

Package ‘InteractiveComplexHeatmap’

April 10, 2023

Type Package

Title Make Interactive Complex Heatmaps

Version 1.6.0

Date 2022-09-30

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, rmarkdown, 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>

License MIT + file LICENSE

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

git_branch RELEASE_3_16

git_last_commit b1f49d1

git_last_commit_date 2022-11-01

Date/Publication 2023-04-10

Author Zuguang Gu [aut, cre] (<<https://orcid.org/0000-0002-7395-8709>>)

Maintainer Zuguang Gu <z.gu@dkfz.de>

R topics documented:

all_column_indices	2
all_row_indices	3
getPositionFromBrush	3
getPositionFromClick	4
getPositionFromDbclick	5
getPositionFromHover	5
HeatmapInfoOutput	6
htPositionsOnDevice	7
htShiny	8
htShinyExample	11
ht_shiny	11
interactivate	12
interactivate.DESeqDataSet	13
interactivate.kde	13
interactivateDensity2D	14
InteractiveComplexHeatmapModal	15
InteractiveComplexHeatmapOutput	17
InteractiveComplexHeatmapWidget	19
is_in_sub_heatmap	21
makeInteractiveComplexHeatmap	21
originalHeatmapOutput	23
rand_mat	24
record_observation	25
selectArea	26
selectPosition	27
subHeatmapOutput	28
Index	29

all_column_indices	<i>Get all column indices from the selected data frame</i>
--------------------	--

Description

Get all column indices from the selected data frame

Usage

```
all_column_indices(df)
```

Arguments

df The selected data frame.

Examples

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

all_row_indices *Get all row indices from the selected data frame*

Description

Get all row indices from the selected data frame

Usage

```
all_row_indices(df)
```

Arguments

df The selected data frame.

Examples

```
# 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

```
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 be the ratio between res set in [makeInteractiveComplexHeatmap](#) and 72 (res/72).

Value

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

See Also

[getPositionFromClick](#), [getPositionFromHover](#), [getPositionFromDbclick](#).

Examples

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

`getPositionFromClick` *Get the position of clicked point on the heatmap image*

Description

Get the position of clicked point on the heatmap image

Usage

```
getPositionFromClick(click, ratio = 1)
```

Arguments

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

Value

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

See Also

[getPositionFromBrush](#), [getPositionFromHover](#), [getPositionFromDbclick](#).

Examples

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

`getPositionFromDbclick`*Get the position of double clicked point on the heatmap image*

Description

Get the position of double clicked point on the heatmap image

Usage

```
getPositionFromDbclick(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 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 double clicked points.

Examples

```
# 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 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 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

<code>heatmap_id</code>	ID of the plot.
<code>title</code>	Title of the output.
<code>width</code>	Width of the output div.
<code>output_ui</code>	A htmlOutput or other <code>*Output</code> object (defined in shiny or other related packages).
<code>output_ui_float</code>	Whether the UI defined by <code>output_ui</code> floats at the mouse positions.
<code>action</code>	It is only used when <code>output_ui_float = TRUE</code> 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
<code>response</code>	It is only used when <code>output_ui_float = TRUE</code> and <code>response = "brush"</code> or <code>response = "brush-output"</code> , 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
<code>internal</code>	Internally used.

See Also

[originalHeatmapOutput](#), [subHeatmapOutput](#).

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)
}
```

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

ht_list	A Heatmap-class or a HeatmapList-class 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.
title	Title of the app.
description	Description of the app. The content will be wrapped by a <code>p</code> tag and inserted before the interactive heatmap widget.
hline	Whether to add the horizontal line (by <code>hr</code> tag) after description.
html	HTML fragment inserted below the heatmap. The value can be a string or be wrapped by HTML .
heatmap_id	Pass to InteractiveComplexHeatmapOutput .
title1	Pass to InteractiveComplexHeatmapOutput .
title2	Pass to InteractiveComplexHeatmapOutput .
width1	Pass to InteractiveComplexHeatmapOutput .

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://jokergoo.shinyapps.io/interactive_upsetp/

- https://jokergooo.shinyapps.io/interactive_pheatmap/
- https://jokergooo.shinyapps.io/interactive_heatmap/
- https://jokergooo.shinyapps.io/interactive_heatmap_2/
- https://jokergooo.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	<i>Examples of interactive complex heatmaps</i>
----------------	---

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

```
# list all examples
htShinyExample()

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

ht_shiny	<i>Interactive heatmaps as a Shiny app</i>
----------	--

Description

Interactive heatmaps as a Shiny app

Usage

```
ht_shiny(...)
```

Arguments

... All goes to [htShiny](#).

Value

A Shiny app object.

Examples

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

interactivate	<i>Generic function for interactivate an object in an interactive Shiny app</i>
---------------	---

Description

Generic function for interactivate an object in an interactive Shiny app

Usage

```
interactivate(x, ...)
```

Arguments

x An object.
... Other arguments.

Examples

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

`interactivate.DESeqDataSet`*Visualize DESeq2 result in an interactive Shiny app*

Description

Visualize DESeq2 result in an interactive Shiny app

Usage

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

Arguments

<code>x</code>	A DESeqDataSet class object. It is normally returned by DESeq .
<code>res</code>	The object returned by results .
<code>seed</code>	Random seed. It is mainly set for the random colors of annotations.
<code>...</code>	Other arguments.

Examples

```
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)  
}
```

`interactivate.kde`*Interactive Shiny application for 2D density distribution*

Description

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

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)  
}
```

 InteractiveComplexHeatmapModal

Interactive complex heatmap modal dialog

Description

Interactive complex heatmap modal dialog

Usage

```
InteractiveComplexHeatmapModal(
  input, output, session, ht_list, heatmap_id = NULL,

  # 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.
title1	Pass to InteractiveComplexHeatmapOutput .
title2	Pass to InteractiveComplexHeatmapOutput .
width1	Pass to InteractiveComplexHeatmapOutput .
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	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 <code>click</code> , <code>hover</code> or <code>dblclick</code> .
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 <code>click/hover/dblclick</code> , <code>brush</code> and <code>brush-output</code> . <code>brush</code> responds in two places which are the sub-heatmap and the output components and <code>brush-output</code> only responds in the output component.
brush_opt	A list of parameters passed to <code>brushOpts</code> . Do not set an ID for the brush. An internal brush ID is automatically set.
output_ui	A <code>htmlOutput</code> or other <code>*Output</code> object (defined in <code>shiny</code> or other related packages). If it is set to <code>NULL</code> , there is no output component in the app.
output_ui_float	Whether the UI defined by <code>output_ui</code> floats at the mouse positions.
containment	Whether the resizing is restricted in a certain parent div? Value can be <code>TRUE/FALSE</code> or a JQuery selector.
internal	Internally used.
...	Pass to the UI container which is wrapped by <code>fluidPage</code> .

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 single 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

```
# 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 .

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	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

```
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")
    })
  }
}
```

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

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

```

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

```

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)
}

```

rand_mat

A random matrix

Description

A random matrix

Usage

```
data(rand_mat)
```

Details

Following code was used to generate rand_mat:

```

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)),

```



```
      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)
```

Author(s)

Zuguang Gu <z.gu@dkfz.de>

Examples

```
data(rand_mat)
rand_mat
```

record_observation	<i>Record the observation object</i>
--------------------	--------------------------------------

Description

Record the observation object

Usage

```
record_observation(obs, heatmap_id = shiny_env$current_heatmap_id)
```

Arguments

obs	Observation object returned by observe or observeEvent .
heatmap_id	The Heatmap ID.

Examples

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

selectArea	<i>Select an area in the heatmap</i>
------------	--------------------------------------

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 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 area as a rectangle.
pos1	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.
pos2	Another point as pos1, together with pos1 defines the selected region.
verbose	Whether to print messages.
ht_pos	A value returned by 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 [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)
```

```
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

```
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

```
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	<i>UI for the sub-heatmaps</i>
------------------	--------------------------------

Description

UI for the sub-heatmaps

Usage

```
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

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

Index

all_column_indices, [2](#)
all_row_indices, [3](#)

brushOpts, [18](#), [23](#)

DataFrame, [7](#), [26](#), [27](#)
DESeq, [13](#)
DESeqDataSet, [13](#)

fluidPage, [18](#)

getPositionFromBrush, [3](#), [4](#)
getPositionFromClick, [4](#), [4](#)
getPositionFromDblclick, [4](#), [5](#)
getPositionFromHover, [4](#), [5](#)

HeatmapInfoOutput, [6](#), [6](#), [23](#)
ht_shiny, [11](#)
HTML, [8](#)
htmlOutput, [6](#), [18](#)
htPositionsOnDevice, [7](#), [26](#), [27](#)
htShiny, [8](#), [12](#)
htShinyExample, [10](#), [11](#), [11](#)

interactivate, [12](#)
interactivate.DESeqDataSet, [13](#)
interactivate.kde, [13](#)
interactivateDensity2D, [14](#)
InteractiveComplexHeatmapModal, [15](#)
InteractiveComplexHeatmapOutput, [8](#), [9](#),
[15](#), [16](#), [17](#), [19](#), [20](#), [22](#)
InteractiveComplexHeatmapWidget, [19](#)
is_in_sub_heatmap, [21](#)

kde, [14](#)

makeInteractiveComplexHeatmap, [3–5](#), [16](#),
[18](#), [20](#), [21](#)

observe, [16](#), [20](#), [25](#)
observeEvent, [16](#), [20](#), [25](#)

originalHeatmapOutput, [6](#), [23](#), [28](#)

plotOutput, [3–5](#)

rand_mat, [24](#)
record_observation, [25](#)
renderPlot, [22](#)
results, [13](#)

selectArea, [26](#)
selectPosition, [27](#)
shinyApp, [9](#)
subHeatmapOutput, [6](#), [23](#), [28](#)

unit, [4–6](#), [26](#), [27](#)