Package ‘spiralize’

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Description It visualizes data along an Archimedean spiral <https://en.wikipedia.org/wiki/Archimedean_spiral>, makes so-called spiral graph or spiral chart. It has two major advantages for visualization: 1. It is able to visualize data with very long axis with high resolution. 2. It is efficient for time series data to reveal periodic patterns.
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cartesian_to_xy

Convert canvas coordinates to the data coordinates

Description

Convert canvas coordinates to the data coordinates

Usage

cartesian_to_xy(x, y, track_index = current_track_index())

Arguments

x X-locations of the data points in canvas coordinates.
y Y-locations of the data points in canvas coordinates.
track_index Index of the track.

Details

The data points are assigned to the nearest inner loops. Denote the a data point has a coordinate (r, theta) in the polar coordinate system, r_k and r_k+1 are the radius of the two loops at theta + 2*pi*a and theta + 2*pi*(a+1) that below and above the data point, the data point is assigned to the loop k.

Value

A data frame with two columns: x and y.

Examples

x = runif(100, -5, 5)
y = runif(100, -5, 5)
spiral_initialize()
spiral_track()
df = cartesian_to_xy(x, y)
# directly draw in the viewport
grid.points(x, y, default.units="native")
# check whether the converted xy are correct (should overlap to the previous points)
spiral_points(df$x, df$y, pch = 16)
current_spiral \quad Get \ current\ spiral \ object

Description

Get current spiral object

Usage

current_spiral()

Details

The returned value is an object of spiral reference class. The following methods might be useful:

$\text{curve()}$: It returns the radius for given angles (in radians).

$\text{spiral\_length()}$: It returns the length of the spiral (from the origin) for a given angle (in radians), thus if you want to get the length of a spiral segment, it will be $\text{spiral\_length(\theta_2)} - \text{spiral\_length(\theta_1)}$ where spiral is the spiral object.

Also there are the following meta-data for the current spiral (assume the object is named s):

s$\text{xlim}$: Data range.
s$\text{xrange}$: s$\text{xlim}[2] - s$\text{xlim}[1]$
s$\text{theta\_lim}$: The corresponding range of theta
s$\text{theta\_range}$: s$\text{theta\_lim}[2] - s\text{theta\_lim}[1]$
s$\text{spiral\_length\_lim}$: The corresponding range of spiral length
s$\text{spiral\_length\_range}$: s$\text{spiral\_length\_lim}[2] - s\text{spiral\_length\_lim}[1]$
s$\text{max\_radius}$: Radius at s$\text{theta\_lim}[2]$

Value

A spiral object.

Examples

spiral\_initialize()
s = current_spiral()
s$\text{curve}(2*\pi*2)$
s$\text{spiral\_length}(2*\pi*2)$
**current_spiral_vp**

Viewport name of current spiral

**Description**

Viewport name of current spiral

**Usage**

`current_spiral_vp()`

**Value**

A string of the viewport name.

**Examples**

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

---

**current_track_index**

Current track index

**Description**

Current track index

**Usage**

`current_track_index()`

**Value**

An integer of the index of the current track.

**Examples**

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

Description
Get meta-data of a track

Usage
get_track_data(field, track_index = current_track_index())

Arguments
field Name, see Details section.
track_index Which track?

Details
There are following fields that can be retrieved for a given track:

- ymin Lower boundary of the data.
- ymax Upper boundary of the data.
- ycenter \((ymin + ymax)/2\)
- ylim \((ylim, ymax)\)
- yrange \(ymax - ymin\)
- height Height of the track, measured as the fraction of the distance between two neighbouring circles.

It is more suggested to directly use TRACK_META to retrieve meta data for the current track.

Value
A numeric value of the corresponding field.

Examples
# There is no example
NULL
horizon_legend

Legend for the horizon chart

Description

Legend for the horizon chart

Usage

horizon_legend(lt, title = "", format = "%.2f", template = "[\{x1\}, \{x2\}]", ...)

Arguments

- **lt**: The object returned by `spiral_horizon`.
- **title**: Title of the legend.
- **format**: Number format of the legend labels.
- **template**: Template to construct the labels.
- ...: Pass to `Legend`.

Value

A `Legend` object.

Examples

# There is no example
NULL

is_in_track

Test whether points are in a track

Description

Test whether points are in a track

Usage

is_in_track(x, y, track_index = current_track_index())

Arguments

- **x**: X-location of data points.
- **y**: Y-location of data points.
- **track_index**: Index of track.
**Value**

A logical vector.

**Examples**

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

---

**names.TRACK_META**

*Names of all supported meta data*

**Description**

Names of all supported meta data

**Usage**

```r
## S3 method for class 'TRACK_META'
names(x)
```

**Arguments**

- `x` Always use TRACK_META.

**Value**

A vector of characters.

**Examples**

```r
names(TRACK_META)
```

---

**n_tracks**

*Number of tracks*

**Description**

Number of tracks

**Usage**

```r
n_tracks()
```

**Value**

An integer of the number of available tracks.
phylo_to_dendrogram

Examples

# There is no example
NULL

phylo_to_dendrogram Convert a phylo object to a dendrogram object

Description

Convert a phylo object to a dendrogram object

Usage

phylo_to_dendrogram(obj, log = FALSE)

Arguments

obj A phylo object.
log Whether the height of the phylogenetic tree should be log-transformed (log10(x + 1)).

Details

The motivation is that phylogenetic tree may contain polytomies, which means at a certain node, there are more than two children branches. Available tools that do the conversion only support binary trees.

The returned dendrogram object is not in its standard format which means it can not be properly drawn by the plot.dendrogram function. However, you can still apply dendextend::cutree to the returned dendrogram object with no problem and the dendrogram can be properly drawn with the ComplexHeatmap package.

Value

A dendrogram object.

Examples

require(ape)
data(bird.families)
d = phylo_to_dendrogram(bird.families)

require(ComplexHeatmap)
grid.dendrogram(d, test = TRUE)
polar_to_cartesian

Convert polar coordinates to cartesian coordinates

Description
Convert polar coordinates to cartesian coordinates

Usage

polar_to_cartesian(theta, r)

Arguments

theta
Angles, in radians.

r
Radius.

Value
A data frame with two columns: x and y.

Examples
# There is no example
NULL

print.TRACK_META

Print TRACK_META

Description
Print TRACK_META

Usage

## S3 method for class 'TRACK_META'
print(x, ...)

Arguments

x
The TRACK_META object.

... Additional parameters.

Value
No value is returned.
set_current_track

**Examples**

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

**Description**

Set current track

**Usage**

```
set_current_track(track_index)
```

**Arguments**

- **track_index**: The index of the track.

**Value**

No value is returned.

**Examples**

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

solve_theta_from_spiral_length

*Get theta from given spiral lengths*

**Description**

Get theta from given spiral lengths

**Usage**

```
solve_theta_from_spiral_length(len, interval = NULL, offset = 0)
```
Arguments

- **len** A vector of spiral lengths.
- **interval** Interval to search for the solution.
- **offset** Offset of the spiral. In the general form: \( r = a + r\theta \), offset is the value of \( a \).

Details

The length of the spiral has a complicated form, see [https://downloads.imagej.net/fiji/snapshots/arc_length.pdf](https://downloads.imagej.net/fiji/snapshots/arc_length.pdf). Let's say the form is \( l = f(\theta) \). `solve_theta_from_spiral_length` tries to find \( \theta \) by a known \( l \). It uses `uniroot` to search solutions.

Value

The \( \theta \) value.

Examples

```r
spiral_initialize()

s = current_spiral()
theta = pi*seq(2, 3, length = 10)
len = s$spiral_length(theta)
solve_theta_from_spiral_length(len) # should be very similar as theta
```

---

**spiral_arrow**

*Draw arrows in the spiral direction*

Description

Draw arrows in the spiral direction

Usage

```r
spiral_arrow(
  x1, x2,
  y = get_track_data("ycenter", track_index),
  width = get_track_data("yrange", track_index)/3,
  arrow_head_length = unit(4, "mm"),
  arrow_head_width = width*2,
  arrow_position = c("end", "start"),
  tail = c("normal", "point"),
  gp = gpar(),
  track_index = current_track_index())
```
**spiral_axis**

**Draw axis along the spiral**

**Description**

Draw axis along the spiral

**Usage**

```r
spiral_axis(h = c("top", "bottom"), at = NULL, major_at = at,
  labels = TRUE, curved_labels = FALSE, minor_ticks = 4,
  major_ticks_length = unit(4, "bigpts"), minor_ticks_length = unit(2, "bigpts"),
  ticks_gp = gpar(), labels_gp = gpar(fontsize = 6),
  track_index = current_track_index())
```
**Arguments**

- **h**  
  Position of the axis. The value can be a character of "top" or "bottom".
- **at**  
  Breaks points on axis.
- **major_at**  
  Breaks points on axis. It is the same as **at**.
- **labels**  
  The corresponding labels for the break points.
- **curved_labels**  
  Whether are the labels are curved?
- **minor_ticks**  
  Number of minor ticks.
- **major_ticks_length**  
  Length of the major ticks. The value should be a **unit** object.
- **minor_ticks_length**  
  Length of the minor ticks. The value should be a **unit** object.
- **ticks_gp**  
  Graphics parameters for the ticks.
- **labels_gp**  
  Graphics parameters for the labels.
- **track_index**  
  Index of the track.

**Value**

No value is returned.

**Examples**

```
spiral_initialize(); spiral_track()
spiral_axis()

# if the spiral is intepolated by the curve length
spiral_initialize(scale_by = "curve_length"); spiral_track()
spiral_axis()

spiral_initialize(xlim = c(0, 360*4), start = 360, end = 360*5); spiral_track()
spiral_axis(major_at = seq(0, 360*4, by = 30))

spiral_initialize(xlim = c(0, 12*4), start = 360, end = 360*5); spiral_track()
spiral_axis(major_at = seq(0, 12*4, by = 1), labels = c("", rep(month.name, 4)))
```

**Description**

Add bars to a track

**Usage**

```
spiral_bars(pos, value, baseline = get_track_data("ymin", track_index),
            bar_width = min(diff(pos)), gp = gpar(), track_index = current_track_index())
```
Arguments

- **pos**: X-locations of the center of bars.
- **value**: Height of bars. The value can be a simple numeric vector, or a matrix.
- **baseline**: Baseline of the bars. Note it only works when value is a simple vector.
- **bar_width**: Width of bars.
- **gp**: Graphical parameters.
- **track_index**: Index of the track.

Value

- No value is returned.

Examples

```r
x = seq(1, 1000, by = 1) - 0.5
y = runif(1000)
spiral_initialize(xlim = c(0, 1000))
spiral_track(height = 0.8)
spiral_bars(x, y)

# a three-column matrix
y = matrix(runif(3*1000), ncol = 3)
y = y/rowSums(y)
spiral_initialize(xlim = c(0, 1000))
spiral_track(height = 0.8)
spiral_bars(x, y, gp = gpar(fill = 2:4, col = NA))
```

---

**spiral_clear**

*Clear the spiral curve*

Description

- Clear the spiral curve

Usage

```r
spiral_clear(check_vp = TRUE)
```

Arguments

- **check_vp**: Whether to check the viewport.

Details

- It basically sets the internally spiral object to NULL, and reset all the global options.
spiral_dendrogram

Description
Draw dendrogram

Usage
spiral_dendrogram(dend, gp = gpar(), track_index = current_track_index())

Arguments
- dend: A stats::dendrogram object.
- gp: Graphics parameters of the dendrogram edges.
- track_index: Index of the track.

Details
Note the dendrogram edges can be rendered with the dendextend package.

Value
Height of the dendrogram.

Examples
```r
k = 500
dend = as.dendrogram(hclust(dist(runif(k))))
spiral_initialize(xlim = c(0, k), start = 360, end = 360*3)
spiral_track(height = 0.8, background_gp = gpar(fill = "#EEEEEE", col = NA))

require(dendextend)
dend = color_branches(dend, k = 4)
spiral_initialize(xlim = c(0, k), start = 360, end = 360*3)
spiral_track(height = 0.8, background_gp = gpar(fill = "#EEEEEE", col = NA))
```
spiral_highlight

Highlight a section of the spiral

Description

Highlight a section of the spiral

Usage

spiral_highlight(x1, x2, type = c("rect", "line"), padding = unit(1, "mm"),
     line_side = c("inside", "outside"), line_width = unit(1, "pt"),
     gp = gpar(fill = "red"), track_index = current_track_index())

Arguments

x1 Start location of the highlighted section.
x2 End location of the highlighted section.
type Type of the highlighting. "rect" means drawing transparent rectangles covering
     the whole track. "line" means drawing annotation lines on top of the track or at
     the bottom of it.
padding When the highlight type is "rect", it controls the padding of the highlighted
     region. The value should be a unit object or a numeric value which is the
     fraction of the length of the highlighted section. The length can be one or two.
     Note it only extends in the radial direction.
line_side If the highlight type is "line", it controls which side of the track to draw the lines.
line_width Width of the annotation line. Value should be a unit object.
gp Graphics parameters.
track_index Index of the track.

Value

No value is returned.

Examples

spiral_initialize(); spiral_track()
spiral_highlight(0.4, 0.6)
spiral_highlight(0.1, 0.2, type = "line", gp = gpar(col = "blue"))
spiral_highlight(0.7, 0.8, type = "line", line_side = "outside")
spiral_highlight_by_sector

Highlight a sector

Description

Highlight a sector

Usage

spiral_highlight_by_sector(x1, x2, x3 = NULL, x4 = NULL, padding = unit(1, "mm"), gp = gpar(fill = "red"))

Arguments

x1 Start location which determines the start of the sector.

x2 End location which determines the end of the sector. Note x2 should be larger than x1 and the angular difference between x1 and x2 should be smaller than a circle.

x3 Start location which determines the start of the sector on the upper border.

x4 End location which determines the end of the sector on the upper border.

padding It controls the radial extension of the sector. The value should be a unit object with length one or two.

gp Graphics parameters.

Details

x1 and x2 determine the position of the highlighted sector. If x3 and x4 are not set, the sector extends until the most outside loop. If x3 and x4 are set, they determine the outer border of the sector. In this case, if x3 and x4 are set, x3 should be larger than x2.

Value

No value is returned.

Examples

spiral_initialize(xlim = c(0, 360*4), start = 360, end = 360*5)
spiral_track()
spiral_axis()
spiral_highlight_by_sector(36, 72)
spiral_highlight_by_sector(648, 684)
spiral_highlight_by_sector(216, 252, 936, 972, gp = gpar(fill = "blue"))
spiral_horizon

Draw horizon chart along the spiral

Description

Draw horizon chart along the spiral

Usage

spiral_horizon(x, y, y_max = max(abs(y)), n_slices = 4, slice_size,  
  pos_fill = "#D73027", neg_fill = "#313695",  
  use_bars = FALSE, bar_width = min(diff(x)),  
  negative_from_top = FALSE, track_index = current_track_index())

Arguments

  x   X-locations of the data points.
  y   Y-locations of the data points.
  y_max  Maximal absolute value on y-axis.
  n_slices  Number of slices.
  slice_size  Size of the slices. The final number of sizes is ceiling(max(abs(y))/slice_size).
  pos_fill  Colors for positive values.
  neg_fill  Colors for negative values.
  use_bars  Whether to use bars?
  bar_width  Width of bars.
  negative_from_top  Should negative distribution be drawn from the top?
  track_index  Index of the track.

Details

Since the track height is very small in the spiral, horizon chart visualization is a efficient way to visualize distribution-like graphics.

Value

A list of the following objects:

  • a color mapping function for colors.
  • a vector of intervals that split the data.
Examples

```r
df = readRDS(system.file("extdata", "global_temperature.rds", package = "spiralize"))
df = df[df$Source == "GCAG", ]
spiral_initialize_by_time(xlim = range(df$Date), unit_on_axis = "months", period = "year",
    period_per_loop = 20, polar_lines_by = 360/20,
    vp_param = list(x = unit(0, "npc"), just = "left"))
spiral_track()
spiral_horizon(df$Date, df$Mean, use_bar = TRUE)
```

---

**spiral_info**

*Information of the current spiral*

**Description**

Information of the current spiral

**Usage**

```r
spiral_info()
```

**Details**

It prints information of the current spiral.

**Value**

No value is returned.

**Examples**

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

---

**spiral_initialize**

*Initialize the spiral*

**Description**

Initialize the spiral
spiral_initialize

Usage

```r
spiral_initialize(xlim = c(0, 1), start = 360, end = 360*5,
    scale_by = c("angle", "curve_length"), period = NULL,
    clockwise = FALSE, flip = c("none", "vertical", "horizontal", "both"),
    reverse = FALSE, polar_lines = scale_by == "angle", polar_lines_by = 30,
    polar_lines_gp = gpar(col = "#808080", lty = 3),
    padding = unit(5, "mm"), newpage = TRUE, vp_param = list())
```

Arguments

- **xlim**: Range on x-locations.
- **start**: Start of the spiral, in degree. `start` and `end` should be positive and `start` should be smaller than `end`.
- **end**: End of the spiral, in degree.
- **scale_by**: How scales on x-axis are equally interpolated? The values can be one of "angle" and "curve_length". If the value is "angle", equal angle difference corresponds to equal difference of data. In this case, in outer loops, the scales are longer than in the inner loops, although the difference on the data are the same. If the value is "curve_length", equal curve length difference corresponds to the equal difference of the data.
- **period**: Under "angle" mode, the number of loops can also be controlled by argument `period` which controls the length of data a spiral loop corresponds to. Note in this case, argument `end` is ignored and the value for `end` is internally recalculated.
- **clockwise**: Whether the curve is in a closewise direction. If it is set to TRUE, argument `flip` and `reverse` are ignored.
- **flip**: How to flip the spiral? By default, the spiral starts from the origin of the coordinate and grows reverseclockwisely. The argument controls the growing direction of the spiral.
- **reverse**: By default, the most inside of the spiral corresponds to the lower boundary of x-location. Setting the value to FALSE can reverse the direction.
- **polar_lines**: Whether draw the polar guiding lines.
- **polar_lines_by**: Increment of the polar lines. Measured in degree. The value can also be a vector that defines where to add polar lines.
- **polar_lines_gp**: Graphics parameters for the polar lines.
- **padding**: Padding of the plotting region. The value can be a unit of length of one to two.
- **newpage**: Whether to apply `grid.newpage` before making the plot?
- **vp_param**: A list of parameters sent to `viewport`.

Value

No value is returned.
Examples

```r
spiral_initialize(); spiral_track()
spiral_initialize(start = 180, end = 360+180); spiral_track()
spiral_initialize(flip = "vertical"); spiral_track()
spiral_initialize(flip = "horizontal"); spiral_track()
spiral_initialize(flip = "both"); spiral_track()
spiral_initialize(); spiral_track(); spiral_axis()
spiral_initialize(scale_by = "curve_length"); spiral_track(); spiral_axis()
```

# the following example shows the difference of `scale_by` more clearly:
```r
make_plot = function(scale_by) {
  n = 100
  require(circlize)
  col = circlize::colorRamp2(c(0, 0.5, 1), c("blue", "white", "red"))
  spiral_initialize(xlim = c(0, n), scale_by = scale_by)
  spiral_track(height = 0.9)
  x = runif(n)
  spiral_rect(1:n - 1, 0, 1:n, 1, gp = gpar(fill = col(x), col = NA))
}
make_plot("angle")
make_plot("curve_length")
```

spiral_initialize_by_gcoor

*Initialize the spiral with genomic coordinates*

Description

Initialize the spiral with genomic coordinates

Usage

```r
spiral_initialize_by_gcoor(xlim, scale_by = "curve_length", ...)
```

Arguments

- `xlim` Range of the genomic coordinates.
- `scale_by` For genomic plot, axis is linearly scaled by the curve length.
- `...` All pass to `spiral_initialize`.

Details

It is basically the same as `spiral_initialize`. The only difference is the axis labels are automatically formatted for genomic coordinates.

Value

No value is returned.
**spiral_initialize_by_time**

**Examples**

```r
spiral_initialize_by_gcoor(c(0, 1000000000))
spiral_track()
spiral_axis()
```

---

**Description**

Initialize the spiral from time objects

**Usage**

```r
spiral_initialize_by_time(xlim, start = NULL, end = NULL,
unit_on_axis = c("days", "months", "weeks", "hours", "mins", "secs"),
period = c("years", "months", "weeks", "days", "hours", "mins"),
normalize_year = FALSE, period_per_loop = 1, polar_lines_by = NULL,
verbose = TRUE, ...)
```

**Arguments**

- `xlim` Range of the time. The value can be time object such as `Date`, `POSIXlt` or `POSIXct`. The value can also be characters and it is converted to time objects automatically.
- `start` Start of the spiral, in degrees. By default it is automatically calculated.
- `end` End of the spiral, in degrees. By default it is automatically calculated.
- `unit_on_axis` Units on the axis.
- `period` Which period to use?
- `normalize_year` Whether to enforce one loop to represent a complete year?
- `period_per_loop` How many periods to put in a loop?
- `polar_lines_by` By default different value of `polar_lines_by` is set for different period. E.g. 360/7 is set if period is "weeks" or 360/24 is set if period is set to "hours". When period is year and `unit_on_axis` is day, the proportion of sectors by polar lines corresponds to the proportion of month days in a year.
- `verbose` Whether to print messages?
- `...` All pass to `spiral_initialize`.

**Details**

"start" and "end" are automatically calculated for different "unit_on_axis" and "period". For example, if "unit_on_axis" is "days" and "period" is "years", then the first day of each each year is always put on theta = 0 + 2*pi*k where k is the index of loops.
spiral_lines

### Value
No value is returned.

### Examples
```r
spiral_initialize_by_time(xlim = c("2014-01-01", "2021-06-17"))
spiral_track(height = 0.6)
spiral_axis()

spiral_initialize_by_time(xlim = c("2021-01-01 00:00:00", "2021-01-05 00:00:00"))
spiral_track(height = 0.6)
spiral_axis()

spiral_initialize_by_time(xlim = c("2021-01-01 00:00:00", "2021-01-01 00:10:00"),
  unit_on_axis = "secs", period = "mins")
spiral_track(height = 0.6)
spiral_axis()
```

---

**spiral_lines**  
*Add lines to a track*

### Description
Add lines to a track.

### Usage
```r
spiral_lines(x, y, type = "l", gp = gpar(),
  baseline = "bottom", area = FALSE, track_index = current_track_index())
```

### Arguments
- **x**: X-locations of the data points.
- **y**: Y-locations of the data points.
- **type**: Type of the line. Value should be one of "l" and "h". When the value is "h", vertical lines (or radial lines if you consider the polar coordinates) relative to the baseline will be drawn.
- **gp**: Graphical parameters.
- **baseline**: Baseline used when type is "l" or area is TRUE.
- **area**: Whether to draw the area under the lines? Note gpar(fill = ...) controls the filled of the areas.
- **track_index**: Index of the track.

### Value
No value is returned.
Examples

```r
x = sort(runif(1000))
y = runif(1000)
spiral_initialize()
spiral_track()
spiral_lines(x, y)

spiral_initialize()
spiral_track()
spiral_lines(x, y, type = "h")

spiral_initialize()
spiral_track()
spiral_lines(x, y, area = TRUE, gp = gpar(fill = "red", col = NA))
```

---

**spiral_opt**

*Global options*

**Description**

Global options

**Usage**

```r
spiral_opt(..., RESET = FALSE, READ.ONLY = NULL, LOCAL = FALSE, ADD = FALSE)
```

**Arguments**

- `...`: Arguments for the parameters, see "details" section.
- `RESET`: Whether to reset to default values.
- `READ.ONLY`: Please ignore.
- `LOCAL`: Please ignore.
- `ADD`: Please ignore.

**Details**

There are following global parameters:

- `min_segment_len`: Minimal length of the segment that partitions a curve.

To access the value of an option: `spiral_opt$name` where `name` is the name of the option. To set a new value for an option: `spiral_opt$name = new_value`.

**Value**

A list of options.
spiral_phylo

Draw phylogenetic tree

**Description**

Draw phylogenetic tree

**Usage**

```r
spiral_phylo(obj, gp = gpar(), log = FALSE, reverse = FALSE,
            group = NULL, group_col = NULL, track_index = current_track_index())
```

**Arguments**

- `obj` A phylo object.
- `gp` Graphics parameters of the tree edges.
- `log` Whether the height of the tree should be log-transformed (log10(x + 1))? 
- `reverse` Whether the tree should be reversed? 
- `group` A categorical variable for splitting the tree. 
- `group_col` A named vector which contains group colors. 
- `track_index` Index of the track.

**Value**

Height of the phylogenetic tree.

**Examples**

```r
require(ape)
data(bird.families)
n = length(bird.families$tip.label)
spiral_initialize(xlim = c(0, n), start = 360, end = 360*3)
spiral_track(height = 0.8)
spiral_phylo(bird.families)
```
**spiral_points**

Add points to a track

**Description**

Add points to a track

**Usage**

```r
spiral_points(x, y, pch = 1, size = unit(0.4, "char"), gp = gpar(), track_index = current_track_index())
```

**Arguments**

- **x**: X-locations of the data points.
- **y**: Y-locations of the data points.
- **pch**: Point type.
- **size**: Size of the points. Value should be a `unit` object.
- **gp**: Graphical parameters.
- **track_index**: Index of the track.

**Value**

No value is returned.

**Examples**

```r
spiral_initialize()
spiral_track()
spiral_points(x = runif(1000), y = runif(1000))
```

---

**spiral_polygon**

Add polygons to a track

**Description**

Add polygons to a track

**Usage**

```r
spiral_polygon(x, y, id = NULL, gp = gpar(), track_index = current_track_index())
```
Arguments

- **x**: X-locations of the data points.
- **y**: Y-locations of the data points.
- **id**: A numeric vector used to separate locations in x and y into multiple polygons.
- **gp**: Graphical parameters.
- **track_index**: Index of the track.

Details

Note the polygon must be closed, which means, the last data point should overlap to the first one.

Value

No value is returned.

Examples

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

---

**spiral_raster**

*Add image to a track*

Description

Add image to a track

Usage

```r
spiral_raster(x, y, image, width = NULL, height = NULL, 
  facing = c("downward", "inside", "outside", "curved_inside", "curved_outside"), 
  nice_facing = FALSE, scaling = 1, track_index = current_track_index())
```

Arguments

- **x**: X-locations of the center of the image.
- **y**: Y-locations of the center of the image.
- **image**: A vector of file paths of images. The format of the image is inferred from the suffix name of the image file. NA value or empty string means no image to drawn. Supported formats are png/svg/pdf/eps/jpeg/jpg/tiff.
- **width**: Width of the image. See Details.
- **height**: Height of the image. See Details.
- **facing**: Facing of the image.
- **nice_facing**: Whether to adjust the facing.
- **scaling**: Scaling factor when facing is set to "curved_inside" or "curved_outside".
- **track_index**: Index of the track.
**spiral_rect**

### Details

When `facing` is set to one of "downward", "inside" and "outside", both of width and height should be unit objects. It is suggested to only set one of width and height, the other dimension will be automatically calculated from the aspect ratio of the image.

When `facing` is set to one of "curved_inside" and "curved_outside", the value can also be numeric, which are the values measured in the data coordinates. Note when the segment in the spiral that corresponds to width is very long, drawing the curved image will be very slow because each pixel is actually treated as a single rectangle.

### Value

No value is returned.

### Examples

```r
image = system.file("extdata", "Rlogo.png", package = "circlize")
x = seq(0.1, 0.9, length = 10)

spiral_initialize()
spiral_track()
spiral_raster(x, 0.5, image)

spiral_initialize()
spiral_track()
spiral_raster(x, 0.5, image, facing = "inside")
```

---

**spiral_rect**

*Add rectangles to a track*

### Description

Add rectangles to a track

### Usage

```r
spiral_rect(xleft, ybottom, xright, ytop, gp = gpar(), track_index = current_track_index())
```

### Arguments

- **xleft**: X-locations of the left bottom of the rectangles.
- **ybottom**: Y-locations of the left bottom of the rectangles.
- **xright**: X-locations of the right top of the rectangles.
- **ytop**: Y-locations of the right top of the rectangles.
- **gp**: Graphical parameters.
- **track_index**: Index of the track.
Value

No value is returned.

Examples

```r
# to simulate heatmap
n = 1000
require(circlize)
col = circlize::colorRamp2(c(0, 0.5, 1), c("blue", "white", "red"))
spiral_initialize(xlim = c(0, n))
spiral_track(height = 0.9)

x1 = runif(n)
spiral_rect(1:n - 1, 0, 1:n, 0.5, gp = gpar(fill = col(x1), col = NA))
x2 = runif(n)
spiral_rect(1:n - 1, 0.5, 1:n, 1, gp = gpar(fill = col(x2), col = NA))
```

spiral_segments  
Add segments to a track

Description

Add segments to a track

Usage

```r
spiral_segments(x0, y0, x1, y1, gp = gpar(), arrow = NULL,
    track_index = current_track_index(), buffer = 10000)
```

Arguments

- **x0**: X-locations of the start points of the segments.
- **y0**: Y-locations of the start points of the segments.
- **x1**: X-locations of the end points of the segments.
- **y1**: Y-locations of the end points of the segments.
- **gp**: Graphical parameters.
- **arrow**: A `arrow` object.
- **track_index**: Index of the track.
- **buffer**: Number of segments to buffer.

Details

The segments on spiral are not straight lines while are more like curves. This means a spiral segment is formed by a list of real straight segments. If there are n1 spiral segments, then there will be n2 straight segments where n2 is normally much larger than n1. To speed up drawing the spiral segments, the locations of the "real" segments are filled to a temporary data frame with buffer rows, when the number of rows exceeds buffer, `grid.segments` is called to draw all the buffered segments.
spiral_text

Value

No value is returned.

Examples

```r
n = 1000
x0 = runif(n)
y0 = runif(n)
x1 = x0 + runif(n, min = -0.01, max = 0.01)
y1 = 1 - y0

spiral_initialize(xlim = range(c(x0, x1)))
spiral_track()
spiral_segments(x0, y0, x1, y1, gp = gpar(col = circlize::rand_color(n)))

n = 100
x0 = runif(n)
y0 = runif(n)
x1 = x0 + runif(n, min = -0.01, max = 0.01)
y1 = 1 - y0

spiral_initialize(xlim = range(c(x0, x1)))
spiral_track()
spiral_segments(x0, y0, x1, y1, arrow = arrow(length = unit(2, "mm")),
                   gp = gpar(col = circlize::rand_color(n, luminosity = "bright"), lwd = runif(n, 0.5, 3)))
```

spiral_text  

Add texts to a track

Description

Add texts to a track

Usage

```r
spiral_text(x, y, text, offset = NULL, gp = gpar(),
            facing = c("downward", "inside", "outside", "clockwise", "reverse_clockwise",
                        "curved_inside", "curved_outside"),
            letter_spacing = 0,
            nice_facing = FALSE, just = "centre", hjust = NULL, vjust = NULL,
            track_index = current_track_index(), ...)
```

Arguments

- `x`  
  X-locations of the texts.
- `y`  
  Y-locations of the texts.
- `text`  
  A vector of texts.
- `offset`  
  Radial offset of the text. The value should be a `unit` object.
**gp**  
Graphical parameters.

**facing**  
Facing of the text.

**letter_spacing**  
Space between two letters. The value is a fraction of the width of current letter. It only works for curved texts.

**nice_facing**  
If it is true, the facing will be automatically adjusted for texts which locate at different positions of the spiral. Note hjust and vjust will also be adjusted.

**just**  
The justification of the text relative to (x, y). The same setting as in `grid.text`.

**hjust**  
Horizontal justification. Value should be numeric. 0 means the left of the text and 1 means the right of the text.

**vjust**  
Vertical justification. Value should be numeric. 0 means the bottom of the text and 1 means the top of the text.

**track_index**  
Index of the track.

...  
Pass to `grid.text`.

**Details**

For the curved text, it only supports one-line text.

**Value**

No value is returned.

**Examples**

```r
x = seq(0.1, 0.9, length = 26)
text = strrep(letters, 6)
spiral_initialize(); spiral_track()
spiral_text(x, 0.5, text)

spirail_initialize(); spiral_track()
spiral_text(x, 0.5, text, facing = "inside")

spirail_initialize(); spiral_track()
spiral_text(x, 0.5, text, facing = "outside")

x = seq(0.1, 0.9, length = 10)
text = strrep(letters[1:10], 20)
spiral_initialize(); spiral_track()
spiral_text(x, 0.5, text, facing = "curved_inside")

spirail_initialize(); spiral_track()
spiral_text(x, 0.5, text, facing = "curved_outside")
```
**spiral_track**  
*Add a new track or go to an existed track*

### Description
Add a new track or go to an existed track

### Usage

```r
spiral_track(ylim = c(0, 1), height = 0.8, background = TRUE,  
background_gp = gpar(col = NA, fill = "#EEEEEE"), reverse_y = FALSE,  
track_index = current_track_index() + 1)
```

### Arguments

- **ylim**  
  Data range of the y-locations.

- **height**  
  Height of the track. The value can be the fraction of the distance of the two neighbour loops. The value can also be a `unit` object.

- **background**  
  Whether to draw the background of the track, i.e. border and filled color of background.

- **background_gp**  
  Graphics parameters of the background.

- **reverse_y**  
  Whether reverse the direction of y-axis.

- **track_index**  
  Index of the track.

### Details
If the track is already existed, the function simply mark the track as the current track and does nothing else.

### Value
No value is returned.

### Examples

```r
spiral_initialize()
spiral_track(height = 0.8)
spiral_initialize()
spiral_track(height = 0.4, background_gp = gpar(fill = "red"))
spiral_track(height = 0.2, background_gp = gpar(fill = "green"))
spiral_track(height = 0.1, background_gp = gpar(fill = "blue"))
```
spiral_xaxis  

*Draw axis along the spiral*

**Description**

Draw axis along the spiral

**Usage**

```r
spiral_xaxis(...)
```

**Arguments**

...  

All pass to `spiral_axis`.

**Value**

No value is returned.

**Examples**

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

---

spiral_yaxis  

*Draw y-axis*

**Description**

Draw y-axis

**Usage**

```r
spiral_yaxis(side = c("both", "start", "end"), at = NULL, labels = TRUE,
ticks_length = unit(2, "bigpts"),
ticks_gp = gpar(), labels_gp = gpar(fontsize = 6),
track_index = current_track_index())
```
**Arguments**

- **side**: On which side of the spiral the y-axis is drawn? "start" means the inside of the spiral and "end" means the outside of the spiral. Note if `reverse` was set to TRUE, then "start" corresponds to the most outside of the spiral.
- **at**: Break points.
- **labels**: Corresponding labels for the break points.
- **ticks_length**: Length of the tick. Value should be a `unit` object.
- **ticks_gp**: Graphics parameters for ticks.
- **labels_gp**: Graphics parameters for labels.
- **track_index**: Index of the track.

**Value**

No value is returned.

**Examples**

```r
spiral_initialize(); spiral_track(height = 0.8)
spiral_yaxis("start")
spiral_yaxis("end", at = c(0, 0.25, 0.5, 0.75, 1), labels = letters[1:5])
```

---

**Description**

Get meta data in the current track

**Usage**

`TRACK_META`

**Details**

The variable `TRACK_META` can only be used to get meta data from the "current" track. If the current track is not the one you want, you can first use `set_current_track` to set the current track.

Don’t directly use `TRACK_META`. The value of `TRACK_META` itself is meaningless. Always use in form of `TRACK_META$name`.

There are following meta data for the current track:

- **xlim**: Data range on x-axis.
- **xmin**: `xlim[1]`.
xy_to_cartesian

Convert data coordinates to the canvas coordinates

Description

Convert data coordinates to the canvas coordinates

Usage

xy_to_cartesian(x, y, track_index = current_track_index())

Arguments

x
Y-locations of the data points.
y
X-locations of the data points.
track_index
Index of the track.

Details

The canvas coordinates correspond to the "native" coordinates of the viewport where the graphics are to be drawn.

Note different settings of flip and reverse in spiral_initialize affect the conversion.
xy_to_polar

Value

A data frame with two columns: x and y.

Examples

# There is no example
NULL

xy_to_polar  Convert data coordinates to polar coordinates

Description

Convert data coordinates to polar coordinates

Usage

xy_to_polar(x, y, track_index = current_track_index(), flip = TRUE)

Arguments

x X-locations of the data points.
y Y-locations of the data points.
track_index Index of the track.
flip If it is FALSE, it returns theta for the original spiral (before flipping).

Details

Note different settings of flip and reverse in spiral_initialize affect the conversion.

Value

A data frame with two columns: theta (in radians) and r (the radius).

Examples

# There is no example
NULL
$\textbf{Description}$

Get meta data in the current track

$\textbf{Usage}$

```r
## S3 method for class 'TRACK_META'
x$name
```

$\textbf{Arguments}$

- `x` Always use TRACK_META.
- `name` Name of the meta name. For all supported names, type `names(TRACK_META)`.

$\textbf{Details}$

The variable TRACK_META can only be used to get meta data from the "current" track. If the current track is not the one you want, you can first use `set_current_track` to set the current track.

There are following meta data for the current track:

- `xlim`: Data range on x-axis.
  - `xmin`: xlim[1].
  - `xmax`: xlim[2].
  - `xcenter`: mean(xlim).
- `theta_lim`: Range of the angles on the spiral, measured in radians.
  - `theta_min`: theta_lim[1].
  - `theta_max`: theta_lim[2].
  - `theta_center`: mean(theta_lim).
- `ylim`: Data range on y-axis.
  - `ymin`: ylim[1].
  - `ymax`: ylim[2].
  - `ycenter`: mean(ylim).
- `rel_height`: Fraction of height of the track to the distance between two neighbouring loops.
- `abs_height`: The height of the track, which is `rel_height` multiplied by the distance between two neighbouring loops.
- `track_index`: Current track index.
Value

The corresponding value.

Examples

    # There is no example
    NULL
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