Package 'shinyHugePlot'

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Type Package

Title Efficient Plotting of Large-Sized Data

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Maintainer Junta Tagusari <j.tagusari@eng.hokudai.ac.jp>

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  (>= 1.4.0), nanotime (>= 0.3.6), assertthat (>= 0.2.1), bit64
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  0.2.2), shinyjs (>= 2.1.0), htmltools (>= 0.5.2), rlang (>=
  1.0.5), duckdb (>= 1.0.0), DBI (>= 1.2.2)

Suggests testthat

Description A tool to plot data with a large sample size using 'shiny' and 'plotly'.
  Relatively small samples are obtained from the original data using a specific algorithm.
  The samples are updated according to a user-defined x range.
  Jonas Van Der Donckt, Jeroen Van Der Donckt, Emiel Deprost (2022) <https:
  //github.com/predict-idlab/plotly-resampler>.

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Author Junta Tagusari [aut, cre, cph],
  Jonas Van Der Donckt [cph],
  Jeroen Van Der Donckt [cph],
  Emiel Deprost [cph]

Repository CRAN

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Contents

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aggregator   *R6 base class for the aggregation*

Description

A base class for the aggregation, which defines the structure of the class and is not available on a stand-alone basis.

Format

An `R6::R6Class` object

Active bindings

parameters Parameters for the aggregation, returned as a named list. Generate a matrix using x and n_out Apply function for nanotime

Methods

> **Public methods:**
>
> - [aggregator$new()](#)
> - [aggregator$aggregate()](#)
> - [aggregator$set_parameters()](#)
> - [aggregator$clone()](#)
>
> **Method** new(): Constructor of aggregator
>
> *Usage:*
> ```
> aggregator$new(
>   ...,
>   interleave_gaps = FALSE,
>   NA_position = "begin",
>   coef_gap = 3
> )
> ```
> *Arguments:*
>
> ... Not used.
>
> interleave_gaps, NA_position, coef_gap Arguments passed to self$set_parameters, optional.
>
> **Method** aggregate(): Aggregates the given input and returns samples.
>
> *Usage:*
> ```
> aggregator$aggregate(x, y, n_out, db = NULL)
> ```
> *Arguments:*
>
> x, y Indexes and values that has to be aggregated.
>
> n_out Integer or numeric.
>
> db Character. The duck-db that contains the x-y data. The number of samples that the aggregated data contains.
>
> **Method** set_parameters(): Setting of the parameters for the aggregation
>
> *Usage:*
> ```
> aggregator$set_parameters(..., interleave_gaps, NA_position, coef_gap)
> ```
> *Arguments:*
>
> ... Not used.
>
> interleave_gaps Boolean, optional. Whether NA values should be added when there are gaps / irregularly sampled data. Irregular gaps between samples are determined whether the gap is larger than the median of the sample gaps times the coefficient for detecting irregular gaps. By default, FALSE.
>
> NA_position Character, optional. Indicates where NAs are placed when gaps are detected. If "end", the first point after a gap will be replaced. If "begin", the last point before a gap will be replaced. If "both", both the encompassing gap data points are replaced. This parameter is only effective when interleave_gaps == TRUE. By default, "begin".
>
> coef_gap Numeric, optional. The coefficient to detect irregular gaps. By default, 3.0.

accepted_datatype Character, optional. This parameter indicates the supported data classes.
    If all data classes are accepted, set it to NULL.

Method clone(): The objects of this class are cloneable with this method.

Usage:

aggregator$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

---

candlestick_aggregator

Aggregation which returns the candle sticks

Description

This aggregator divides the data into no-overlapping intervals and calculate the first, maximum,
minimum, and last values of the data, which represents candle sticks.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> candlestick_aggregator

Methods

Public methods:

- candlestick_aggregator$new()
- candlestick_aggregator$clone()

Method new(): Constructor of the aggregator.

Usage:

candlestick_aggregator$new(..., interleave_gaps, coef_gap, NA_position)

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator
    object.

yupr, y, ylwr Functions. Statistical values are calculated using this function. By default, max,
    mean, min, respectively. Note that the NA values are omitted automatically.

Method clone(): The objects of this class are cloneable with this method.

Usage:

candlestick_aggregator$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- candlestick_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(nanotime::as.nanotime(noise_fluct$time), noise_fluct$f500, 100)
fig <- plotly::plot_ly(
  x = d_agg$x, open = d_agg$open, high = d_agg$high, low = d_agg$low, close = d_agg$close,
  type = "candlestick"
  )
```

---

custom_func_aggregator

Aggregation using a user-defined function.

Description

Arbitrary function can be applied using this aggregation class.

Format

An `R6::R6Class` object

Super class

`shinyHugePlot::aggregator` -> `custom_func_aggregator`

Methods

Public methods:

- custom_func_aggregator$new()
- custom_func_aggregator$set_aggregation_func()
- custom_func_aggregator$clone()

Method new(): Constructor of the Aggregator.

Usage:
```
custom_func_aggregator$new(
  ...,
  aggregation_func,
  interleave_gaps,
  coef_gap,
  NA_position
)
```

Arguments:

aggregation_func Function. User-defined function to aggregate data, of which arguments are x, y and n_out.

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of `aggregator`
    object.

Method `set_aggregation_func()`: Set a function to aggregate the data

Usage:

`custom_func_aggregator$set_aggregation_func(aggregation_func)`

Arguments:

`aggregation_func` Function. User-defined function to aggregate data, of which arguments are
    `x`, `y` and `n_out`.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

`custom_func_aggregator$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

Examples

```
custom_agg_func <- function(x, y, n_out) {
  bin_width <- floor(length(x)/n_out)
  x_idx <- seq(floor(bin_width / 2), bin_width * n_out, bin_width)
  y_mat <- y[1:(bin_width * n_out)] %>%
    matrix(nrow = bin_width)
  y_agg <- apply(y_mat, 2, quantile, probs = 0.25)
  return(list(x = x[x_idx], y = y_agg))
}
data(noise_fluct)
agg <- custom_func_aggregator$new(
  aggregation_func = custom_agg_func, interleave_gaps = TRUE
  )
d_agg <- agg$aggregate(
  x = noise_fluct$time, y = noise_fluct$f500, n_out = 1000
  )
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

custom_stat_aggregator

Aggregation which returns arbitrary statistics

Description

This aggregator divides the data into no-overlapping intervals and calculate specific statistical values
such as the mean.

Format

An `R6::R6Class` object

Super class

`shinyHugePlot::aggregator` -> `custom_stat_aggregator`

Methods

Public methods:

- [custom_stat_aggregator$new()](#)
- [custom_stat_aggregator$clone()](#)

Method `new()`: Constructor of the Aggregator.

Constructor of the Aggregator.

Usage:

```
custom_stat_aggregator$new(
  ...,
  y_func = mean,
  x_mean = TRUE,
  interleave_gaps,
  coef_gap,
  NA_position
)
```

Arguments:

`y_func` Function. Statistical values are calculated using this function. By default, `mean`.

`x_mean` Boolean. Whether using the mean values or not for the x values. If not, the x values that give the specific y values are used. E.g., if you use `max` as the `aggregation_func` and set this argument to `FALSE`, x values that give the maximum y values are used. By default, `TRUE`.

`interleave_gaps, coef_gap, NA_position, ...` Arguments pass to the constructor of `aggregator` object.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
custom_stat_aggregator$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- custom_stat_aggregator$new(y_func = mean, interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

downsampler   *R6 class for down-sampling data*

Description

A class for down-sampling data with a large number of samples. An instance contains (the reference of) original data, layout of the figure, and options for aggregating the original data. An interactive plot for displaying large-sized data can be obtained using the figure, down-sampler and its options included in the instance, while making the plot using `shiny_hugeplot` function is easier (see examples). See the super class (`plotly_datahandler`) to find more members to handle the data in `plotly`.

Format

An `R6::R6Class` object

Super class

`shinyHugePlot::plotly_datahandler` -> `downsampler`

Active bindings

downsample_options   Options for aggregating (down-sampling) data registered in this instance.

n_out_default   Default sample size.

aggregator_default   Default aggregator instance.

Methods

Public methods:

- downsampler$new()
- downsampler$add_trace()
- downsampler$update_trace()
- downsampler$set_downsample_options()
- downsampler$clone()

Method `new()`: To construct an instance, original data, layout of the figure, and options for aggregating the original data are necessary. The original data and the layout of the figure can be given by providing a `plotly` object (`figure` argument). The options for aggregating the original data can be given by providing an aggregator (`aggregator` argument) and the number of samples (`n_out` argument). See the constructor of the `plotly_datahandler` class for more information on other arguments.

    Usage:

```
downsampler$new(
  figure = NULL,
  formula = NULL,
  srcs = NULL,
  srcs_ext = list(),
  n_out = 1000L,
  aggregator = min_max_aggregator$new(),
  tz = Sys.timezone(),
  use_light_build = TRUE,
 legend_options = list(name_prefix = "<b style=\"color:sandybrown\">[S]</b> ",
  name_suffix = "", xdiff_prefix = "<i style=\"color:#fc9944\"> ~", xdiff_suffix =
    "</i>"),
  verbose = F
)
```

Arguments:

figure, srcs, srcs_ext, formula, legend_options, tz, use_light_build Arguments passed
    to `plotly_datahandler$new`.

n_out Integer or numeric. The number of samples shown after down-sampling. By default
    1000.

aggregator An instance of an R6 class for aggregation. Select an aggregation function. The
    list of the functions are obtained using `list_aggregators`. By default, `min_max_aggregator$new()`.

verbose Boolean. Whether detailed messages to check the procedures are shown. By default,
    `FALSE`.

Method `add_trace()`: Add a new series to the data registered in the instance. If a data frame
(`traces_df` argument) compliant with `self$orig_data` is given, it will be added to `self$orig_data`.
If attributes to construct a `plotly` object (`...` argument) are given, a data frame is constructed
and added. Options for aggregating data can be set using `aggregator` and `n_out` arguments. It is
a wrapper of `self$set_trace_data` and `self$set_downsample_options`. See these methods
for more information. Note that the traces of the figure are not updated with this method and
`self$update_trace` is necessary.

  Usage:
  ```
  downsampler$add_trace(..., traces_df = NULL, n_out = NULL, aggregator = NULL)
  ```
  Arguments:

  `...`, `traces_df` Arguments passed to `self$set_trace_data` (see the super class of `plotly_datahandler`)

  `n_out`, `aggregator` Arguments passed to `self$set_downsample_options`.

Method `update_trace()`: Update traces of the figure registered in the instance (`self$figure$x$data`)
according to re-layout order (`relayout_order` argument). Using `reset` and `reload` arguments,
traces are updated without re-layout orders. It just registers the new traces and returns nothing by
default. It returns the new traces if `send_trace` is `TRUE`.

  Usage:
  ```
  downsampler$update_trace(
    relayout_order = list(NULL),
    reset = FALSE,
    reload = FALSE,
  ```

```
    send_trace = FALSE
)
```

Arguments:

relayout_order Named list. A list generated by plotlyjs_relayout, which is obtained us-
    ing plotly::event_data. e.g., If you would like set the range of the 2nd x axis to [10.0,
    21.5], list(`xaxis2.range[0]` = 10.0, `xaxis2.range[1]` = 21.5). If you would like
    reset the range of the 1st x axis, list(xaxis.autorange = TRUE, xaxis.showspike =
    TRUE).

reset Boolean. If it is TRUE, all other arguments are neglected and the figure will be reset (all
    the ranges of x axes are initialized). By default, FALSE.

reload Boolean. If it is TRUE, the ranges of the figure are preserved but the aggregation will be
    conducted with the current settings. By default, FALSE.

send_trace Boolean. If it is TRUE, a named list will be returned, which contains the indexes of
    the traces that will be updated (trace_idx_update) and the updated traces (new_trace).
    By default, FALSE.

Method set_downsample_options(): In the instance, options for aggregating data are regis-
tered as data frame. (see self$downsample_options.) Using this method, the options can be
set.

Usage:

downsampler$set_downsample_options(uid = NULL, n_out = NULL, aggregator = NULL)

Arguments:

uid Character, optional. The unique id of the trace. If NULL, all the options registered in this
    instance are updated. By default, NULL.

n_out Numeric or integer, optional. The number of samples output by the aggregator. If NULL,
    the default value registered in this instance is used. By default, NULL.

aggregator aggregator object, optional. An instance that aggregate the data. If NULL, the
    default value registered in this instance is used.

Method clone(): The objects of this class are cloneable with this method.

Usage:

downsampler$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)

# example 1 : Easy method using shiny_hugeplot
shiny_hugeplot(noise_fluct$time, noise_fluct$f500)

# example 2 : Manual method using a downsampler object
fig <- plot_ly(
  x = noise_fluct$time,
  y = noise_fluct$f500,
```

```
    type = "scatter",
    mode = "lines"
    ) %>%
    layout(xaxis = list(type = "date")) %>%
    shinyHugePlot::plotly_build_light()

ds <- downsampler$new(
  figure = fig,
  aggregator = min_max_aggregator$new(interleave_gaps = TRUE)
)

ui <- fluidPage(
  plotlyOutput(outputId = "hp", width = "800px", height = "600px")
)

server <- function(input, output, session) {

  output$hp <- renderPlotly(ds$figure)

  observeEvent(plotly::event_data("plotly_relayout"),{
    updatePlotlyH(session, "hp", plotly::event_data("plotly_relayout"), ds)
  })

}

shinyApp(ui = ui, server = server)


# example 3 : Add another series of which aggregator is different

noise_events <- tibble(
  time = c("2022-11-09 12:25:50", "2022-11-09 12:26:14"),
  level = c(60, 60)
)

ds$add_trace(
  x = noise_events$time, y = noise_events$level, name = "event",
  type = "scatter", mode = "markers",
  aggregator = null_aggregator$new()
)
ds$update_trace(reset = TRUE)

server <- function(input, output, session) {

  output$hp <- renderPlotly(ds$figure)

  observeEvent(plotly::event_data("plotly_relayout"),{
    updatePlotlyH(session, "hp", plotly::event_data("plotly_relayout"), ds)
  })

}

shinyApp(ui = ui, server = server)
```

---

eLTTB_aggregator   *Aggregation using local minimum and maximum values, and Largest Triangle Three Buckets (LTTB) method.*

Description

Efficient version off LTTB by first reducing really large data with the `min_max_ovlp_aggregator` and then further aggregating the reduced result with `LTTB_aggregator`.

Format

An `R6::R6Class` object

Super class

`shinyHugePlot::aggregator` -> `eLTTB_aggregator`

Public fields

`LTTB` An R6 LTTB_aggregator instance

`minmax` An R6 `min_max_ovlp_aggregator` instance

Methods

Public methods:

- [eLTTB_aggregator$new()]
- [eLTTB_aggregator$clone()]

Method `new()`: Constructor of the aggregator.

Usage:

`eLTTB_aggregator$new(..., interleave_gaps, coef_gap, NA_position)`

Arguments:

`...` Arguments pass to the constructor of `aggregator`, `LTTB_aggregator` and `min_max_oblp_aggregator` objects.

`interleave_gaps, coef_gap, NA_position` Arguments pass to the constructor of `aggregator` object.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

`eLTTB_aggregator$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- eLTTB_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

list_aggregators   *Show the aggregation functions*

Description

It displays all the aggregators registered in the package. No arguments are necessary.

Usage

```
list_aggregators()
```

Examples

```
list_aggregators()
```

LTTB_aggregator   *Aggregation using Largest Triangle Three Buckets (LTTB) method.*

Description

The LTTB method aggregates the huge samples using the areas of the triangles formed by the samples. Numerical distances are employed in this class, which requires the ratio between x and y values. When the x is datetime, nanosecond is a unit. When the x is factor or character, it will be encoded into numeric codes.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> LTTB_aggregator

Methods

Public methods:

- [LTTB_aggregator$new()](#)
- [LTTB_aggregator$clone()](#)

Method new(): Constructor of the aggregator.

Usage:
```
LTTB_aggregator$new(
  ...,
  nt_y_ratio = 1e+09,
  x_y_ratio = 1,
  interleave_gaps,
  coef_gap,
  NA_position
)
```

Arguments:

x_y_ratio, nt_y_ratio Numeric. These parameters set the unit length of the numeric x and
   nanotime x. For example, setting x_y_ratio to 2 is equivalent to assuming 2 is the unit
   length of x (and 1 is always the unit length of y). The unit length is employed to calculate
   the area of the triangles.

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator
   object. Note that accepted_datatype has default value. Downsample with the Largest Tri-
   angle Three Buckets (LTTB) aggregation method

Method clone(): The objects of this class are cloneable with this method.

Usage:
```
LTTB_aggregator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- LTTB_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(
  x = noise_fluct$time, y = noise_fluct$f500, n_out = 1000
  )
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

max_aggregator *Aggregation using local maximum (absolute) values.*

Description

Divide the data into small data ranges and find the maximum (absolute) value of each. It may be useful for the waveform data.

Format

An `R6::R6Class` object

Super class

`shinyHugePlot::aggregator` -> `max_aggregator`

Methods

Public methods:

- `max_aggregator$new()`
- `max_aggregator$clone()`

Method `new()`: Constructor of the Aggregator.

Usage:

`max_aggregator$new(..., interleave_gaps, coef_gap, NA_position, use_abs = TRUE)`

Arguments:

`interleave_gaps, coef_gap, NA_position, ...` Arguments pass to the constructor of `aggregator` object.

`use_abs` Logical. If `TRUE`, the absolute value is used.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

`max_aggregator$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- max_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

min_max_aggregator   *Aggregation using local minimum and maximum values.*

Description

Divide the data into small data ranges and find the maximum and minimum values of each. Note that many samples may be replaced with NA, if interleave_gaps = TRUE and the original data is increased or decreased monotonically. Use min_max_ovlp_aggregator instead in that case. n_out must be even number.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> min_max_aggregator

Methods

Public methods:

- [min_max_aggregator$new()](#min_max_aggregatornew)
- [min_max_aggregator$clone()](#min_max_aggregatorclone)

Method new(): Constructor of the Aggregator.

Usage:

min_max_aggregator$new(..., interleave_gaps, coef_gap, NA_position)

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator object.

Method clone(): The objects of this class are cloneable with this method.

Usage:

min_max_aggregator$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- min_max_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

min_max_ovlp_aggregator

Aggregation using local minimum and maximum values of which small data ranges have 50% overlaps.

Description

Divide the data into 50% overlapping intervals and find the maximum and minimum values of each. n_out must be even number.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> min_max_ovlp_aggregator

Methods

Public methods:

- min_max_ovlp_aggregator$new()
- min_max_ovlp_aggregator$clone()

Method new(): Constructor of the Aggregator.

Usage:

min_max_ovlp_aggregator$new(..., interleave_gaps, coef_gap, NA_position)

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator object.

Method clone(): The objects of this class are cloneable with this method.

Usage:

min_max_ovlp_aggregator$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- min_max_ovlp_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

noise_fluct | *Time-series fluctuations in sound level*

Description

Results of the measurement of the sound level, where peaks due to road traffic are observed.

Usage

```
noise_fluct
```

Format

A data frame with 32,001 rows and 4 columns:

time time

f500, f1000, f2000 Octave-band sound levels whose center frequencies are 500, 1000 and 2000 Hz.

Author(s)

Junta Tagusari <j.tagusari@eng.hokudai.ac.jp>

---

nth_pnt_aggregator | *Aggregation which returns every Nth point.*

Description

Aggregation by extracting every Nth data.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> nth_pnt_aggregator

Methods

Public methods:

- nth_pnt_aggregator$new()
- nth_pnt_aggregator$clone()

Method new(): Constructor of the Aggregator.

Usage:

```
nth_pnt_aggregator$new(..., interleave_gaps, coef_gap, NA_position)
```

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator
    object.

Method clone(): The objects of this class are cloneable with this method.

Usage:

```
nth_pnt_aggregator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- nth_pnt_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500, 1000)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines")
```

---

    null_aggregator   *NULL aggregator.*

Description

It does not aggregate the data but returns the full samples within the range.

Format

An R6::R6Class object

Super class

shinyHugePlot::aggregator -> null_aggregator

Methods

Public methods:

- null_aggregator$new()
- null_aggregator$aggregate()
- null_aggregator$clone()

Method new(): Constructor of the Aggregator.

Usage:

```
null_aggregator$new(..., interleave_gaps, coef_gap, NA_position)
```

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of `aggregator`
      object.

Method `aggregate()`: A function that does nothing other than inserting NAs.

Usage:

`null_aggregator$aggregate(...)`

Arguments:

`...` Arguments passed to `super$aggregate`.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

`null_aggregator$clone(deep = FALSE)`

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- null_aggregator$new(interleave_gaps = TRUE)
d_agg <- agg$aggregate(noise_fluct$time, noise_fluct$f500)
plotly::plot_ly(
  x = d_agg$x[1:100], y = d_agg$y[1:100], type = "scatter", mode = "lines"
)
```

---

  plotly_build_light   *Build* plotly *data with low computation cost*

Description

Before illustrating data using `plotly`, it must be built (`figure$x$data` are need to be made using
`figure$x$attrs`). However, because a lot of procedures are necessary, the computation cost is
relatively high. With this function, the data is built in quite short time by omitting several proce-
dures for high-frequency data. Note that this function is not universally applicable to all `plotly`
objects but made for high-frequency scatter data. `plotly::plotly_build` function may return
better results in specific cases although it takes more time.

Usage

```
plotly_build_light(fig, vars_hf = c("x", "y", "text", "hovertext"))
```

Arguments

fig	plotly object. Note that `fig$x$attrs` is not NULL and each `fig$x$attrs` element has an element named x. This function generates `fig$x$data` using `fig$x$attrs`.
vars_hf	Character, optional. Variable names where high frequency data is included. It must include x.

Value

built `plotly` object

Examples

```
data(noise_fluct)
plotly_build_light(
  plotly::plot_ly(
    x = noise_fluct$time,
    y = noise_fluct$f500,
    name = "level",
    type = "scatter"
  )
)

plotly_build_light(
  plotly::plot_ly(
    data = noise_fluct,
    x = ~time,
    y = ~f500,
    name = "level",
    type = "scatter"
  )
)
```

---

plotly_datahandler   *R6 class for handling plotly data*

Description

A class for handling `plotly` data, which defines functions used in the `downsampler` class

Format

An `R6::R6Class` object

Public fields

`figure` `plotly` object.

Active bindings

`orig_data` Data frame representing `plotly` traces.

`trace_df_default` Data frame representing default values of `plotly` traces. `name` column represents the names of the attributes. `required` column represents whether the attributes are necessary to construct a data frame of a trace. `data` column represents whether the attributes are the data. `default` attributes represents default values of the attributes. When constructing a data frame of a trace, default values are used if no values are assigned. `class` column represents the acceptable classes of the attributes.

Methods

Public methods:

- plotly_datahandler$new()
- plotly_datahandler$set_trace_data()
- plotly_datahandler$srcs_to_df()
- plotly_datahandler$plotly_data_to_df()
- plotly_datahandler$clone()

Method new()**:** Constructing an instance. The data contained in a plotly object (figure argument) will be included in the instance (as a reference).

Usage:

```
plotly_datahandler$new(
  figure = NULL,
  srcs = NULL,
  formula = NULL,
  srcs_ext = NULL,
 legend_options = list(name_prefix = "<b style=\"color:sandybrown\">[S]</b> ",
  name_suffix = "", xdiff_prefix = "<i style=\"color:#fc9944\"> ~", xdiff_suffix =
    "</i>"),
  tz = Sys.timezone(),
  use_light_build = TRUE
)
```

Arguments:

figure plotly object. The traces of this object will be down-sampled.

srcs, srcs_ext, formula Character and formula, optional. srcs is the path of the source data (or directory). When a directory is specified, srcs_ext is the extension of the source file. formula is the formula to extract the data from the source data.

legend_options Named list, optional. Names of the elements are name_prefix, name_suffix, xdiff_prefix, and xdiff_suffix. name_prefix and name_suffix will be added to the name of the trace when the down-sampling is applied. By default, prefix is a bold orange [S] and suffix is none. xdiff_prefix and xdiff_suffix are employed to show the mean aggregation size of the down-sampling.

tz Character, optional. Time zone used to display time-series data. By default Sys.timezone().

use_light_build Boolean, optional. Whether plotly_build_light is used. It quickly build scatter-type plotly data. By default, TRUE.

Method set_trace_data()**:** In the instance, data is contained as a data frame (see self$orig_data for detailed information). Using this method, the data can be added or overwritten. If a data frame (traces_df argument) is given, it will be added to self$orig_data or reassigned as self$orig_data. If attributes to construct a plotly object (... argument) are given, a data frame is constructed and used.

Usage:

```
plotly_datahandler$set_trace_data(..., traces_df = NULL, append = FALSE)
```

Arguments:

... Arguments to constitute a `plotly` attributes, optional. For instance, `x`, `y`, `type`, and `mode` are applicable. See `plotly::plot_ly`.

`traces_df` Data frame, optional. Data frame whose format is agreed with `self$orig_data`. If `traces_df` is given, arguments in `...` are neglected.

`append` Boolean, optional. Whether the data is append or overwrite. By default, `FALSE` (the traces are overwritten).

Method `srcs_to_df()`: Covert the data contained in `srcs` file(s) to a duck-db. A minimum data and the path of the database will be returned.

Usage:

`plotly_datahandler$srcs_to_df(fml, srcs, srcs_ext = NULL)`

Arguments:

`fml` Formula. The formula to extract the data from the source data.

`srcs` Character. The name of the source file (e.g. data.parquet) or the directory can be specified.

`srcs_ext` Character, optional. The extension of the source file, if `srcs` is a directory.

Method `plotly_data_to_df()`: Covert the data contained in `plotly` object to a data frame. A unique id (`uid`) is granted to each data. The data frame will be returned.

Usage:

`plotly_datahandler$plotly_data_to_df(plotly_data, use_datatable = TRUE)`

Arguments:

`plotly_data` List. The list whose elements are named list representing `plotly` traces. All elements must have elements named `type`.

`use_datatable` Boolean. If it is `TRUE`, data such as `x` and `y` are nested in a `data.table`, of which key column is `x`. By default, `TRUE`.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

`plotly_datahandler$clone(deep = FALSE)`

Arguments:

`deep` Whether to make a deep clone.

---

range_stat_aggregator	*Aggregation which returns the ranges and nominal values within small data ranges*

Description

This aggregator divides the data into no-overlapping intervals and calculate specific statistics that represents the range and nominal values of the data, such as the max, min and mean.

Format

An `R6::R6Class` object

Super classes

shinyHugePlot::aggregator -> shinyHugePlot::rng_aggregator -> range_stat_aggregator

Methods

Public methods:

- range_stat_aggregator$new()
- range_stat_aggregator$clone()

Method new(): Constructor of the aggregator.

Usage:
```
range_stat_aggregator$new(
  ...,
  ylwr = min,
  y = mean,
  yupr = max,
  interleave_gaps,
  coef_gap,
  NA_position
)
```

Arguments:

yupr, y, ylwr Functions. Statistical values are calculated using this function. By default, max, mean, min, respectively. Note that the NA values are omitted automatically.

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator object.

Method clone(): The objects of this class are cloneable with this method.

Usage:
```
range_stat_aggregator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- range_stat_aggregator$new(
  ylwr = min, y = mean, yupr = max, interleave_gaps = TRUE
)
d_agg <- agg$aggregate(nanotime::as.nanotime(noise_fluct$time), noise_fluct$f500, 100)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines") %>%
  plotly::add_trace(x = d_agg$x, y = d_agg$ylwr, type = "scatter", mode = "lines")%>%
  plotly::add_trace(x = d_agg$x, y = d_agg$yupr, type = "scatter", mode = "lines")
```

---

rms_max_aggregator	*Aggregation which returns the rms and maximum values within small data ranges*

Description

This aggregator divides the data into no-overlapping intervals and calculate the root-mean-square and the maximum absolute values of the data, which may be helpful to understand the waveforms.

Format

An `R6::R6Class` object

Super classes

`shinyHugePlot::aggregator` -> `shinyHugePlot::rng_aggregator` -> `rms_max_aggregator`

Methods

Public methods:

- `rms_max_aggregator$new()`
- `rms_max_aggregator$clone()`

Method `new()`: Constructor of the aggregator.

Usage:

```
rms_max_aggregator$new(
  ...,
  interleave_gaps,
  coef_gap,
  NA_position,
  use_abs = TRUE
)
```

Arguments:

`interleave_gaps`, `coef_gap`, `NA_position`, `...` Arguments pass to the constructor of `aggregator` object.

`use_abs` Boolean. If 'TRUE', the maximum absolute values are calculated.

Method `clone()`: The objects of this class are cloneable with this method.

Usage:

```
rms_max_aggregator$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
data(noise_fluct)
agg <- rms_max_aggregator$new(
  ylwr = min, y = mean, yupr = max, interleave_gaps = TRUE
)
d_agg <- agg$aggregate(nanotime::as.nanotime(noise_fluct$time), noise_fluct$f500, 100)
plotly::plot_ly(x = d_agg$x, y = d_agg$y, type = "scatter", mode = "lines") %>%
  plotly::add_trace(x = d_agg$x, y = d_agg$ylwr, type = "scatter", mode = "lines")%>%
  plotly::add_trace(x = d_agg$x, y = d_agg$yupr, type = "scatter", mode = "lines")
```

---

rng_aggregator   *Aggregation that returns ranges of the data.*

Description

A super class for describing `aggregator` that returns x, y, ylwr and yupr values based on given x
and y data.

Format

An `R6::R6Class` object

Value

List of which elements represent the ranges. If there are no NAs, the length of the list is 1; multiple
lists are obtained if there are NAs. Each element of list has x and y values that surround the range of
values.

Super class

`shinyHugePlot::aggregator` -> `rng_aggregator`

Methods

Public methods:

- `rng_aggregator$new()`
- `rng_aggregator$as_plotly_range()`
- `rng_aggregator$as_range()`
- `rng_aggregator$clone()`

Method `new()`: Constructor of the Aggregator.

Usage:

`rng_aggregator$new(interleave_gaps, coef_gap, NA_position, ...)`

Arguments:

interleave_gaps, coef_gap, NA_position, ... Arguments pass to the constructor of aggregator object.

Method as_plotly_range(): Compute a plotly trace to illustrate the range of the data.

Usage:

rng_aggregator$as_plotly_range(x, y, ylwr, yupr, opacity = 0.5)

Arguments:

x, y, ylwr, yupr Outputs of the sub class of rng_aggregator.

opacity Numeric, optional. Opacity of the range fill. By default, 0.5.

Method as_range(): Compute x, ylwr and yupr from a plotly trace made by self$as_plotly_range.

Usage:

rng_aggregator$as_range(prng)

Arguments:

prng List that represents range values, which must contains x, y. Note that the list may be an element of a list generated by self$as_plotly_range.

Method clone(): The objects of this class are cloneable with this method.

Usage:

rng_aggregator$clone(deep = FALSE)

Arguments:

deep Whether to make a deep clone.

---

shinyHugePlot   *shinyHugePlot*

Description

An interactive plot for data with a large sample size using shiny andplotly can be obtained. For an easy application, see shiny_hugeplot function. For a manual application, see downsampler class.

Author(s)

Maintainer: Junta Tagusari <j.tagusari@eng.hokudai.ac.jp> [copyright holder]

Other contributors:

- Jonas Van Der Donckt [copyright holder]
- Jeroen Van Der Donckt [copyright holder]
- Emiel Deprost [copyright holder]

---

shiny_hugeplot   *Wrapper for plotting large-sized data using* shinyHugePlot

---

Description

This is a S3 class function to easily plot large-sized data using downsampler object including
plotly and shiny application. Using data that is given as a first argument, shiny application
will be constructed and (by default,) executed. As the first argument, many classes are applicable,
ranging from a numeric vector representing y values to a downsampler object containing original
data, layout of the figure and options for aggregating the original data.

Usage

```
shiny_hugeplot(obj, ...)

## Default S3 method:
shiny_hugeplot(
  obj = NULL,
  y = NULL,
  tz = Sys.timezone(),
  use_light_build = TRUE,
  plotly_options = list(type = "scatter", mode = "lines"),
  plotly_layout_options = list(),
  aggregator = min_max_aggregator$new(),
  n_out = 1000L,
  run_shiny = TRUE,
  downsampler_options = list(),
  shiny_options = list(),
  width = "100%",
  height = "600px",
  verbose = FALSE,
  ...
)

## S3 method for class 'formula'
shiny_hugeplot(
  obj = NULL,
  srcs = NULL,
  n_out = 1000L,
  aggregator = min_max_aggregator$new(),
  run_shiny = TRUE,
  use_light_build = TRUE,
  fread_options = list(),
  downsampler_options = list(),
  plotly_options = list(type = "scatter", mode = "lines"),
  plotly_layout_options = list(),
  shiny_options = list(),
```

```
    width = "100%",
    height = "600px",
    verbose = FALSE,
    ...
)

## S3 method for class 'character'
shiny_hugeplot(
  obj = NULL,
  n_out = 1000L,
  aggregator = min_max_aggregator$new(),
  run_shiny = TRUE,
  use_light_build = TRUE,
  fread_options = list(),
  downsampler_options = list(),
  plotly_options = list(type = "scatter", mode = "lines"),
  plotly_layout_options = list(),
  shiny_options = list(),
  width = "100%",
  height = "600px",
  verbose = FALSE,
  ...
)

## S3 method for class 'matrix'
shiny_hugeplot(
  obj = NULL,
  n_out = 1000L,
  aggregator = min_max_aggregator$new(),
  run_shiny = TRUE,
  use_light_build = TRUE,
  downsampler_options = list(),
  plotly_options = list(type = "scatter", mode = "lines"),
  plotly_layout_options = list(),
  shiny_options = list(),
  width = "100%",
  height = "600px",
  verbose = FALSE,
  ...
)

## S3 method for class 'data.frame'
shiny_hugeplot(
  obj = NULL,
  tz = Sys.timezone(),
  n_out = 1000L,
  aggregator = min_max_aggregator$new(),
  run_shiny = TRUE,
```

```
    use_light_build = TRUE,
    downsampler_options = list(),
    plotly_options = list(type = "scatter", mode = "lines"),
    plotly_layout_options = list(),
    shiny_options = list(),
    width = "100%",
    height = "600px",
    verbose = FALSE,
    ...
)

## S3 method for class 'plotly'
shiny_hugeplot(
    obj,
    n_out = 1000L,
    aggregator = min_max_aggregator$new(),
    run_shiny = TRUE,
    use_light_build = TRUE,
    downsampler_options = list(),
    shiny_options = list(),
    width = "100%",
    height = "600px",
    verbose = FALSE,
    ...
)

## S3 method for class 'downsampler'
shiny_hugeplot(
    obj,
    run_shiny = TRUE,
    shiny_options = list(),
    width = "100%",
    height = "600px",
    verbose = FALSE,
    ...
)
```

Arguments

obj   Numeric/nanotime/POSIXt vector, numeric matrix, data.frame, single character
                    string, plotly object, or downsampler object. If a numeric vector is given, it
                    will be used as y values of the figure of the shiny application (the x values are
                    calculated by seq_along(obj)). It will be interpreted as the x values if you use
                    y argument together. If a nanotime (see nanotime package) vector is given,
                    it will be used as the x values (y argument is mandatory). If a numeric matrix
                    is given, which must have more than 2 columns, the first and second column
                    values will be used as the x and y values. If a data frame is given, which must
                    have columns named x and y, these columns will be used as the x and y values.
                    If a single character string is given, it will be used as a file path to obtain a

	data frame (data frame will be loaded using `data.table::fread`). If a `plotly` object is given, the data and layout of it will be used for constructing the figure of the `shiny` application. If a `downsampler` object is given, the data, layout, and down-sampling options for aggregating original data of it will be used for constructing `shiny` application. If a `formula` is given, the data will be saved and loaded using duck-db. The sources of the data (`srcs`) must be given as a character string
`...`	Not used.
`y`	Numeric vector, optional. y values of the figure of `shiny` application, which is required if the `obj` argument is used as the x values.
`tz`	Timezone, optional. It is used to convert the `nanotime` to the time displayed in the figure. By default, `Sys.timezone()`.
`use_light_build`	Boolean, optional. Whether `shinyHugePlot::plotly_build_light` will be used. (if `FALSE`, `plotly::plotly_build` will be used) By default, `TRUE`.
`plotly_options`	Named list, optional. Arguments passed to `plotly::plot_ly`.
`plotly_layout_options`	Named list, optional. Arguments passed to `plotly::layout`.
`aggregator`	Instance of R6 classes for aggregating data, optional. The classes can be listed using `list_aggregators`. By default, `min_max_aggregator$new()`.
`n_out`	Integer, optional. Number of samples get by the down-sampling. By default, 1000.
`run_shiny`	Boolean, optional. whether a generated `shiny` application will be launched. By default, `TRUE`.
`downsampler_options`	Named list, optional. Arguments passed to `downsampler$new`. Note that use `aggregator` and `n_out` arguments if you want to set these arguments.
`shiny_options`	Named list, optional. Arguments passed to `shinyApp` function.
`width, height`	Character, optional. Arguments passed to `plotlyOutput`. By default, `100%` and `600px`.
`verbose`	Boolean. Whether detailed messages to check the procedures are shown. By default, `FALSE`.
`srcs`	Character, used when a `formula` is given as the `obj`.
`fread_options`	Named list, optional. Arguments passed to `data.table::fread`, which is used if a single character string is given as the `obj`.

Examples

```
data(noise_fluct)

shiny_hugeplot(noise_fluct$f500)
shiny_hugeplot(noise_fluct$time, noise_fluct$f500)
```

---

updatePlotlyH   *Function to call a method to update* plotly *traces*

Description

It is used by registering in a shiny application. It receives events in plotly figure and update it using a method of a downsampler instance. See the examples in downsampler class.

Usage

```
updatePlotlyH(
  session,
  outputId,
  relayout_order,
  ds_obj,
  reset = FALSE,
  reload = FALSE,
  verbose = FALSE
)
```

Arguments

session	session object. The object passed to function given to shinyServer.
outputId	Character. The outputId of the figure, whose data will be down-sampled
relayout_order	Named list. The list generated by plotlyjs_relayout, which is obtained using plotly::event_data.
ds_obj	downsampler instance. The instance containing original data of the figure, which is also used for updating the traces of plotly.
reset	Boolean. It it is TRUE, the figure will be updated even if relayout_order is NULL. The ranges of x axes are reset (initialized).
reload	Boolean. It it is TRUE, the figure will be updated even if relayout_order is NULL. The ranges of x axes are preserved.
verbose	Boolean. Whether detailed messages to check the procedures are shown. By default, FALSE.

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