, must be a tibble/data.frame.
- **date_col**: The column holding the date.
- **value_col**: The column holding the value.
- **color_col**: The column holding the variable for color.
- **facet_col**: The column holding the variable for faceting.
- **facet_ncol**: How many columns do you want.
- **interactive**: Return a plotly plot if set to TRUE and a static ggplot2 plot if set to FALSE. The default is FALSE.

Details

This function takes only a few of the arguments in the function and presets others while choosing the defaults on others. The smoother functionality is turned off.

Value

A plotly plot or a ggplot2 static plot

Author(s)

Steven P. Sanderson II, MPH

See Also


Examples

```r
suppressPackageStartupMessages(library(dplyr))
library(timetk)
library(healthyR.data)

healthyR.data::healthyR_data %>%
  filter(ip_op_flag == "I") %>%
  select(visit_end_date_time, service_line) %>%
```
filter_by_time(
  .date_var = visit_end_date_time,
  .start_date = "2020"
) %>%
group_by(service_line) %>%
summarize_by_time(
  .date_var = visit_end_date_time,
  .by = "month",
  visits = n()
) %>%
ungroup() %>%
ts_plt(
  .date_col = visit_end_date_time,
  .value_col = visits,
  .color_col = service_line
)

---

**ts_readmit_rate_plt**  
*Plot Readmit Rate*

**Description**

Plot Readmit Rate

**Usage**

```r
ts_readmit_rate_plt(.data, .date_col, .value_col, .by_grouping, .interactive)
```

**Arguments**

- `.data`  
The data you need to pass.
- `.date_col`  
The date column.
- `.value_col`  
The value column.
- `.by_grouping`  
How you want the data summarized - "sec", "min", "hour", "day", "week", "month", "quarter" or "year".
- `.interactive`  
TRUE or FALSE. TRUE returns a plotly plot and FALSE returns a static ggplot2 plot.

**Details**

- Expects a tibble with a date time column and a value column
- Uses timetk for underlying summarization and plot
- If `.by_grouping` is missing it will default to "day"

**Value**

A timetk time series plot that is interactive
Author(s)

Steven P. Sanderson II, MPH

Examples

```r
set.seed(123)

suppressPackageStartupMessages(library(timetk))
suppressPackageStartupMessages(library(purrr))
suppressPackageStartupMessages(library(dplyr))

ts_tbl <- tk_make_timeseries(
  start = "2019-01-01",
  by = "day",
  length_out = "1 year 6 months"
)

values <- arima.sim(
  model = list(
    order = c(0, 1, 0)),
  n = 547,
  mean = 1,
  sd = 5
)

df_tbl <- tibble(
  x = ts_tbl,
  y = values
) %>%
  set_names("Date","Values")

ts_readmit_rate_plt(
  .data = df_tbl,
  .date_col = Date,
  .value_col = Values,
  .by = "month",
  .interactive = FALSE
)
```

---

**ts_signature_tbl**

Make a Time Enhanced Tibble

Description

Returns a tibble that adds the time series signature from the `timetk::tk_augment_timeseries_signature()` function. All added from a chosen date column defined by the `.date_col` parameter.

Usage

```r
ts_signature_tbl(.data, .date_col, .pad_time = TRUE, ...)
```
Arguments

- **.data**: The data that is being analyzed.
- **.date_col**: The column that holds the date.
- **.pad_time**: Boolean TRUE/FALSE. If TRUE then the `timetk::pad_by_time()` function is called and used on the data.frame before the modification. The default is TRUE.
- **...**: Grouping variables to be used by `dplyr::group_by()` before using `timetk::pad_by_time()`

Details

- Supply data with a date column and this will add the year, month, week, week day and hour to the tibble. The original date column is kept.
- Returns a time-series signature tibble.
- You must know the data going into the function and if certain columns should be dropped or kept when using further functions

Value

A tibble

Examples

```r
library(timetk)

ts_signature_tbl(
  .data = m4_daily,
  .date_col = date,
  .pad_time = TRUE,
  id
)
```

---

**umap_list**  
*UMAP Projection*

Description

Create a umap object from the `uwot::umap()` function.

Usage

```r
umap_list(.data, .kmeans_map_tbl, .k_cluster = 5)
```

Arguments

- **.data**: The data from the `kmeans_user_item_tbl()` function.
- **.kmeans_map_tbl**: The data from the `kmeans_mapped_tbl()`.
- **.k_cluster**: Pick the desired amount of clusters from your analysis of the scree plot.
Details

This takes in the user item table/matrix that is produced by `kmeans_user_item_tbl()` function. This function uses the defaults of `uwot::umap()`.

Value

A list of tibbles and the umap object

Author(s)

Steven P. Sanderson II, MPH

See Also

- https://cran.r-project.org/package=uwot (CRAN)
- https://github.com/jlmelville/uwot (GitHub)
- https://github.com/jlmelville/uwot (arXiv paper)

Examples

```r
library(healthyR.data)
library(healthyR)
library(dplyr)
library(broom)

data_tbl <- healthyR_data %>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping) %>%
  mutate(record = 1) %>%
  as_tibble()

uit_tbl <- kmeans_user_item_tbl(
  .data = data_tbl
,  .row_input = service_line
,  .col_input = payer_grouping
,  .record_input = record
)

kmm_tbl <- kmeans_mapped_tbl(uit_tbl)

umap_list(.data = uit_tbl, kmm_tbl, 3)
```
**umap_plt**  
*UMAP and K-Means Cluster Visualization*

**Description**
Create a UMAP Projection plot.

**Usage**
```r
umap_plt(.data, .point_size = 2, .label = TRUE)
```

**Arguments**
- `.data`: The data from the `umap_list()` function.
- `.point_size`: The desired size for the points of the plot.
- `.label`: Should `ggrepel::geom_label_repel()` be used to display cluster user labels.

**Details**
This takes in `umap_kmeans_cluster_results_tbl` from the `umap_list()` function output.

**Value**
A ggplot2 UMAP Projection with clusters represented by colors.

**Author(s)**
Steven P. Sanderson II, MPH

**See Also**
- [https://cran.r-project.org/package=uwot](https://cran.r-project.org/package=uwot) (CRAN)
- [https://github.com/jlmelville/uwot](https://github.com/jlmelville/uwot) (GitHub)
- [https://github.com/jlmelville/uwot](https://github.com/jlmelville/uwot) (arXiv paper)

**Examples**
```r
library(healthyR.data)
library(healthyR)
library(dplyr)
library(broom)
library(ggplot2)

data_tbl <- healthyR_data %>%
  filter(ip_op_flag == "I") %>%
  filter(payer_grouping != "Medicare B") %>%
  filter(payer_grouping != "?") %>%
  select(service_line, payer_grouping)
```
```r
mutate(record = 1) %>%
as_tibble()

uit_tbl <- kmeans_user_item_tbl(
  .data = data_tbl,
  .row_input = service_line,
  .col_input = payer_grouping,
  .record_input = record
)

kmm_tbl <- kmeans_mapped_tbl(uit_tbl)

ump_lst <- umap_list(.data = uit_tbl, kmm_tbl, 3)

umap_plt(.data = ump_lst, .point_size = 3)
```
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