Package ‘InteractiveComplexHeatmap’

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Type Package

Title Make Interactive Complex Heatmaps

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Depends R (>= 4.0.0), ComplexHeatmap (>= 2.11.0)

Imports grDevices, stats, shiny, grid, GetoptLong, S4Vectors (>= 0.26.1), digest, IRanges, kableExtra (>= 1.3.1), utils, svglite, htmltools, clisymbols, jsonlite, RColorBrewer, fontawesome

Suggests knitr, markdown, testthat, EnrichedHeatmap, GenomicRanges, data.table, circlize, GenomicFeatures, tidyverse, tidyHeatmap, cluster, org.Hs.eg.db, simplifyEnrichment, GO.db, SC3, GOexpress, SingleCellExperiment, scater, gplots, pheatmap, airway, DESeq2, DT, cola, BiocManager, gridtext, HilbertCurve (>= 1.21.1), shinydashboard, SummarizedExperiment, pkgndep, ks

VignetteBuilder knitr

Description This package can easily make heatmaps which are produced by the ComplexHeatmap package into interactive applications. It provides two types of interactivities:
1. on the interactive graphics device, and 2. on a Shiny app. It also provides functions for integrating the interactive heatmap widgets for more complex Shiny app development.

biocViews Software, Visualization, Sequencing

URL https://github.com/jokergoo/InteractiveComplexHeatmap

BugReports https://github.com/jokergoo/InteractiveComplexHeatmap/issues

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git_url https://git.bioconductor.org/packages/InteractiveComplexHeatmap

git_branch RELEASE_3_19

git_last_commit db888a9

git_last_commit_date 2024-04-30
Description

Get all column indices from the selected data frame

Usage

all_column_indices(df)
**all_row_indices**

**Arguments**

- `df` The selected data frame.

**Examples**

```r
# There is no example
NULL
```

---

**getPositionFromBrush**

Get the position of the brushed area on the heatmap image

**Description**

Get the position of the brushed area on the heatmap image

**Usage**

```r
getPositionFromBrush(brush, ratio = 1)
```

**Arguments**

- `brush` The input brush object. Assume `heatmap_brush` is the ID set to argument `brush` in `plotOutput`, then the value here is `input$heatmap_brush`.
- `ratio` The relative resolution. The value should the ratio between `res` set in `makeInteractiveComplexHeatmap` and 72 (`res/72`).
getPositionFromClick

Value
A list of length two. The two elements correspond to the coordinates of the two diagonal points.

See Also
getPositionFromClick, getPositionFromHover, getPositionFromDblclick.

Examples
# There is no example
NULL

getDescriptionFromClick

Get the position of clicked point on the heatmap image

Usage
getPositionFromClick(click, ratio = 1)

Arguments

- **click**: The input click object. Assume heatmap_click is the ID set to argument click in plotOutput, then the value here is input$heatmap_click.
- **ratio**: The relative resolution. The value should be the ratio between res set in makeInteractiveComplexHeatmap and 72 (res/72).

Value
A unit object of length two which are the coordinates of the clicked points.

See Also
getPositionFromBrush, getPositionFromHover, getPositionFromDblclick.

Examples
# There is no example
NULL
getPositionFromDblclick

Get the position of double clicked point on the heatmap image

Description
Get the position of double clicked point on the heatmap image

Usage
getPositionFromDblclick(dblclick, ratio = 1)

Arguments
- dblclick: The input dblclick object. Assume heatmap_dblclick is the ID set to argument dblclick in plotOutput, then the value here is input$heatmap_dblclick.
- ratio: The relative resolution. The value should the ratio between res set in makeInteractiveComplexHeatmap and 72 (res/72).

Value
A unit object of length two which are the coordinates of the double clicked points.

Examples
```r
# There is no example
NULL
```

getPositionFromHover

Get the position of hovered point on the heatmap image

Description
Get the position of hovered point on the heatmap image

Usage
getPositionFromHover(hover, ratio = 1)

Arguments
- hover: The input hover object. Assume heatmap_hover is the ID set to argument hover in plotOutput, then the value here is input$heatmap_hover.
- ratio: The relative resolution. The value should the ratio between res set in makeInteractiveComplexHeatmap and 72 (res/72).
Value

A unit object of length two which are the coordinates of the hover points.

Examples

# There is no example
NULL

HeatmapInfoOutput UI for the output

Description

UI for the output

Usage

HeatmapInfoOutput(heatmap_id, title = NULL, width = 400,
 output_ui = default_output_ui(heatmap_id),
 output_ui_float = FALSE, action = NULL, response = NULL, internal = FALSE)

Arguments

heatmap_id ID of the plot.
title Title of the output.
width Width of the output div.
output_ui A htmlOutput or other *Output object (defined in shiny or other related packages).
output_ui_float Whether the UI defined by output_ui floats at the mouse positions.
action It is only used when output_ui_float = TRUE to properly bind the floating frame to the event on heatmap (i.e. click, hover or dblclick). If HeatmapInfoOutput is executed after originalHeatmapOutput, the value for it is automatically decided
response It is only used when output_ui_float = TRUE and response = "brush" or response = "brush-output", so that single clicking or hovering won’t have any effect, in other word, there is only response from brushing. If HeatmapInfoOutput is executed after originalHeatmapOutput, the value for it is automatically decided
internal Internally used.

See Also

originalHeatmapOutput, subHeatmapOutput.
htPositionsOnDevice

Examples

    # See examples on the help page of originalHeatmapOutput()


htPositionsOnDevice    Get heatmap positions on the graphics device

Description

Get heatmap positions on the graphics device

Usage

htPositionsOnDevice(ht_list = get_last_ht(), unit = "inch", valueOnly = FALSE, 
    include_annotation = FALSE, calibrate = TRUE)

Arguments

ht_list A HeatmapList-class object returned by draw,Heatmap-method or 
    draw,HeatmapList-method. If it is omitted, it uses the last generated 
    heatmap.
unit The unit.
valueOnly Whether only return the numeric values.
include_annotation Internally used.
calibrate Internally used.

Details

ht_list must have been already updated by draw() function. The function needs to be executed 
under a graphics device where the heatmap is written.

Value

It returns a DataFrame object of the position of every heatmap slice.

Examples

    if(dev.interactive()) {
        m = matrix(rnorm(100), 10)
        ht = Heatmap(m, row_km = 2, column_km = 2)
        ht = draw(ht)
        pos = htPositionsOnDevice(ht)
        InteractiveComplexHeatmap:::redraw_ht_vp(pos)
    }
htShiny

Interactive heatmaps as a Shiny app

Description

Interactive heatmaps as a Shiny app

Usage

htShiny(ht_list = get_last_ht(), title = NULL,
description = NULL, hline = TRUE, html = NULL,

  # parameters passed to InteractiveComplexHeatmapOutput()
heatmap_id = NULL, title1 = "Original heatmap", title2 = "Selected sub-heatmap",
width1 = ifelse(layout == "1|(2-3)", 800, 450),
height1 = ifelse(layout == "1-(2|3)", 700, 350),
width2 = 400,
height2 = 350,
width3 = ifelse(layout == "(1-2)|3", 800, 400),
layout = ifelse("brush" %in% response, "(1-2)|3", "1-3"), compact = FALSE,
action = "click", cursor = TRUE, response = c(action, "brush"),
brush_opt = list(stroke = "#f00", opacity = 0.6),
output_ui_float = FALSE,

  # specific for sub-heatmap
show_cell_fun = TRUE, show_layer_fun = TRUE,

  save = NULL, app_options = list())

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ht_list</td>
<td>A <code>Heatmap-class</code> or a <code>HeatmapList-class</code> object. If it is not specified, the last generated heatmap is used. The heatmap object should better be already updated by <code>draw()</code> function.</td>
</tr>
<tr>
<td>title</td>
<td>Title of the app.</td>
</tr>
<tr>
<td>description</td>
<td>Description of the app. The content will be wrapped by a <code>p</code> tag and inserted before the interactive heatmap widget.</td>
</tr>
<tr>
<td>hline</td>
<td>Whether to add the horizontal line (by <code>hr</code> tag) after description.</td>
</tr>
<tr>
<td>html</td>
<td>HTML fragment inserted below the heatmap. The value can be a string or be wrapped by <code>HTML</code>.</td>
</tr>
<tr>
<td>heatmap_id</td>
<td>Pass to <code>InteractiveComplexHeatmapOutput</code>.</td>
</tr>
<tr>
<td>title1</td>
<td>Pass to <code>InteractiveComplexHeatmapOutput</code>.</td>
</tr>
<tr>
<td>title2</td>
<td>Pass to <code>InteractiveComplexHeatmapOutput</code>.</td>
</tr>
<tr>
<td>width1</td>
<td>Pass to <code>InteractiveComplexHeatmapOutput</code>.</td>
</tr>
</tbody>
</table>
htShiny

height1 Pass to InteractiveComplexHeatmapOutput.
width2 Pass to InteractiveComplexHeatmapOutput.
height2 Pass to InteractiveComplexHeatmapOutput.
width3 Pass to InteractiveComplexHeatmapOutput.
layout Pass to InteractiveComplexHeatmapOutput.
compact Pass to InteractiveComplexHeatmapOutput.
action Pass to InteractiveComplexHeatmapOutput.
cursor Pass to InteractiveComplexHeatmapOutput.
response Pass to InteractiveComplexHeatmapOutput.
brush_opt Pass to InteractiveComplexHeatmapOutput.
output_ui_float Pass to InteractiveComplexHeatmapOutput.
show_cell_fun Whether show graphics made by cell_fun on the main heatmap?
show_layer_fun Whether show graphics made by cell_fun on the main heatmap?
save The value can be set to a folder name so that the shiny app is saved into several files.
app_options All pass to the options argument in shinyApp.

Details

With any Heatmap/HeatmapList object, directly send to htShiny() to create a Shiny app for the heatmap(s):

    htShiny(ht_list)

If the heatmaps are already drawn, ht_list can be omitted and the last heatmap object is retrieved automatically:

Heatmap(...) + other_heatmaps_or_annotations # or other functions that internally use Heatmap()
htShiny()

Value

A Shiny app object.

See Also

- https://jokergoo.shinyapps.io/interactive_complexheatmap/
- https://jokergoo.shinyapps.io/interactive_complexheatmap_vertical/
- https://jokergoo.shinyapps.io/interactive_densityheatmap/
- https://jokergoo.shinyapps.io/interactive_oncoprint/
- https://jokergoo.shinyapps.io/interactive_enrichedheatmap/
- https://jokergooo.shinyapps.io/interactive_upsetp/
• https://jokergoo.shinyapps.io/interactive_pheatmap/
• https://jokergoo.shinyapps.io/interactive_heatmap/
• https://jokergoo.shinyapps.io/interactive_heatmap_2/
• https://jokergoo.shinyapps.io/interactive_tidyheatmap/

There are also many examples that can be get with htShinyExample.

Examples

# use last generated heatmap
if(interactive() && dev.interactive()) {
  m = matrix(rnorm(100), 10)
  Heatmap(m)
  htShiny()
}

# by providing a heatmap/heatmap list
if(interactive()) {
  m = matrix(rnorm(100), 10)
  rownames(m) = 1:10
  colnames(m) = 1:10

  ht = Heatmap(m)
  ht = draw(ht)
  htShiny(ht)
}

# vertical heatmap list
if(interactive()) {
  m1 = matrix(rnorm(100), 10)
  rownames(m1) = 1:10
  colnames(m1) = 1:10
  ht1 = Heatmap(m1, row_km = 2, column_km = 2)

  m2 = matrix(sample(letters[1:10], 100, replace = TRUE), 10)
  ht2 = Heatmap(m2)

  ht_list = draw(ht1 + ht2)
  htShiny(ht_list)

  ht_list = ht1 %v% ht2
  htShiny(ht_list)
}

# compact mode
if(interactive()) {
  m = matrix(rnorm(100), 10)
  Heatmap(m)
  htShiny(compact = TRUE)
}
htShinyExample

Examples of interactive complex heatmaps

Description

Examples of interactive complex heatmaps

Usage

htShinyExample(which)

Arguments

which An index of which example to use. The list of all examples can be obtained by executing `htShinyExample` with no argument.

Details

In every example, there is a Shiny app opened, which also includes source code that generates this app.

Value

A Shiny app object.

Examples

```r
# list all examples
htShinyExample()

if(interactive()) {
  htShinyExample(4.2)
}
```

ht_shiny Interactive heatmaps as a Shiny app

Description

Interactive heatmaps as a Shiny app

Usage

ht_shiny(...)
**interactivate**

**Arguments**

... All goes to [htShiny](https://htshiny.org/).

**Value**

A Shiny app object.

**Examples**

```r
# There is no example
NULL
```

---

**interactivate**  
*Generic function for interactivate an object in an interactive Shiny app*

**Description**

Generic function for interactivate an object in an interactive Shiny app

**Usage**

`interactivate(x, ...)`

**Arguments**

- `x`  
  An object.

- `...`  
  Other arguments.

**Examples**

```r
# There is no example
NULL
```
Description

Visualize DESeq2 result in an interactive Shiny app

Usage

```r
## S3 method for class 'DESeqDataSet'
interactivate(x, res = DESeq2::results(x), seed = 123, ...)
```

Arguments

- `x`: A `DESeqDataSet` class object. It is normally returned by `DESeq`.
- `res`: The object returned by `results`.
- `seed`: Random seed. It is mainly set for the random colors of annotations.
- `...`: Other arguments.

Examples

```r
if(interactive()) {
  require(airway)
data(airway)
se = airway

  require(DESeq2)
dds = DESeqDataSet(se, design = ~ dex)
keep = rowSums(counts(dds)) >= 10
dds = dds[keep, ]
.dds$dex = relevel(dds$dex, ref = "untrt")
.dds = DESeq(dds)

  interactivate(dds)
}
```

Description

Interactive Shiny application for 2D density distribution
interactivateDensity2D

Interactive Shiny application for 2D density distribution

Description

Interactive Shiny application for 2D density distribution

Usage

interactivateDensity2D(x, y, ...)

Arguments

x A numeric vector.
y A numeric vector.
... All pass to kde.

Examples

if(interactive()) {
  lt = readRDS(system.file("extdata", "2d_density_xy.rds", package = "InteractiveComplexHeatmap"))
  interactivateDensity2D(lt$x, lt$y)
}

interactivateDensity2D

Interactive Shiny application for 2D density distribution

Usage

## S3 method for class 'kde'
interactivate(x, ...)

Arguments

x a kde object generated by kde.
...
Other arguments.

Examples

if(interactive()) {
  require(ks)
  lt = readRDS(system.file("extdata", "2d_density_xy.rds", package = "InteractiveComplexHeatmap"))
  data = cbind(lt$x, lt$y)
  fit = kde(data)
  interactivate(fit)
}

interactivateDensity2D

Interactive Shiny application for 2D density distribution

Usage

interactivateDensity2D(x, y, ...)

Arguments

x A numeric vector.
y A numeric vector.
... All pass to kde.

Examples

if(interactive()) {
  lt = readRDS(system.file("extdata", "2d_density_xy.rds", package = "InteractiveComplexHeatmap"))
  interactivateDensity2D(lt$x, lt$y)
}
Interactive Complex Heatmap Modal

Description

Interactive complex heatmap modal dialog

Usage

InteractiveComplexHeatmapModal(
  input, output, session, ht_list, heatmap_id = NULL,
  title1 = "Original heatmap", title2 = "Selected sub-heatmap",
  width1 = ifelse(layout == "1|(2-3)", 800, 450),
  height1 = ifelse(layout == "1-(2|3)", 700, 350),
  width2 = 370,
  height2 = 350,
  width3 = ifelse(layout == "(1-2)|3", 800, 370),
  layout = ifelse("brush" %in% response, "(1-2)|3", "1-3"),
  compact = FALSE,
  action = "click", cursor = TRUE, response = c(action, "brush"),
  brush_opt = list(stroke = "#f00", opacity = 0.6),
  output_ui = TRUE, output_ui_float = FALSE,
  # parameters passed to makeInteractiveComplexHeatmap()
  click_action = NULL, brush_action = NULL,
  # other configurations
  js_code = "", close_button = TRUE, cancel_action = c("remove", "hide"))

Arguments

input Passed from the Shiny server function.
output Passed from the Shiny server function.
session Passed from the Shiny server function.
ht_list A Heatmap-class or a HeatmapList-class object.
heatmap_id ID of the plot. If it is not specified, an internal ID is assigned.
title1 Pass to InteractiveComplexHeatmapOutput.
title2 Pass to InteractiveComplexHeatmapOutput.
width1 Pass to InteractiveComplexHeatmapOutput.
height1 Pass to InteractiveComplexHeatmapOutput.
width2 Pass to InteractiveComplexHeatmapOutput.
height2 Pass to InteractiveComplexHeatmapOutput.
InteractiveComplexHeatmapModal

width3 Pass to InteractiveComplexHeatmapOutput.
layout Pass to InteractiveComplexHeatmapOutput.
compact Pass to InteractiveComplexHeatmapOutput.
action Pass to InteractiveComplexHeatmapOutput.
cursor Pass to InteractiveComplexHeatmapOutput.
response Pass to InteractiveComplexHeatmapOutput.
brush_opt Pass to InteractiveComplexHeatmapOutput.
output_ui Pass to InteractiveComplexHeatmapOutput.
output_ui_float Pass to InteractiveComplexHeatmapOutput.
click_action Pass to makeInteractiveComplexHeatmap.
brush_action Pass to makeInteractiveComplexHeatmap.
js_code Additional JavaScript code that is put after the interactive heatmap UI. The value can be a text or a function that takes "heatmap ID" as the argument and returns the formatted JavaScript code.
close_button Whether to add a close button at the end of the widget. If it is FALSE, the widget can be closed by clicking outside of the widget.
cancel_action Whether to remove the UI from HTML or just hide it when the UI is closed.

Details
It creates an interactive heatmap "modal dialog" according to a certain action. The function is normally put inside observe or observeEvent.

Value
No value is returned.

Examples
if(interactive()) {
  require(ComplexHeatmap)

  ui = fluidPage(
    actionButton("show_heatmap", "Generate_heatmap"),
  )

  server = function(input, output, session) {
    m = matrix(rnorm(100), 10)
    ht = Heatmap(m)

    observeEvent(input$show_heatmap, {
      InteractiveComplexHeatmapModal(input, output, session, ht)
    })
  }
  shiny::shinyApp(ui, server)
}
InteractiveComplexHeatmapOutput

UI for the interactive complex heatmaps

Description
UI for the interactive complex heatmaps

Usage
InteractiveComplexHeatmapOutput(heatmap_id = NULL,
  title1 = "Original heatmap", title2 = "Selected sub-heatmap",
  title3 = if(output_ui_float) NULL else "Output",
  width1 = ifelse(layout == "1|(2-3)", 800, 450),
  height1 = ifelse(layout == "1-(2|3)", 700, 350),
  width2 = 400,
  height2 = 350,
  width3 = NULL,
  layout = ifelse("brush" %in% response, "(1-2)|3", "1-3"), compact = FALSE,
  action = "click", cursor = TRUE,
  response = c(action, "brush"),
  brush_opt = list(stroke = "#f00", opacity = 0.6),
  output_ui = default_output_ui(heatmap_id),
  output_ui_float = FALSE, containment = FALSE,
  internal = FALSE,
  ...
)

Arguments

heatmap_id ID of the plot. If it is not specified, an internal ID is assigned.
title1 Title of the original heatmap.
title2 Title of the sub-heatmap.
title3 Title of the output.
width1 Width of the original heatmap.
height1 Height of the original heatmap.
width2 Width of the sub-heatmap.
height2 Height of the sub-heatmap.
width3 Width of the output div.
layout One of "(1|2)-3", "1-(2|3)", "1-2-3", "1|2|3", "1|2-3". If brush is not set with the argument response, which means there is no sub-heatmap panel, the code 2 can be omitted.
compact If the value is TRUE, there will be no sub-heatmap, and output floats at the mouse position when click/hover on the original heatmap.
**action** Which action for selecting single cells on the heatmap? Value should be click, hover or dblclick.

**cursor** When moving mouse on heatmap, whether to show the cursors on the four sides?

**response** Which action needs to be responded on the server side? Value should be in click/hover/dblclick, brush and brush-output. brush responds in two places which are the sub-heatmap and the output components and brush-output only responds in the output component.

**brush_opt** A list of parameters passed to brushOpts. Do not set an ID for the brush. An internal brush ID is automatically set.

**output_ui** A htmlOutput or other *Output object (defined in shiny or other related packages). If it is set to NULL, there is no output component in the app.

**output_ui_float** Whether the UI defined by output_ui floats at the mouse positions.

**containment** Whether the resizing is restricted in a certain parent div? Value can be TRUE/FALSE or a JQuery selector.

**internal** Internally used.

... Pass to the UI container which is wrapped by fluidPage.

**Details**

This function generates HTML fragment for the interactive UI. See the example in makeInteractiveComplexHeatmap page.

**layout** is defined as follows (1 for the original heatmap, 2 for the selected sub-heatmap and 3 is for the output:

- "(1-2)|3": Heatmap and sub-heatmap are in a same row, and output is in a second row. This is the default layout.
- "1|(2-3)": Heatmap is in a single row, while sub-heatmap and output are in a second row.
- "1-2-3": All three components are in a same row.
- "1|2|3": Each component is in a single row.
- "1-(2|3)": Being different from the other four layouts, this is a two-column layout. Heatmap is in a sigle column. Sub-heatmap and output are vertically aligned and the two are in the second column.

The hover event is implemented with https://github.com/websanova/mousestop.

**Value**

A UI that can be used in Shiny.

**Examples**

```r
# There is no example
NULL
```
InteractiveComplexHeatmapWidget

Interactive complex heatmap widget

Description
Interactive complex heatmap widget

Usage

InteractiveComplexHeatmapWidget(
  input, output, session, ht_list, heatmap_id = NULL, output_id,
  # parameters passed to InteractiveComplexHeatmapOutput()
  title1 = "Original heatmap", title2 = "Selected sub-heatmap",
  width1 = ifelse(layout == "1|(2-3)", 800, 450),
  height1 = ifelse(layout == "1-(2|3)", 700, 350),
  width2 = 370,
  height2 = 350,
  width3 = ifelse(layout == "(1-2)|3", 800, 370),
  layout = ifelse("brush" %in% response, "(1-2)|3", "1-3"),
  compact = FALSE,
  action = "click", cursor = TRUE, response = c(action, "brush"),
  brush_opt = list(stroke = "#f00", opacity = 0.6),
  output_ui = TRUE, output_ui_float = FALSE,
  # parameters passed to makeInteractiveComplexHeatmap()
  click_action = NULL, brush_action = NULL,
  # other configurations
  js_code = "", close_button = TRUE, cancel_action = c("remove", "hide"))

Arguments

input Passed from the Shiny server function.
output Passed from the Shiny server function.
session Passed from the Shiny server function.
ht_list A Heatmap-class or a HeatmapList-class object.
heatmap_id ID of the plot. If it is not specified, an internal ID is assigned.
output_id Where the heatmap is put.
title1 Pass to InteractiveComplexHeatmapOutput.
title2 Pass to InteractiveComplexHeatmapOutput.
width1 Pass to InteractiveComplexHeatmapOutput.
height1 Pass to InteractiveComplexHeatmapOutput.
width2 Pass to InteractiveComplexHeatmapOutput.
**InteractiveComplexHeatmapWidget**

- **height** 2: Pass to `InteractiveComplexHeatmapOutput`.
- **width** 3: Pass to `InteractiveComplexHeatmapOutput`.
- **layout**: Pass to `InteractiveComplexHeatmapOutput`.
- **compact**: Pass to `InteractiveComplexHeatmapOutput`.
- **action**: Pass to `InteractiveComplexHeatmapOutput`.
- **cursor**: Pass to `InteractiveComplexHeatmapOutput`.
- **response**: Pass to `InteractiveComplexHeatmapOutput`.
- **brush_opt**: Pass to `InteractiveComplexHeatmapOutput`.
- **output_ui**: Pass to `InteractiveComplexHeatmapOutput`.
- **output_ui_float**: Pass to `InteractiveComplexHeatmapOutput`.
- **click_action**: Pass to `makeInteractiveComplexHeatmap`.
- **brush_action**: Pass to `makeInteractiveComplexHeatmap`.
- **js_code**: Additional JavaScript code that is put after the interactive heatmap UI. The value can be a text or a function that takes "heatmap ID" as the argument and returns the formatted JavaScript code.
- **close_button**: Whether to add a close button at the end of the widget.
- **cancel_action**: Whether to remove the UI from HTML or just hide it when the UI is closed.

**Details**

It creates an interactive heatmap widget according to a certain action. The UI is placed to the output ID that user defined.

The function is normally put inside `observe` or `observeEvent`.

**Value**

No value is returned.

**Examples**

```r
if(interactive()) {
  require(ComplexHeatmap)

  ui = fluidPage(
    actionButton("show_heatmap", "Generate_heatmap"),
    htmlOutput("heatmap_output")
  )

  server = function(input, output, session) {
    m = matrix(rnorm(100), 10)
    ht = Heatmap(m)

    observeEvent(input$show_heatmap, {
      InteractiveComplexHeatmapWidget(input, output, session, ht, output_id = "heatmap_output")
    })
  }
```

is_in_sub_heatmap

is_in_sub_heatmap Test whether it is in sub heatmap

Description
Test whether it is in sub heatmap

Usage
is_in_sub_heatmap()

Details
Normally, it is used in cell_fun/layer_fun.

Examples
# There is no example
NULL

makeInteractiveComplexHeatmap

Process heatmaps on the sever side

Description
Process heatmaps on the sever side

Usage
makeInteractiveComplexHeatmap(input, output, session, ht_list,
heatmap_id = shiny_env$current_heatmap_id,
click_action = NULL, hover_action = NULL,
dblclick_action = NULL, brush_action = NULL, res = 72,
show_cell_fun = TRUE, show_layer_fun = TRUE)
Arguments

- **input**: Passed from the Shiny server function.
- **output**: Passed from the Shiny server function.
- **session**: Passed from the Shiny server function.
- **ht_list**: A `Heatmap-class` or a `HeatmapList-class` object.
- **heatmap_id**: The corresponding heatmap ID from the UI. If there is only one interactive heatmap in the app, this argument does not need to be specified and it will use the current one used in `InteractiveComplexHeatmapOutput`.
- **click_action**: Additional actions on the server side when receiving a click event on the UI. This self-defined function should accept two or four arguments. If it is two arguments, they should be `df` and `output` and if it is four arguments, they should be `df`, `input`, `output`, and `session`.
- **hover_action**: Additional actions at the server side when receiving a hover event on the UI.
- **dblclick_action**: Additional actions at the server side when receiving a dblclick event on the UI.
- **brush_action**: Additional actions at the server side when receiving a brush event on the UI.
- **res**: Resolution of the plot, pass to `renderPlot`.
- **show_cell_fun**: Whether show graphics made by `cell_fun` on the main heatmap?
- **show_layer_fun**: Whether show graphics made by `cell_fun` on the main heatmap?

Value

No value is returned.

Examples

```r
if(interactive()) {
  ht = Heatmap(m)
  ht = draw(ht)

  ui = fluidPage(
    InteractiveComplexHeatmapOutput()
  )

  server = function(input, output, session) {
    makeInteractiveComplexHeatmap(input, output, session, ht)
  }

  shiny::shinyApp(ui, server)
}
```
originalHeatmapOutput

UI for the original heatmap

Description

UI for the original heatmap

Usage

originalHeatmapOutput(heatmap_id, title = NULL,
  width = 450, height = 350,
  action = "click", cursor = TRUE,
  response = c(action, "brush"),
  brush_opt = list(stroke = "#f00", opacity = 0.6),
  containment = FALSE, internal = FALSE)

Arguments

heatmap_id    ID of the plot.
title         Title of the original heatmap.
width          Width of the original heatmap.
height         Height of the original heatmap.
action         Which action for selecting single cells on the heatmap? Value should be click, hover or dblclick.
cursor        When moving mouse on heatmap, whether to show the cursors on the four sides?
response       Which action needs to be responded on the server side? Value should be in click/hover/dblclick, brush and brush-output. brush responds in two places which are the sub-heatmap and the output components and brush-output only responds in the output component.
brush_opt      A list of parameters passed to brushOpts. Do not set an ID for the brush. An internal brush ID is automatically set.
containment    Whether the resizing is restricted in a certain parent div? Value can be TRUE/FALSE or a JQuery selector.
internal       Internally used.

See Also

subHeatmapOutput, HeatmapInfoOutput.
Examples

```r
if(interactive()) {
  require(shinydashboard)
  m = matrix(rnorm(100), 10)
  ht = Heatmap(m)

  body = dashboardBody(
    fluidRow(
      box(title = "Original heatmap", width = 4, solidHeader = TRUE, status = "primary",
           originalHeatmapOutput("ht")
      ),
      box(title = "Sub-heatmap", width = 4, solidHeader = TRUE, status = "primary",
           subHeatmapOutput("ht")
      ),
      box(title = "Output", width = 4, solidHeader = TRUE, status = "primary",
           HeatmapInfoOutput("ht")
      )
    )
  )

  ui = dashboardPage(
    dashboardHeader(),
    dashboardSidebar(),
    body
  )

  server = function(input, output, session) {
    makeInteractiveComplexHeatmap(input, output, session, ht, "ht")
  }

  shinyApp(ui, server)
}
```

---

```r
data(rand_mat)
```

**rand_mat**

*A random matrix*

### Description

A random matrix

### Usage

data(rand_mat)

### Details

Following code was used to generate `rand_mat`:

```r
set.seed(123)
rand_mat = cbind(rbind(matrix(rnorm(20*20, mean = 1, sd = 0.5), nr = 20),
                       matrix(rnorm(20*20, mean = 0, sd = 0.5), nr = 20),
                       matrix(rnorm(20*20, mean = 0, sd = 0.5), nr = 20)),
```

```r
```
record_observation

```r
rbind(matrix(rnorm(20*20, mean = 0, sd = 0.5), nr = 20),
  matrix(rnorm(20*20, mean = 1, sd = 0.5), nr = 20),
  matrix(rnorm(20*20, mean = 0, sd = 0.5), nr = 20)),
rbind(matrix(rnorm(20*20, mean = 0.5, sd = 0.5), nr = 20),
  matrix(rnorm(20*20, mean = 0.5, sd = 0.5), nr = 20),
  matrix(rnorm(20*20, mean = 1, sd = 0.5), nr = 20))
) + matrix(rnorm(60*60, sd = 0.5), nr = 60)
colnames(rand_mat) = paste0("C", 1:60)
rownames(rand_mat) = paste0("R", 1:60)
```
selectArea

Select an area in the heatmap

Description
Select an area in the heatmap

Usage
selectArea(ht_list = get_last_ht(), pos1 = NULL, pos2 = NULL, mark = TRUE, verbose = TRUE, 
ht_pos = NULL, include_annotation = FALSE, calibrate = TRUE)

Arguments
ht_list A \texttt{HeatmapList-class} object returned by \texttt{draw,Heatmap-method} or \texttt{draw,HeatmapList-method}. 
If it is omitted, it uses the last generated heatmap.
mark Whether to mark the selected area as a rectangle.
pos1 If the value is \texttt{NULL}, it can be selected by click on the heatmap (of course, the 
heatmap should be on the interactive graphics device). If it is set, it must be a 
\texttt{unit} object with length two which corresponds to the x and y position of the 
point.
pos2 Another point as pos1, together with pos1 defines the selected region.
verbose Whether to print messages.
ht_pos A value returned by \texttt{htPositionsOnDevice}.
include_annotation Internally used.
calibrate Internally used. Mainly works for Rstudio desktop IDE.

Details
The regions can be selected interactively or selected manually by setting pos1 and pos2.

Value
A \texttt{DataFrame} object with row indices and column indices corresponding to the selected region.

Examples
if(dev.interactive()) {
  m = matrix(rnorm(100), 10)
  rownames(m) = 1:10
  colnames(m) = 1:10

  ht = Heatmap(m)
  ht = draw(ht)
  selectArea(ht)
```r
set.seed(123)
ht = Heatmap(m, row_km = 2, column_km = 2)
ht = draw(ht)
selectArea(ht)
}
```

### selectPosition

**Select a position in the heatmap**

#### Description

Select a position in the heatmap

#### Usage

```r
selectPosition(ht_list = get_last_ht(), pos = NULL, mark = TRUE, verbose = TRUE,
               ht_pos = NULL, calibrate = TRUE)
```

#### Arguments

- `ht_list`: A `HeatmapList-class` object returned by `draw,Heatmap-method` or `draw,HeatmapList-method`. If it is omitted, it uses the last generated heatmap.
- `mark`: Whether to mark the selected position as a point.
- `pos`: If the value is `NULL`, it can be selected by click on the heatmap (of course, the heatmap should be on the interactive graphics device). If it is set, it must be a `unit` object with length two which corresponds to the x and y position of the point.
- `verbose`: Whether to print messages.
- `ht_pos`: A value returned by `htPositionsOnDevice`.
- `calibrate`: Internally used. Mainly works for Rstudio desktop IDE.

#### Details

The regions can be selected interactively or selected manually by setting `pos`.

#### Value

A `DataFrame` object with row indices and column indices corresponding to the selected position.
Examples

```r
if(dev.interactive()) {
  m = matrix(rnorm(100), 10)
  rownames(m) = 1:10
  colnames(m) = 1:10

  ht = Heatmap(m)
  ht = draw(ht)
  selectPosition(ht)
}
```

---

**subHeatmapOutput**

*UI for the sub-heatmaps*

---

**Description**

UI for the sub-heatmaps

**Usage**

```r
subHeatmapOutput(heatmap_id, title = NULL, width = 400, height = 350, containment = FALSE, internal = FALSE)
```

**Arguments**

- `heatmap_id` ID of the plot.
- `title` Title of the sub-heatmap.
- `width` Width of the sub-heatmap.
- `height` Height of the sub-heatmap.
- `containment` Whether the resizing is restricted in a certain parent div? Value can be `TRUE/FALSE` or a JQuery selector.
- `internal` Internally used.

**See Also**

`originalHeatmapOutput`.

**Examples**

```r
# See examples on the help page of originalHeatmapOutput()
```
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