# Package ‘zenplots’

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Title Zigzag Expanded Navigation Plots

Description Graphical tools for visualizing high-dimensional data along a path of alternating one- and two-dimensional plots. Note that this includes interactive graphics plots based on 'loon' in turn based on 'tcltk' (included as part of the standard R distribution). It also requires 'graph' from Bioconductor. For more detail on use and algorithms, see <doi:10.18637/jss.v095.i04>.

Author Marius Hofert [aut], Wayne Oldford [aut, cre]

Maintainer Wayne Oldford <rwoldford@uwaterloo.ca>

URL https://github.com/great-northern-diver/zenplots

Depends R (>= 3.4.0)

Imports grid, graphics, loon, stats, methods, MASS, graph, PairViz

Suggests knitr, rmarkdown, Rgraphviz, ADGofTest, copula, Matrix, pcaPP, qqtest, qrmdata, qrmtools, rugarch, zoo, ggplot2, lattice, gridExtra, scagnostics, testthat

Enhances

License GPL-2 | GPL-3

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**adjust_bb**  
*Auxiliary function for adjusting a bounding box*

**Description**

Auxiliary function for adjusting a bounding box

**Usage**

```r
adjust_bb(lastturn, coordslastBB, w, h)
```

**Arguments**

- `lastturn` last turn
- `coordslastBB` coordinates of the last bounding box
- `w` width
- `h` height

**Value**

Coordinates of the adjusted bounding box

**Author(s)**

Wayne Oldford

---

**arrow_1d_graphics**  
*Arrow plot in 1d using R’s base graphics*

**Description**

Arrow plot in 1d using R’s base graphics

**Usage**

```r
arrow_1d_graphics(
  zargs,
  loc = c(0.5, 0.5),
  angle = 60,
  length = 0.6,
  add = FALSE,
  plot... = NULL,
  ...
)
```
arrow_1d_grid

Arguments

- `zargs`: argument list as passed from `zenplot()`
- `loc`: (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- `angle`: angle in [0, 180]
- `length`: length of the arrow in [0,1] from tip to base
- `add`: logical indicating whether this plot should be added to the last one
- `plot...`: additional arguments passed to `plot_region()`
- `...`: additional arguments passed to `segments()`

Value

`invisible()`

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using R’s base graphics: `boxplot_1d_graphics()`, `density_1d_graphics()`, `hist_1d_graphics()`, `jitter_1d_graphics()`, `label_1d_graphics()`, `lines_1d_graphics()`, `points_1d_graphics()`, `rect_1d_graphics()`, `rug_1d_graphics()`

Other default 1d plot functions: `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

---

**arrow_1d_grid**  
*Arrow plot in 1d using the grid package*

Description

Arrow plot in 1d using the grid package
Usage

arrow_1d_grid(
  zargs,
  loc = c(0.5, 0.5),
  angle = 60,
  length = 0.6,
  draw = FALSE,
  ...
)

Arguments

zargs  argument list as passed from zenplot()

loc    (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)

angle  angle from the shaft to the edge of the arrow head

length length of the arrow in [0,1] from tip to base

draw   logical indicating whether drawing should take place

...    additional arguments passed to gpar()

Value

grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the grid package: boxplot_1d_grid(), density_1d_grid(), hist_1d_grid(), jitter_1d_grid(), label_1d_grid(), lines_1d_grid(), points_1d_grid(), rect_1d_grid(), rug_1d_grid()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_graphics(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()
arrow_1d_loon

Arrow plot in 1d using the interactive loon package

Description

Arrow plot in 1d using the interactive loon package

Usage

arrow_1d_loon(
  zargs,
  loc = c(0.5, 0.5),
  length = 0.6,
  angle = NULL,
  linkingGroup = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
  parent = NULL,
  ...
)

Arguments

zargs The argument list as passed from zenplot()
loc The (x,y) location of the center of the arrow
length The length of the arrow
angle The angle from the shaft to the edge of the arrow head
linkingGroup A string specifying the initial group of plots to be linked to this plot
showLabels Logical determining whether axis labels are displayed
showScales Logical determining whether scales are displayed
showGuides Logical determining whether the background guidelines are displayed
baseplot If non-null the base plot on which the plot should be layered
parent The tk parent for this loon plot widget
... Additional parameters passed to loon::l_layer_line(...)

Value

A loon loon::l_plot(...)

Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using the interactive loon package: `boxplot_1d_loon()`, `density_1d_loon()`, `hist_1d_loon()`, `jitter_1d_loon()`, `label_1d_loon()`, `lines_1d_loon()`, `points_1d_loon()`, `rect_1d_loon()`, `rug_1d_loon()

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()

---

**arrow_2d_graphics**

*Arrow plot in 2d using R’s base graphics*

Description

Arrow plot in 2d using R’s base graphics

Usage

```r
arrow_2d_graphics(
  zargs,  
  loc = c(0.5, 0.5),  
  angle = 60,  
  length = 0.2,  
  add = FALSE,  
  group... = NULL,  
  plot... = NULL,  
  ...
)
```

Arguments

- `zargs` 
  argument list as passed from `zenplot()`
- `loc` 
  (x,y)-location (in (0,1)^2) of the center of the arrow
- `angle` 
  angle from the shaft to the edge of the arrow head
- `length` 
  length of the arrow in [0,1] from tip to base
- `add` 
  logical indicating whether this plot should be added to the last one
- `group...` 
  list of arguments passed to `group_2d_graphics` (or NULL)
- `plot...` 
  additional arguments passed to `plot_region()`
- `...` 
  additional arguments passed to `points()`
**arrow_2d_grid**

**Value**

invisible()

**Author(s)**

Marius Hofert and Wayne Oldford

**See Also**

Other default 2d plot functions using R’s base graphics: axes_2d_graphics(), density_2d_graphics(), group_2d_graphics(), label_2d_graphics(), points_2d_graphics(), qq_2d_graphics(), rect_2d_graphics()

Other default 2d plot functions: arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()

---

**arrow_2d_grid**  
*Arrow plot in 2d using the grid package*

**Description**

Arrow plot in 2d using the grid package

**Usage**

```r
arrow_2d_grid(
  zargs,
  loc = c(0.5, 0.5),
  angle = 60,
  length = 0.2,
  group... = list(cex = 0.66),
  draw = FALSE,
  ...
)
```

**Arguments**

- `zargs`  
  argument list as passed from `zenplot()`
- `loc`  
  (x,y)-location of the center of the arrow
- `angle`  
  angle from the shaft to the edge of the arrow head
- `length`  
  length of the arrow in [0,1] from tip to base
- `group...`  
  list of arguments passed to `group_2d_grid` (or NULL)
- `draw`  
  logical indicating whether drawing should take place
- `...`  
  additional arguments passed to `gpar()`
**Value**

`grob (invisibly)`

**Author(s)**

Marius Hofert and Wayne Oldford

**See Also**

Other default 2d plot functions using the grid package: `axes_2d_grid()`, `density_2d_grid()`, `group_2d_grid()`, `label_2d_grid()`, `points_2d_grid()`, `qq_2d_grid()`, `rect_2d_grid()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`

---

**Description**

Arrow plot in 2d using the interactive loon package

**Usage**

```r
arrow_2d_loon(
  zargs,
  loc = rep(0.5, 2),
  length = 0.2,
  angle = 30,
  linkingGroup = NULL,
  color = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
  parent = NULL,
  group... = NULL,
  ...
)
```

Arguments

- **zargs**: The argument list as passed from `zenplot()`
- **loc**: The (x,y) location of the center of the arrow
- **length**: The length of the arrow
- **angle**: The angle from the shaft to the edge of the arrow head
- **linkingGroup**: The initial linking group
- **color**: The color
- **showLabels**: Logical determining whether axis labels are displayed
- **showScales**: Logical determining whether scales are displayed
- **showGuides**: Logical determining whether the background guidelines are displayed
- **baseplot**: If non-null the base plot on which the plot should be layered
- **parent**: The tk parent for this loon plot widget
- **group...**: A list of arguments passed to `group_2d_loon` (or NULL)
- **...**: Additional parameters passed to `loon::l_layer_line()`

Value

the plot (invisibly)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the interactive loon package: `axes_2d_loon()`, `density_2d_loon()`, `group_2d_loon()`, `label_2d_loon()`, `points_2d_loon()`, `rect_2d_loon()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `axes_2d_graphics()`, `axes_2d_grid()`, `density_2d_graphics()`, `density_2d_grid()`, `group_2d_graphics()`, `group_2d_grid()`, `extract_2d()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`

---

as_numeric A list of columns

Description

A list of columns

Usage

as_numeric(x)
Arguments

x          A list of columns

Value

A list where each column is converted to data (range() works, can be plotted, etc.)

Note

See plot.default -> xy.coords()

Author(s)

Marius Hofert

axes_2d_graphics

Axes arrows in 2d using R’s base graphics

Description

Axes arrows in 2d using R’s base graphics

Usage

axes_2d_graphics(
  zargs,
  length = 0.1,
  eps = 0.04,
  code = 2,
  xpd = NA,
  add = FALSE,
  group... = NULL,
  plot... = NULL,
  ...
)

Arguments

zargs            argument list as passed from zenplot()
length           length of the arrow head
eps              distance by which the axes are moved away from the plot region
code             integer code determining the kind of arrows to be drawn; see ?arrows
xpd              logical or NA, determining the region with respect to which clipping takes place; see ?par
add              logical indicating whether this plot should be added to the last one
axes_2d_grid

Description

Axes arrow using the grid package

Usage

```r
axes_2d_grid(
  zargs,
  angle = 30,
  length = unit(0.05, "npc"),
  type = "open",
  eps = 0.02,
  group... = list(cex = 0.66),
  draw = FALSE,
  ...
)
```
Axes arrows in 2d using the interactive loon package

Description

Axes arrows in 2d using the interactive loon package

Arguments

- `zargs`: argument list as passed from `zenplot()`
- `angle`: angle of the arrow head (see ?arrow)
- `length`: length of the arrow in [0,1] from tip to base
- `type`: type of the arrow head (see ?arrow)
- `eps`: distance by which the axes are moved away from the plot region
- `group...`: list of arguments passed to `group_2d_grid` (or NULL)
- `draw`: logical indicating whether drawing should take place
- `...`: additional arguments passed to `gpar()`

Value

- `grob` (invisibly)

Note


Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the grid package: `arrow_2d_grid()`, `density_2d_grid()`, `group_2d_grid()`, `label_2d_grid()`, `points_2d_grid()`, `qq_2d_grid()`, `rect_2d_grid()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`
axes_2d_loon

Usage

axes_2d_loon(
  zargs,
  angle = 30,
  length = 0.05,
  eps = 0.02,
  linkingGroup = NULL,
  color = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
  parent = NULL,
  group... = NULL,
  ...
)

Arguments

zargs The argument list as passed from zenplot()
angle The angle of the arrow head
length The length of the arrow head
eps The distance by which the axes are moved away from the plot region
linkingGroup The initial linking group
color Colour used fill if ccol is NULL, a grey palette is used otherwise.
showLabels Logical determining whether axis labels are displayed
showScales Logical determining whether scales are displayed
showGuides Logical determining whether the background guidelines are displayed
baseplot If non-null the base plot on which the plot should be layered
parent The tk parent for this loon plot widget
group... A list of arguments passed to group_2d_loon (or NULL)
... Additional arguments passed to loon::l_plot()

Value

the loon plot

Note


Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 2d plot functions using the interactive loon package: `arrow_2d_loon()`, `density_2d_loon()`, `group_2d_loon()`, `label_2d_loon()`, `points_2d_loon()`, `rect_2d_loon()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`

---

**boxplot_1d_graphics**  
*Box plot in 1d using R's base graphics*

**Description**

Box plot in 1d using R’s base graphics

**Usage**

```r
boxplot_1d_graphics(
  zargs,
  cex = 0.4,
  range = NULL,
  axes = FALSE,
  add = FALSE,
  ...
)
```

**Arguments**

- `zargs`  
  The argument list as passed from `zenplot()`

- `cex`  
  The character expansion factor

- `range`  
  A numerical value which determines how far the plot whiskers extend. If NULL, the whiskers (range) grows with sample size.

- `axes`  
  A logical indicating whether axes should be drawn

- `add`  
  A logical indicating whether this plot should be added to the last one

- `...`  
  Additional arguments passed to `boxplot()`

**Value**

`invisible()`

**Author(s)**

Marius Hofert and Wayne Oldford
Boxplot in 1d using the grid package

Description

Boxplot in 1d using the grid package

Usage

```r
boxplot_1d_grid(
  zargs,
  pch = 21,
  size = 0.02,
  col = NULL,
  lwd = 2,
  bpwidth = 0.5,
  range = NULL,
  draw = FALSE,
  ...
)
```

Arguments

- `zargs`: argument list as passed from `zenplot()`
- `pch`: plot symbol
- `size`: size of the plot symbol
- `col`: color
- `lwd`: graphical parameter line width for whiskers and median
- `bpwidth`: width of boxplot on scale of default.units
- `range`: numerical value used to determine how far the plot whiskers extend. If NULL, the whiskers (range) grows with sample size.
- `draw`: logical indicating whether drawing should take place
- `...`: additional arguments passed to `gpar()`
Value

gTree grob containing the boxplot components as grobs

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the grid package: arrow_1d_grid(), density_1d_grid(), hist_1d_grid(), jitter_1d_grid(), label_1d_grid(), lines_1d_grid(), points_1d_grid(), rect_1d_grid(), rug_1d_grid()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_graphics(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rect_1d_grid(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()
Arguments

zargs  The argument list as passed from zenplot()
color  colour for boxplot
linecolor  Colour used for the lines to draw the boxplot
lwd  The parameter line width for whiskers and median and box boundaries
range  numerical value used to determine how far the plot whiskers extend. If NULL, the whiskers (range) grows with sample size.
showLabels  Logical determining whether axis labels are displayed
showScales  Logical determining whether scales are displayed
showGuides  Logical determining whether the background guidelines are displayed
linkingGroup  A string specifying the initial group of plots to be linked to this plot
baseplot  If non-null the base plot on which the plot should be layered
parent  The tk parent for this loon plot widget
...  Additional parameters passed to gpar()

Value

A loon loon::l_plot(...)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the interactive loon package: arrow_1d_loon(), density_1d_loon(), hist_1d_loon(), jitter_1d_loon(), label_1d_loon(), lines_1d_loon(), points_1d_loon(), rect_1d_loon(), rug_1d_loon()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), density_1d_graphics(), density_1d_grid(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()
**burst**

*Splitting an Input Object into a List of Columns*

**Description**

Splits a (numeric/logical/character) vector, matrix, data.frame or a list of such into a list of columns, with corresponding group and variable information as well as labels. This is an auxiliary function for checking and converting the data argument of zenplot().

**Usage**

```r
burst(x, labs = list())
```

**Arguments**

- `x` A numeric vector, matrix, data.frame or, for `burst()`, a list of such.
- `labs` Either `NULL` (in which case neither group nor variable labels are used or computed) or a list with components
  - `group` - the group label basename or labels for the groups (or `NULL` for no group labels)
  - `var` - the variable label basename or labels for the variables (or `NULL` for no variable labels)
  - `sep` - the string used as the separator between group and variable labels
  - `group2d` - a `logical` indicating whether labels of `group2d_*.()` plots are affected by `group = NULL` (or printed anyway)

If any of these components is not given, it is set to the defaults as described in `zenplot()`. Note that if at least one (group or variable) label is given in `x`, then those (original) labels will be used. If `labs = NULL`, neither group nor variable labels are used.

**Value**

A `list` with components
- `xcols` - a list containing the column vectors of `x`
- `groups` - the group number for each column of `x`
- `vars` - the variable number (within each group) for each column of `x`
- `glabs` - the group label for each column of `x`
- `labs` - the group and variable labels for each column of `x`

**Note**

Performance critical

**Author(s)**

Marius Hofert
See Also

Other tools for constructing your own plot1d and plot2d functions: burst_aux(), check_zargs(), extract_1d(), extract_2d(), plot_indices()

Examples

```r
## Unnamed list of (some named, some unnamed) valid components
A <- matrix(1:12, ncol = 3)
x <- list(A, 1:4, as.data.frame(A))

burst(x, labs = list(group = "G", var = "V", sep = ", "))
burst(x) # the same defaults as above
burst(x, labs = list(sep = " ")) # only changing the separator
## Note: - No group labels are given in 'x' and thus they are constructed
##       in the above call
## - The variable names are only constructed if not given

burst(x, labs = list(group = ""))
burst(x, labs = list(group = NULL, group2d = TRUE)) # no group labels
## Note: There's no effect of 'group2d = TRUE' visible here as
## 'x' doesn't contain group labels

burst(x, labs = list(group = NULL)) # no group labels unless groups change
burst(x, labs = list(var = NULL)) # no variable labels
burst(x, labs = list(group = NULL, var = NULL)) # neither one
burst(x, labs = NULL) # similarly, without any labels at all

## Named list
x <- list(mat = A, vec = 1:4, df = as.data.frame(A))
burst(x)
## Note: - The given group labels are used
##       - The variable names are only constructed if not given

burst(x, labs = list(group = NULL, group2d = TRUE)) # no group labels
burst(x, labs = list(group = NULL)) # no group labels unless groups change
## Note: Now the effect of 'group2d' is visible.

## Partially named list
x <- list(mat = A, vec = 1:4, as.data.frame(A))
burst(x)
burst(x, labs = list(group = NULL, group2d = TRUE)) # no group labels
burst(x, labs = list(group = NULL)) # no group labels unless groups change
burst(x, labs = list(var = NULL)) # no variable labels
burst(x, labs = list(group = NULL, var = NULL)) # only group labels and only if groups change
burst(x, labs = NULL) # neither group nor variable labels
```
check_zargs

Description

Auxiliary function for burst()

Usage

burst_aux(x, labs = "V")

Arguments

x A vector, matrix or data.frame (or a (pure) list, but that we don’t use here)

labs The variable labels: - if NULL, no labels are used - if of length 1, use this label and append 1:ncol(x) but only if x doesn’t have any column names (otherwise use the latter) - if of length ncol(x), use that but only if x doesn’t have any column names (otherwise use the latter)

Value

’x’ as a list of named columns

Note

- Performance critical (no checks here) - Data frames always have default names. They are possibly ugly but we have to use them here as we cannot determine whether they were assigned automatically or on purpose.

Author(s)

Marius Hofert

See Also

Other tools for constructing your own plot1d and plot2d functions: burst(), check_zargs(), extract_1d(), extract_2d(), plot_indices()

check_zargs Checking whether certain arguments appear in zargs

Description

Checking whether certain arguments appear in zargs

Usage

check_zargs(zargs, ...)

connect_pairs

Arguments

zargs The argument list as passed from zenplot()

... The arguments to be checked for presence in zargs

Value

A logical indicating whether some arguments are missing in zargs

Author(s)

Marius Hofert

See Also

Other tools for constructing your own plot1d and plot2d functions: burst_aux(), burst(), extract_1d(), extract_2d(), plot_indices()

---

connect_pairs Connecting Possibly Overlapping Pairs Into a List of Paths

Description

Pairs, given as rows of a matrix, data.frame, or list, are processed to return a list of paths, each identifying the connected pairs in the rows of x.

Usage

connect_pairs(x, duplicate.rm = FALSE)

Arguments

x two-column matrix, data.frame, or list containing vectors of length two representing the pairs to be connected.

duplicate.rm logical indicating whether equal pairs (up to permutation) are to be omitted.

Value

A list each of whose elements give a path of connected pairs. Each list element is a vector of length at least 2 (longer vectors > 2 in length identify the pairs connected in a path).

Author(s)

Marius Hofert and Wayne Oldford
See Also

zenplot() which provides the zenplot.
Other tools related to constructing zenpaths: extract_pairs(), graph_pairs(), groupData(), indexData(), zenpath()

Examples

## First something simple.
(pairs <- matrix(c(1,2,2,3,3,5,5,7,8,9), ncol = 2, byrow = TRUE))
## Connect pairs into separate paths defined by the row order.
connect_pairs(pairs)

## Now something different
nVars <- 5
pairs <- expand.grid(1:nVars, 1:nVars)
## and take those where
(pairs <- pairs[pairs[,1] < pairs[,2],])
connect_pairs(pairs)

## Something more complicated.
## Get weights
set.seed(27135)
x <- runif(choose(nVars,2)) # weights

## We imagine pairs identify edges of a graph with these weights
## Get a zenpath ordering the edges based on weights
(zp <- zenpath(x, pairs = pairs, method = "strictly.weighted"))

## And connect these giving the list of paths
connect_pairs(zp)

---

convert_occupancy

Converting an Occupancy Matrix

Description

Convert an occupancy matrix to matrix with different symbols.

Usage

convert_occupancy(x, to = c("", "<", ">", "v", "^", "="))

Arguments

x          an occupancy matrix consisting of the character "" (unoccupied), "1" (left), 
            "r" (right), "d" (down) or "u" (up) as returned by zenplot().

to         a vector of symbols to which "", "1", "r", "d" and "u" should be mapped.
Value

matrix as the occupancy matrix but with entries replaced by those in to.

Author(s)

Marius Hofert

See Also

Other zenplot technical tools: is.standard(), n2dcols_aux(), num_cols(), turn_checker()

Examples

```r
# Generate some data
n <- 1000 # sample size
d <- 20 # dimension
set.seed(271) # set seed (for reproducibility)
x <- matrix(rnorm(n * d), ncol = d) # i.i.d. N(0,1) data

# Extract the occupancy matrix from a zenplot
res <- zenplot(x)
(occ <- res["path"]["occupancy"])

# Convert the occupancy matrix
convert_occupancy(occ)
```

---

density_1d_graphics    Density plot in 1d using R's base graphics

Description

Density plot in 1d using R’s base graphics

Usage

density_1d_graphics(
  zargs,
  density... = NULL,
  offset = 0.08,
  add = FALSE,
  plot... = NULL,
  ...
)
Density plot in 1d using the grid package

Description

Density plot in 1d using the grid package

Usage

density_1d_grid(zargs, density... = NULL, offset = 0.08, draw = FALSE, ...)

Arguments

zargs  argument list as passed from zenplot()
density... list of arguments for density()
offset  number in [0, 0.5] determining how far away the density stays from the plot margins (for creating space between the two)
add  logical indicating whether this plot should be added to the last one
plot...  additional arguments passed to plot_region()
...  additional arguments passed to polygon()

Value

invisible()

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using R’s base graphics: arrow_1d_graphics(), boxplot_1d_graphics(), hist_1d_graphics(), jitter_1d_graphics(), label_1d_graphics(), lines_1d_graphics(), points_1d_graphics(), rect_1d_graphics(), rug_1d_graphics()

Other default 1d plot functions: arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_grid(), hist_1d_loon(), jitter_1d_grid(), jitter_1d_loon(), label_1d_grid(), label_1d_loon(), lines_1d_grid(), lines_1d_loon(), points_1d_grid(), points_1d_loon(), rect_1d_grid(), rect_1d_loon(), rug_1d_grid(), rug_1d_loon()
Arguments

- **zargs**: argument list as passed from `zenplot()`
- **density**: list of arguments for density()
- **offset**: numerical value in $[0, 0.5]$ used to offset the density within the height 1 box in which it appears
- **draw**: logical indicating whether drawing should take place
- **...**: additional arguments passed to `gpar()`

Value

grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`, `hist_1d_grid()`, `jitter_1d_grid()`, `label_1d_grid()`, `lines_1d_grid()`, `points_1d_grid()`, `rect_1d_grid()`, `rug_1d_grid()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

density_1d_loon

Density plot in 1d using the interactive loon package

Description

Density plot in 1d using the interactive loon package

Usage

density_1d_loon(
  zargs,
  density.args = list(),
  method = c("single", "double"),
  lwd = NULL,
  linewidth = NULL,
Arguments

zargs
density.args
method
lwd
linewidth
color
fill
linecolor
linkingGroup
showLabels
showScales
showGuides
baseplot
parent
...

Value

A loon loon::l_plot(...)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the interactive loon package: arrow_1d_loon(), boxplot_1d_loon(), hist_1d_loon(), jitter_1d_loon(), label_1d_loon(), lines_1d_loon(), points_1d_loon(), rect_1d_loon(), rug_1d_loon()
density_2d_graphics

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_graphics(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()

density_2d_graphics  Density plot in 2d using R’s base graphics

Description

Density plot in 2d using R’s base graphics

Usage

density_2d_graphics(
  zargs,
  ngrids = 25,
  drawlabels = FALSE,
  axes = FALSE,
  box = FALSE,
  add = FALSE,
  group... = NULL,
  ...
)

Arguments

zargs argument list as passed from zenplot()
ngrids number of grid points in each dimension. Can be scalar or a length-2 integer vector.
drawlabels logical indicating whether the contours should be labelled
axes logical indicating whether axes should be drawn
box logical indicating whether a box should be drawn
add logical indicating whether this plot should be added to the last one
group... list of arguments passed to group_2d_graphics (or NULL)
... additional arguments passed to points()

Value

invisible()
Author(s)
Marius Hofert and Wayne Oldford

See Also
Other default 2d plot functions using R’s base graphics: `arrow_2d_graphics()`, `axes_2d_graphics()`, `group_2d_graphics()`, `label_2d_graphics()`, `points_2d_graphics()`, `qq_2d_graphics()`, `rect_2d_graphics()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`

density_2d_grid  

Density plot in 2d using the grid package

Description
Density plot in 2d using the grid package

Usage

density_2d_grid(
  zargs,
  ngrids = 25,
  ccol = NULL,
  clwd = 1,
  clty = 1,
  box = FALSE,
  box.width = 1,
  box.height = 1,
  group... = list(cex = 0.66),
  draw = FALSE,
  ...
)

Arguments

zargs  
argument list as passed from `zenplot()`

ngrids  
number of grid points in each direction. Can be scalar or a length-2 integer vector.

ccol  
vector (which is then recycled to the appropriate length) giving the color of the contours

clwd  
vector (which is then recycled to the appropriate length) giving the line widths of the contours
Density plot in 2d using the interactive loon package

### Description

Density plot in 2d using the interactive loon package
Usage

density_2d_loon(
  zargs,
  ngrids = 25,
  ccol = NULL,
  color = NULL,
  clwd = NULL,
  lwd = NULL,
  linewidth = 1,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  linkingGroup = NULL,
  baseplot = NULL,
  parent = NULL,
  group... = NULL,
  ...
)

Arguments

  zargs  The argument list as passed from zenplot()
  ngrids Number of grid points in each direction. Can be scalar or a length-2 integer
           vector.
  ccol   A vector (which is then recycled to the appropriate length) giving the color of
           the contours
  color  Colour used fill if ccol is NULL, a grey palette is used otherwise.
  clwd   A vector (which is then recycled to the appropriate length) giving the line widths
           of the contours
  lwd    Line width used only when clwd = NULL
  linewidth Line width used when both clwd and lwd are NULL, value of 1 used otherwise.
  showLabels Logical determining whether axis labels are displayed
  showScales Logical determining whether scales are displayed
  showGuides Logical determining whether the background guidelines are displayed
  linkingGroup The initial linking group
  baseplot If non-null the base plot on which the plot should be layered
  parent The tk parent for this loon plot widget
  group... A list of arguments passed to group_2d_loon (or NULL)
  ...     Additional parameters passed to loon::l_layer_line()

Value

  invisible()
de_elect

Author(s)
Marius Hofert and Wayne Oldford

See Also
Other default 2d plot functions using the interactive loon package: arrow_2d_loon(), axes_2d_loon(), group_2d_loon(), label_2d_loon(), points_2d_loon(), rect_2d_loon()

Other default 2d plot functions:
arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()

Description
Data set consisting of 68 columns of data about the German elections 2002 and 2005.

Usage
data("de_elect")

Format
A data.frame() with 68 columns:

District: electoral district
State: federal state (Bundesland)
Num.comm: number of communities
Area: area 2004-12-31 (in square km)
Pop: population 2004-12-31 (in 1000)
Men: men (in 1000)
Citizens: germans (in 1000)
Density: population density 2004-12-31 (in square km)
Pop.1e.15: population younger than (or equal to) 15 years 2002-12-31 (in percent)
Pop.15.18: population between 15 and 18 years old 2002-12-31 (in percent)
Pop.18.25: population between 18 and 25 years old 2002-12-31 (in percent)
Pop.25.35: population between 25 and 35 years old 2002-12-31 (in percent)
Pop.35.60: population between 35 and 60 years old 2002-12-31 (in percent)
Pop.g.60: population older than 60 years 2002-12-31 (in percent)
Births: live births (per 1000)
Deaths: deaths (per 1000)
Move.in: moving there in 2003 (per 1000)
Move.out: moving away in 2003 (per 1000)
Increase: increase in population (per 1000)
Farms: number of farms in 2001 (per 1000)
Agriculture: agriculturally used land (in ha)
Mining: mining companies and processing trade 2002-09-30 (per 1000)
Mining.employees: employees in mining and processing trade 2002-09-30 (per 1000)
Apt.new: new apartments 2002 (per 1000)
Apt: apartments 2002-12-31 (per 1000)
Motorized: motor vehicles 2003-01-31 (per 1000)
School.finishers: school finishers 2002 (per 1000)
School.wo.2nd: without secondary school (ohne Hauptschule) 2002 (in percent)
School.2nd: with secondary school (Hauptschule) 2002 (in percent)
School.Real: with graduation from Realschule 2002 (in percent)
School.UED: with university-entrance diploma (Gymnasium) 2002 (in percent)
Unemployment.03: unemployment 2003-12-31 (in percent)
Unemployment.04: unemployment 2004-12-31 (in percent)
Employed: employed subject to social insurance contribution (per 1000)
FFF: farmers, foresters, fishermen (in percent)
Industry: industry employees subject to social insurance contribution (in percent)
CTT: commerce, transportation and telecommunication employees subject to social insurance contribution (in percent)
OS: other services (in percent)
Voters.05: eligible voters 2005
Voters.02: eligible voters 2002
Votes.05: number of votes 2005
Votes.02: number of votes 2002
Invalid.05: invalid votes 2005
Invalid.02: invalid votes 2002
Valid.05: valid votes 2005
Valid.02: valid votes 2002
Votes.SPD.05: votes for SPD 2005
Votes.SPD.02: votes for SPD 2002
Votes.CDU.CSU.05: votes for CDU/CSU 2005
Votes.CDU.CSU.02: votes for CDU/CSU 2002
Votes.Gruene.05: votes for Gruene 2005
Votes.Gruene.02: votes for Gruene 2002
Votes.FDP.05: votes for FDP 2005
Votes.FDP.02: votes for FDP 2002
Votes.Linke.05: votes for Linke 2005
Votes.Linke.02: votes for Linke 2002
SPD.05: SPD 2005 (as a fraction in [0,1])
CDU.CSU.05: CDU/CSU 2005 (as a fraction in [0,1])
Gruene.05: Gruene 2005 (as a fraction in [0,1])
FDP.05: FDP 2005 (as a fraction in [0,1])
Linke.05: Linke 2005 (as a fraction in [0,1])
Others.05: Other parties 2005 (as a fraction in [0,1])
SPD.02: SPD 2002 (as a fraction in [0,1])
CDU.CSU.02: CDU/CSU 2002 (as a fraction in [0,1])
Gruene.02: Gruene 2002 (as a fraction in [0,1])
FDP.02: FDP 2002 (as a fraction in [0,1])
Linke.02: Linke 2002 (as a fraction in [0,1])
Others.02: other parties 2002 (as a fraction in [0,1])

Source
The data was obtained from http://www.bundeswahlleiter.de but is not available under this link anymore. Furthermore, the first column of the original data set is ommitted as it only contained the row numbers.

Examples
data("de_elect")

extract_1d

Extracting information for our default/provided plot1d()

Description
Extracting information for our default/provided plot1d()

Usage
extract_1d(zargs)

Arguments
zargs The argument list as passed from zenplot(). This must at least contain x, orientations, vars, num, lim and labs; see zenplot() for an explanation of these variables.
Details

This is an auxiliary function called on zargs within any 1d plotting function (e.g. `hist_1d_grid`, `density_1d_graphics`, or `points_1d_loon`) to extract the 1d data from zargs needed for plotting. For performance reasons, no checking of the input object is done.

Value

A list list with

- `x`: the data to be plotted in the 1d plot
- `xcols`: a list with all columns of `x`
- `groups`: the group numbers for each column of `x`
- `vars`: the variable numbers for each column of `x`
- `glabs`: the group labels for each column of `x`
- `vlabs`: the variable labels for each column of `x`
- `horizontal`: a logical indicating whether the plot is horizontal or vertical, and
- `xlim`: the axis limits.

Note

Performance critical

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other tools for constructing your own plot1d and plot2d functions: `burst_aux()`, `burst()`, `check_zargs()`, `extract_2d()`, `plot_indices()`

Other data extraction functions to build plots: `extract_2d()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`,
`boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`,
`density_1d_grid()`, `density_1d_loon()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`,
`jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`,
`label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`,
`points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`,
`rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

Examples

```r
## This function is used within the default (any user defined)
## 1d plots
my_1d_plot <- function(zargs, your_name = "Bob", ...) {
  data_1d <- extract_1d(zargs)
  msg <- paste("Components of zargs available",
                "to construct a 1d plot for ",
```
print(msg)
## just print the names of the data components
## which you might want to use in your plot
print(names(data_1d))
## You might have to draw your 1d plot differently depending
## upon whether it is to appear horizontally or vertically
if (data_1d$horizontal) {
  print("This plot would be horizontal")
} else {
  print("This one would be vertical")
}
## You can plot whatever you want using the information in
## could use any of these to construct any 1d plot you want
## using R's graphics or any of zemplot's built in 1d plots.
##
## For example, here we use zemplot's base graphics functions
## First a histogram
hist_1d_graphics(zargs, ...)
## to which we add the variable label
label_1d_graphics(zargs, add = TRUE, col = "red", ...)
## similar functions could be called for the other packages.
## You can print the source of anyone of the default functions
## to get some idea of managing details.
}

## And now try it out
zenplot(iris[,1:3], plot1d = my_1d_plot)

---

**extract_2d**  
Extracting information for our default/provided plot2d()

### Description

Extracting information for our default/provided plot2d()

### Usage

extract_2d(zargs)

### Arguments

- **zargs**  
The argument list as passed from `zenplot()`. This must at least contain `x, vars, num, lim` and `labs` for `extract_2d()`. See `zenplot()` for an explanation of these variables.
Details

This is an auxiliary function called on zargs within any 1d plotting function (e.g. `hist_1d_grid`, `density_1d_graphics`, or `points_1d_loon`) to extract the 1d data from zargs needed for plotting. For performance reasons, no checking of the input object is done.

Value

A list `list` with

- `x` and `y`: the data to be plotted in the 2d plot
- `xcols`: a list with all columns of `x`
- `groups`: the group numbers for each column of `x`
- `vars`: the variable numbers for each column of `x`
- `glabs`: the group labels for each column of `x`
- `vlabs`: the variable labels for each column of `x`
- `xlim` and `ylim`: the x-axis and y-axis limits, and
- `same.group`: a `logical` indicating whether the x and y variables belong to the same group.

Note

Performance critical

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other tools for constructing your own plot1d and plot2d functions: `burst_aux()`, `burst()`, `check_zargs()`, `extract_1d()`, `plot_indices()`

Other data extraction functions to build plots: `extract_1d()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`

Examples

```r
## This function is used within the default (any user defined)
## 2d plot functions
#
my_2d_plot <- function(zargs, your_name = "BillyBob", ...) {
  data_2d <- extract_2d(zargs)
  msg <- paste("Components of zargs available",
                "to construct a 2d plot for ",
                your_name)
```
print(msg)
## just print the names of the data components
## which you might want to use in your plot
print(names(data_2d))

## You can plot whatever you want using the information in
## could use any of these to construct any 1d plot you want
## using R's graphics or any of zemplot's built in 1d plots.
##
## For example, here we could use
## use zenplot's base graphics functions
## First a scatterplot
points_2d_graphics(zargs, ...)
## to which we overlay density contours
density_2d_graphics(zargs, add = TRUE, col = "steelblue", ...)
## similar functions could be called for the other packages.
## You can print the source of anyone of the default functions
## to get some idea of managing details.
}

## And now try it out
zenplot(iris, plot2d = my_2d_plot)

extract_pairs  Extract Pairs from a Path of Indices

Description

Extracts pairs from a path of indices, representing the path by the pairs (connected by common variable) and return a shortened path.

Usage

extract_pairs(x, n)

Arguments

x  the path, a vector or list of indices of the variables to be plotted.

n  A vector of length two giving the number of pairs to extract from the path x (if NULL, all pairs are returned (nothing extracted); if of length one, it is replicated in the pair). The first number corresponds to the beginning of the path, the second to the end; at least one of the two numbers should be >= 1.

Value

returns an object of the same type as the input x but (possibly) shortened. It extracts the first/last so-many pairs of x.
get_layout

Description

Compute the layout of the zen plot

Usage

get_layout(
  turns,
  n2dplots,
  first1d = TRUE,
  last1d = TRUE,
  width1d = 1,
  width2d = 10
)

Arguments

- turns: turns (character vector consisting if "u", "d", "l", "r")
- n2dplots: the number of 2d plots (faces of the hypercube to be laid out)
- first1d: logical indicating whether the first 1d plot should be plotted
- last1d: logical indicating whether the last 1d plot should be plotted
- width1d: width of 1d plots
- width2d: width of 2d plots

Examples

### Begin with a path
(zp <- zenpath(c(3, 5), method = "eulerian.cross")) # integer(2) argument

### Extract the first two pairs and last four of indices
extract_pairs(zp, n = c(2, 4))

### Extract the first and last three pairs of indices
extract_pairs(zp, n = 3) # the 3 is repeated automatically

Author(s)

Marius Hofert and Wayne Oldford

See Also

zenplot() which provides the zenplot.

Other tools related to constructing zenpaths: connect_pairs(), graph_pairs(), groupData(), indexData(), zenpath()
get_path

Value
list containing 1) the plot orientations (c("h", "s", "v", "s", ...)) 2) the plot dimensions (1d plot, 2d plot, 1d plot, ...) 3) the variable numbers plotted (an (nPlots, 2)-matrix) 4) the total width of the layout 5) the total height of the layout 6) coordinates of the bounding boxes

Author(s)
Marius Hofert and Wayne Oldford

get_path  Computing the path according to the provided method

Description
Computing the path according to the provided method

Usage
get_path(
  turns = NULL,
  n2dcols = c("letter", "square", "A4", "golden", "legal"),
  n2dplots,
  method = c("tidy", "double.zigzag", "single.zigzag", "rectangular"),
  first1d = TRUE,
  last1d = TRUE
)

Arguments
turns The turns
n2dcols The number of columns of 2d plots (>= 1) or one of "letter", "square", "A4", "golden", "legal". Note that n2dcols is ignored if turns is not NULL.
n2dplots The number of 2d plots to be laid out
method A character string indicating the method according to which the path is built
first1d A logical indicating whether the first 1d plot should be plotted
last1d A logical indicating whether the last 1d plot should be plotted

Value
the path, a list containing the turns, the positions (indices in the occupancy matrix) and the the occupancy matrix

Author(s)
Marius Hofert and Wayne Oldford
get_zigzag_turns  Compute turns for zigzag

Description
Compute turns for zigzag

Usage
get_zigzag_turns(
  nPlots,
  n2dcols,
  method = c("tidy", "double.zigzag", "single.zigzag")
)

Arguments
- nPlots: total number of plots
- n2dcols: number of columns of 2d plots (>= 1)
- method: character string indicating which zigzag method to use

Value
turns

Author(s)
Marius Hofert and Wayne Oldford

graph_pairs  Turn pairs or paths into a graph

Description
Pairs are processed to produce a graph with the elements of the pairs as vertices and the pairs as undirected edges. The result can be displayed using plot().

Usage
graph_pairs(x, var.names = NULL, edgemode = c("undirected", "directed"))
Arguments

x: matrix or list of pairs along a zenpath. Can also be a list containing vectors representing paths in the graph. Every path must be of length at least 2 (i.e. each vector element of the list).

var.names: names of the variables appearing in x.

edgemode: type of edges to be used: either "undirected" (the default) or "directed" (in which case the order of the nodes in each pair matters).

Value

a graphNEL object; can be displayed using plot().

Note

zenplot() never use directed graphs nor graphs with isolated (disconnected) nodes.

Author(s)

Marius Hofert and Wayne Oldford

See Also

zenplot() which provides the zenplot.

Other tools related to constructing zenpaths: connect_pairs(), extract_pairs(), groupData(), indexData(), zenpath()

Examples

```r
## To display the graphs constructed the packages
## graph and Rgraphviz packages need to be loaded
library(graph)
library(Rgraphviz)
##
## Get some pairs
pairs <- matrix(c(1, 2, 5, 1, 3, 4, 2, 3, 4, 2), ncol = 2, byrow = TRUE)
g <- graph_pairs(pairs)
## which can be displayed using plot(g)
plot(g)

## Build a graph from a list of paths
paths <- list(3:1, c(3, 5, 7), c(1, 4, 7), c(6, 7))
gp <- graph_pairs(paths)
## graph package draws with grid, so clear
grid.newpage()
plot(gp)

## Nodes do not need to be numbers
alpha_paths <- list(letters[3:1], letters[c(3, 5, 7)],
                    letters[c(1, 4, 7)], letters[c(6, 7)])
grid.newpage()
```
plot(graph_pairs(alpha_paths))

## Zenplots never uses this feature but you could
## build a directed graph with a single isolated node
dg <- graph_pairs(alpha_paths,
                   var.names = c(letters[1:7], "ALONE"),
                   edgemode = "directed" )
grid.newpage()
plot(dg)

---

**groupData**  
*Splitting a Matrix into a List of Matrices*

**Description**

Takes a matrix `x` and groups its rows (or columns) as specified by `indices`. Returns a list of matrices, one for each group.

**Usage**

`groupData(x, indices, byrow = FALSE)`

**Arguments**

- `x`  
  A matrix (or an object convertible to such via `as.matrix()`).

- `indices`  
  list of vectors of indices according to which `x` is grouped; each vector of indices define a group.

- `byrow`  
  logical indicating whether the grouping is done by row (`byrow = TRUE`) or by column (`byrow = FALSE`, the default).

**Value**

A list of matrices (one per group). Such a list, grouped by columns, is then typically passed on to `zenplot()`.

**Author(s)**

Marius Hofert and Wayne Oldford

**See Also**

`zenplot()` which provides the zenplot.

Other tools related to constructing zenpaths: `connect_pairs()`, `extract_pairs()`, `graph_pairs()`, `indexData()`, `zenpath()`
Examples

```r
## get a matrix
x <- matrix(1:15, ncol = 3)
colGroups <- list(c(1,2), list(2:3))
rowGroups <- list(c(1,4), list(2:3))
groupData(x, indices = colGroups)
groupData(x, indices = rowGroups, byrow = TRUE)
```

**group_2d_graphics**

Plot of labels indicating adjacent groups using R's base graphics

**Description**

Plot of labels indicating adjacent groups using R’s base graphics

**Usage**

```r
group_2d_graphics(
  zargs,
  glabs = NULL,
  sep = "\n",
  loc = c(0.5, 0.5),
  add = FALSE,
  plot... = NULL,
  ...
)
```

**Arguments**

- `zargs` argument list as passed from `zenplot()`
- `glabs` group labels being indexed by the plot variables (and thus of length as the number of variables); if NULL then they are determined with `extract_2d()`
- `sep` group label separator
- `loc` (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- `add` logical indicating whether this plot should be added to the last one
- `plot...` additional arguments passed to `plot_region()`
- `...` additional arguments passed to `text()`

**Value**

invisible()
group_2d_grid

Plot of labels indicating adjacent groups using the grid package

Description
Plot of labels indicating adjacent groups using the grid package

Usage

group_2d_grid(
  zargs,
  glabs = NULL,
  sep = "\\n",
  loc = c(0.5, 0.5),
  draw = FALSE,
  ...
)

Arguments
zargs argument list as passed from zenplot()
glabs group labels being indexed by the plot variables (and thus of length as the number of variables); if NULL then they are determined with extract_2d()
sep group label separator
loc (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
draw logical indicating whether drawing should take place
... additional arguments passed to gpar()
Value

grob (invisibly)

Note

For performance reasons (avoiding having to call extract_2d() twice), 'glabs' is an extra argument

Author(s)

Marius Hofert

See Also

Other default 2d plot functions using the grid package: arrow_2d_grid(), axes_2d_grid(), density_2d_grid(), label_2d_grid(), points_2d_grid(), qq_2d_grid(), rect_2d_grid()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()
happiness

Arguments

zargs argument list as passed from zenplot()

glabs group labels being indexed by the plot variables (and thus of length as the number of variables); if NULL then they are determined with extract_2d()

sep group label separator

size plot size

rot rotation

baseplot If non-NULL the base plot on which the plot should be layered

parent tk parent for this loon plot widget

... Additional arguments passed to text()

Value

invisible()

Note

For performance reasons (avoiding having to call extract_2d() twice), 'glabs' is an extra argument

Author(s)

Marius Hofert & Wayne Oldford

See Also

Other default 2d plot functions using the interactive loon package: arrow_2d_loon(), axes_2d_loon(), density_2d_loon(), label_2d_loon(), points_2d_loon(), rect_2d_loon()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()

happiness World Happiness Data Set

Description

Data set consisting of 498 rows and 12 columns containing data from the World Happiness Report over three years.

Usage

data("happiness")
Format

`data.frame()` with 12 columns:

- **Time**: year of the World Happiness Report.
- **Region**: region of the world.
- **Country**: country.
- **Happiness**: happiness score measured in the respective year (see `Time`) by asking “How would you rate your happiness on a scale of 0 to 10 where 10 is happiest?”.
- **Rank**: rank of the country based on Happiness.
- **GDP**: extent to which the gross domestic product per capita contributed to the calculation of Happiness.
- **Family**: extent to which family contributed to the calculation of Happiness.
- **Health**: extent to which life expectancy contributed to the calculation of Happiness.
- **Freedom**: extent to which freedom contributed to the calculation of Happiness.
- **Corruption**: extent to which the perception of corruption contributed to the calculation of Happiness.
- **Generosity**: extent to which generosity contributed to the calculation of Happiness.
- **Dystopia**: extent to which the dystopia residual contributed to the calculation of Happiness.

Dystopia is an imaginary country with the world’s least-happy people (which can act as a benchmark against which all countries can be favorably compared).

Details

GDP, Family, Health, Freedom, Corruption and Generosity describe the extent to which these factors contribute in evaluating the happiness in each country. If added together with Dystopia, one receives the happiness score.

Source

The data set was obtained from [https://www.kaggle.com/unsdsn/world-happiness](https://www.kaggle.com/unsdsn/world-happiness) on 2018-04-20 in three different .csv files (one for each year). Joint columns (variables) where then built, the rows expanded (to be the same for each year) and sorted according to Region and Country. Finally, Time was added to obtain a single data set.

References

[https://www.kaggle.com/unsdsn/world-happiness](https://www.kaggle.com/unsdsn/world-happiness)

Examples

```r
data("happiness")
stopifnot(all.equal(rowSums(happiness[,c("GDP", "Family", "Health", "Freedom",
                   "Corruption", "Generosity",
                   "Dystopia")]),
                   happiness[, "Happiness"], tol = 5e-5))```
hist_1d_graphics  

*Description*

Histogram as 1d plot using R’s base graphics

*Usage*

```r
hist_1d_graphics(
  zargs,
  breaks = NULL,
  length.out = 21,
  col = NULL,
  axes = FALSE,
  add = TRUE,
  plot... = NULL,
...
)
```

*Arguments*

- `zargs`  
  argument list as passed from `zenplot()`
- `breaks`  
  see ?hist; the default is 20 equi-width bins covering the data range
- `length.out`  
  number of break points if `breaks = NULL`
- `col`  
  vector of colors for the bars or bar components; see ?barplot
- `axes`  
  logical indicating whether axes should be drawn
- `add`  
  logical indicating whether this plot should be added to the last one
- `plot...`  
  additional arguments passed to `plot_region()`
- `...`  
  additional arguments passed to `barplot()`

*Value*

`invisible()`

*Author(s)*

Marius Hofert and Wayne Oldford

*See Also*

Other default 1d plot functions using R’s base graphics: `arrow_1d_graphics()`, `boxplot_1d_graphics()`, `density_1d_graphics()`, `jitter_1d_graphics()`, `label_1d_graphics()`, `lines_1d_graphics()`, `points_1d_graphics()`, `rect_1d_graphics()`, `rug_1d_graphics()`
Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

---

| hist_1d_grid | Histogram in 1d using the grid package |

Description

Histogram in 1d using the grid package

Usage

```r
hist_1d_grid(
  zargs,
  breaks = NULL,
  length.out = 21,
  col = NULL,
  fill = NULL,
  draw = FALSE,
  ...
)
```

Arguments

- **zargs**: argument list as passed from `zenplot()`
- **breaks**: see `?hist`; the default is 20 equi-width bins covering the data range
- **length.out**: number of break points if `breaks = NULL`
- **col**: colour of the histogram bar interiors, unless `fill` is specified, then this is the colour of the border
- **fill**: logical passed to the underlying `rectGrob()`
- **draw**: logical indicating whether drawing should take place
- **...**: additional arguments passed to `gpar()`

Value

- grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`, `density_1d_grid()`, `jitter_1d_grid()`, `label_1d_grid()`, `lines_1d_grid()`, `points_1d_grid()`, `rect_1d_grid()`, `rug_1d_grid()

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()

---

**hist_1d_loon**

*Histogram in 1d using the interactive loon package*

**Description**

Histogram in 1d using the interactive loon package

**Usage**

```r
hist_1d_loon(
  zargs,
  breaks = NULL,
  color = NULL,
  fill = NULL,
  showStackedColors = TRUE,
  showBinHandle = FALSE,
  showLabels = FALSE,
  linkingGroup = NULL,
  showScales = FALSE,
  showGuides = FALSE,
  parent = NULL,
  ...
)
```

**Arguments**

- `zargs` The argument list as passed from `zenplot()`
- `breaks` Argument passed to `hist()` to get information on bins. Default is 20 equi-width bins covering the range of `x`
- `color` colour of the histogram bar interiors, unless `fill` is specified, then this is the colour of the border
- `fill` colour of the histogram bar interior if given
Indexing a Matrix or Data Frame According to Given Indices

Description

Indexing a Matrix or Data Frame According to Given Indices

Usage

indexData(x, indices)
is.standard

Arguments

  x  A matrix or data.frame (most useful for the latter).

  indices  vector of column indices of x (typically obtained from zenpath()).

Value

An object as x (typically a data.frame or matrix) containing x indexed by indices.

Note

Useful for constructing data.frames without .1, .2, ... in their names when indexing a data.frame with a zenpath.

Author(s)

Marius Hofert and Wayne Oldford

See Also

zenplot() which provides the zenplot.

Other tools related to constructing zenpaths: connect_pairs(), extract_pairs(), graph_pairs(), groupData(), zenpath()

Examples

```r
## The function is handiest for data frames
## where we want to reuse the variable names
## without adding a suffix like ".1" etc.
## For example,
x <- BOD  # Biochemical Oxygen Demand data in base R
indices <- rep(1:2, 2)
## now compare
indexData(x, indices)
## to
x[, indices]
## zenplots prefer not to have the suffixes.
```

Description

Check Argument for Being a Vector, Matrix, Data Frame or a List of such

Usage

is.standard(x)
**Arguments**

- **x**
  A vector, matrix, data.frame or list of such

**Value**

A logical indicating whether x is of the above type

**Author(s)**

Marius Hofert

**See Also**

Other zenplot technical tools: `convert_occupancy()`, `n2dcols_aux()`, `num_cols()`, `turn_checker()`

---

**jitter_1d_graphics**

**Jittered dot plot in 1d using R’s base graphics**

**Description**

Jittered dot plot in 1d using R’s base graphics

**Usage**

```r
jitter_1d_graphics(
  zargs,
  loc = 0.5,
  offset = 0.25,
  cex = 0.4,
  add = FALSE,
  plot... = NULL,
  ...
)
```

**Arguments**

- **zargs**
  argument list as passed from `zenplot()`
- **loc**
  location in [0,1]: 0 corresponds to left, 1 to right (in the direction of the path)
- **offset**
  number in [0,0.5] determining how far off the center the jittered points reach maximally
- **cex**
  character expansion factor
- **add**
  logical indicating whether this plot should be added to the last one
- **plot...**
  additional arguments passed to `plot_region()`
- **...**
  additional arguments passed to `points()`
**jitter_1d_grid**

Jittered dot plot in 1d using the grid package

**Description**

Jittered dot plot in 1d using the grid package

**Usage**

```r
jitter_1d_grid(
  zargs,
  loc = 0.5,
  offset = 0.25,
  pch = 21,
  size = 0.02,
  draw = FALSE,
  ...
)
```

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `loc`: location in [0,1]; 0 corresponds to left, 1 to right (in the direction of the path)
- `offset`: number in [0,0.5] determining how far off the center the jittered points reach maximally
- `pch`: plotting symbol
**jitter_1d_loon**

Jittered dot plot in 1d using the interactive loon package

### Description

Jittered dot plot in 1d using the interactive loon package

### Usage

```r
jitter_1d_loon(
  zargs,
  linkingGroup = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  glyph = "ocircle",
  itemLabel = NULL,
  showItemLabels = TRUE,
```

### Value

grob (invisibly)

### Note

The default point size was chosen to match the default of graphics

### Author(s)

Marius Hofert and Wayne Oldford

### See Also

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`, `density_1d_grid()`, `hist_1d_grid()`, `label_1d_grid()`, `lines_1d_grid()`, `points_1d_grid()`, `rect_1d_grid()`, `rug_1d_grid()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`
jitter_1d_loon

parent = NULL,

Arguments

zargs The argument list as passed from zenplot()
linkingGroup A string specifying the initial group of plots to be linked to this plot
showLabels Logical determining whether axis labels are displayed
showScales Logical determining whether scales are displayed
showGuides Logical determining whether the background guidelines are displayed
glyph Glyph to be used for points, default is the open circle: "ocircle"
itemLabel A vector of strings to serve as the item labels
showItemLabels Logical determining whether item labels display on mouse hover
parent The tk parent for this loon plot widget

Value

A loon loon::l_plot(...)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the interactive loon package: arrow_1d_loon(), boxplot_1d_loon(), density_1d_loon(), hist_1d_loon(), label_1d_loon(), lines_1d_loon(), points_1d_loon(), rect_1d_loon(), rug_1d_loon()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()
label_1d_graphics

Label plot in 1d using R's base graphics

Description

Label plot in 1d using R’s base graphics

Usage

label_1d_graphics(
  zargs,
  loc = c(0.5, 0.5),
  label = NULL,
  box = FALSE,
  add = FALSE,
  plot... = NULL,
  ...
)

Arguments

- **zargs**: argument list as passed from `zenplot()`
- **loc**: (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- **label**: label to be used
- **box**: logical indicating whether a box is to be drawn.
- **add**: logical indicating whether this plot should be added to the last one
- **plot...**: additional arguments passed to `plot_region()`
- **...**: additional arguments passed to `text()` and `box()`

Value

invisible()

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using R’s base graphics: `arrow_1d_graphics()`, `boxplot_1d_graphics()`, `density_1d_graphics()`, `hist_1d_graphics()`, `jitter_1d_graphics()`, `lines_1d_graphics()`, `points_1d_graphics()`, `rect_1d_graphics()`, `rug_1d_graphics()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`
`label_1d_grid`  
*Label plot in 1d using the grid package*

**Description**

Label plot in 1d using the grid package

**Usage**

```r
label_1d_grid(
  zargs,
  loc = c(0.5, 0.5),
  label = NULL,
  cex = 0.66,
  box = FALSE,
  box.width = 1,
  box.height = 1,
  draw = FALSE,
  ...
)
```

**Arguments**

- `zargs`  
  argument list as passed from `zenplot()`
- `loc`  
  (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- `label`  
  label to be used
- `cex`  
  character expansion factor
- `box`  
  logical indicating whether a box should be drawn around the text
- `box.width`  
  width of the box
- `box.height`  
  height of the box
- `draw`  
  logical indicating whether drawing should take place
- `...`  
  additional arguments passed to `gpar()`

**Value**

`grob` (invisibly)
**Author(s)**

Marius Hofert and Wayne Oldford

**See Also**

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`, `density_1d_grid()`, `hist_1d_grid()`, `jitter_1d_grid()`, `lines_1d_grid()`, `rect_1d_grid()`, `rug_1d_grid()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

---

**label_1d_loon**

*Label plot in 1d using the interactive loon package*

**Description**

Label plot in 1d using the interactive loon package

**Usage**

```r
label_1d_loon(
  zargs,
  loc.x = NULL,
  loc.y = NULL,
  label = NULL,
  rot = NULL,
  size = 8,
  box = FALSE,
  color = NULL,
  linkingGroup = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
  parent = NULL,
  ...
)
```
Arguments

- **zargs**: The argument list as passed from `zenplot()`
- **loc.x**: x-location of the label
- **loc.y**: y-location of the label
- **label**: The label to be used
- **rot**: The rotation of the label
- **size**: The font size
- **box**: A logical indicating whether the label is to be enclosed in a box.
- **color**: Color of the label (and of box when `box = TRUE`).
- **linkingGroup**: A string specifying the initial group of plots to be linked to this plot
- **showLabels**: Logical determining whether axis labels are displayed
- **showScales**: Logical determining whether scales are displayed
- **showGuides**: Logical determining whether the background guidelines are displayed
- **baseplot**: If non-null the base plot on which the plot should be layered
- **parent**: The tk parent for this loon plot widget
- **...**: Additional parameters passed to `loon::l_layer_text(...)`

Value

A `loon::l_plot(...)`

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the interactive loon package: `arrow_1d_loon()`, `boxplot_1d_loon()`, `density_1d_loon()`, `hist_1d_loon()`, `jitter_1d_loon()`, `lines_1d_loon()`, `points_1d_loon()`, `rect_1d_loon()`, `rug_1d_loon()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`
label_2d_graphics  

Label plot in 2d using R’s base graphics

Description
Label plot in 2d using R’s base graphics

Usage

label_2d_graphics(
  zargs,
  loc = c(0.98, 0.05),
  label = NULL,
  adj = 1:0,
  box = FALSE,
  add = FALSE,
  group... = NULL,
  plot... = NULL,
  ...
)

Arguments

zargs  argument list as passed from zenplot()
loc  (x,y)-location (in (0,1)^2) of the center of the rectangle
label  label to be used
adj  x (and optionally y) adjustment of the label
box  logical indicating whether a box should be drawn
add  logical indicating whether this plot should be added to the last one
group...  list of arguments passed to group_2d_graphics (or NULL)
plot...  additional arguments passed to plot_region()
...  additional arguments passed to rect()

Value
invisible()

Author(s)
Marius Hofert and Wayne Oldford
See Also

Other default 2d plot functions using R’s base graphics: `arrow_2d_graphics()`, `axes_2d_graphics()`, `density_2d_graphics()`, `group_2d_graphics()`, `points_2d_graphics()`, `qq_2d_graphics()`, `rect_2d_graphics()`.

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`.

---

**label_2d_grid**  
Label plot in 2d using the grid package

**Description**

Label plot in 2d using the grid package

**Usage**

```r
label_2d_grid(
  zargs,
  loc = c(0.98, 0.05),
  label = NULL,
  cex = 0.66,
  just = c("right", "bottom"),
  rot = 0,
  box = FALSE,
  box.width = 1,
  box.height = 1,
  group... = list(cex = cex),
  draw = FALSE,
  ...
)
```

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `loc`: (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- `label`: label to be used
- `cex`: character expansion factor
- `just`: (x,y)-justification of the label
- `rot`: rotation of the label
- `box`: logical indicating whether a box should be drawn
Label plot in 2d using the interactive loon package

Description
Label plot in 2d using the interactive loon package

Usage

```r
label_2d_loon(
  zargs,
  loc = NULL,
  label = NULL,
  rot = 0,
  size = 8,
  box = FALSE,
  color = NULL,
  linkingGroup = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
)```

Value
grob (invisibly)

Author(s)
Marius Hofert and Wayne Oldford

See Also
Other default 2d plot functions using the grid package: `arrow_2d_grid()`, `axes_2d_grid()`, `density_2d_grid()`, `group_2d_grid()`, `points_2d_grid()`, `qq_2d_grid()`, `rect_2d_grid()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`
parent = NULL,
group... = NULL,
...
)

Arguments

zargs The argument list as passed from `zenplot()`
loc The location of the label
label The label to be used
rot The rotation of the label
size The font size
box A `logical` indicating whether the label is to be enclosed in a box.
color Color of the label (and of box when `box = TRUE`).
linkingGroup The initial linking group
showLabels Logical determining whether axis labels are displayed
showScales Logical determining whether scales are displayed
showGuides Logical determining whether the background guidelines are displayed
baseplot If non-null the base plot on which the plot should be layered
parent The tk parent for this loon plot widget
group... A list of arguments passed to `group_2d_loon` (or NULL)
... Additional parameters passed to `loon::l_layer_text(...)`

Value

The base loon::l_plot with the added text layer

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the interactive loon package: `arrow_2d_loon()`, `axes_2d_loon()`, `density_2d_loon()`, `group_2d_loon()`, `points_2d_loon()`, `rect_2d_loon()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`
**layout_1d_graphics**

*Layout plot in 1d*

**Description**

Layout plot in 1d

**Usage**

```r
layout_1d_graphics(zargs, ...)
```

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `...`: additional arguments passed to `label_1d_graphics()`

**Value**

`invisible()`

**Author(s)**

Marius Hofert and Wayne Oldford

---

**layout_1d_grid**

*Layout plot in 1d using the grid package*

**Description**

Layout plot in 1d using the grid package

**Usage**

```r
layout_1d_grid(zargs, ...)
```

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `...`: additional arguments passed to `label_1d_grid()`

**Value**

`grob (invisibly)`

**Author(s)**

Marius Hofert and Wayne Oldford
**layout_1d_loon**  
*Layout plot in 1d using the interactive loon package*

**Description**

Layout plot in 1d using the interactive loon package

**Usage**

```r
layout_1d_loon(zargs, ...)  
```

**Arguments**

- `zargs`: The argument list as passed from `zenplot()`
- `...`: Additional arguments passed to `label_1d_loon()`

**Value**

`invisible()`

**Author(s)**

Marius Hofert and Wayne Oldford

---

**layout_2d_graphics**  
*Layout plot in 2d*

**Description**

Layout plot in 2d

**Usage**

```r
layout_2d_graphics(zargs, ...)  
```

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `...`: additional arguments passed to `label_2d_graphics()`

**Value**

`invisible()`
**layout_2d_grid**

**Note**

Here we also pass ‘...’ to group_2d_grid() (to easily adjust font size etc.)

**Author(s)**

Marius Hofert and Wayne Oldford

---

**layout_2d_grid**  
*Layout plot in 2d using the grid package*

---

**Description**

Layout plot in 2d using the grid package

**Usage**

```r
layout_2d_grid(zargs, ...)
```

**Arguments**

- `zargs` argument list as passed from `zenplot()`
- `...` additional arguments passed to `label_2d_grid()`

**Value**

`grob` (invisibly)

**Note**

Here we also pass ‘...’ to group_2d_grid() (to easily adjust font size etc.)

**Author(s)**

Marius Hofert and Wayne Oldford
layout_2d_loon  
*Layout plot in 2d using the interactive loon package*

**Description**

Layout plot in 2d using the interactive loon package

**Usage**

`layout_2d_loon(zargs, ...)`

**Arguments**

- `zargs`  
  The argument list as passed from `zenplot()`
- `...`  
  Additional arguments passed to `label_2d_grid()`

**Value**

A loon plot

**Note**

Here we also pass `...'` to `group_2d_loon()` (to easily adjust font size etc.)

**Author(s)**

Marius Hofert and Wayne Oldford

lines_1d_graphics  
*Line plot in 1d using R’s base graphics*

**Description**

Line plot in 1d using R’s base graphics

**Usage**

```r
lines_1d_graphics(
  zargs,
  loc = c(0.5, 0.5),
  length = 1,
  add = FALSE,
  plot... = NULL,
  ...
)
```
**lines_1d_grid**

Lines plot in 1d using the grid package

**Arguments**

- `zargs`: argument list as passed from `zenplot()`
- `loc`: (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- `length`: length of the line (in [0,1])
- `add`: logical indicating whether this plot should be added to the last one
- `plot...` additional arguments passed to `plot_region()`
- `...`: additional arguments passed to `lines()`

**Value**

`invisible()`

**Author(s)**

Marius Hofert and Wayne Oldford

**See Also**

Other default 1d plot functions using R's base graphics: `arrow_1d_graphics()`, `boxplot_1d_graphics()`, `density_1d_graphics()`, `hist_1d_graphics()`, `jitter_1d_graphics()`, `label_1d_graphics()`, `points_1d_graphics()`, `rect_1d_graphics()`, `rug_1d_graphics()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

**Description**

Lines plot in 1d using the grid package

**Usage**

```r
lines_1d_grid(
  zargs,
  loc = c(0.5, 0.5),
  length = 1,
  arrow = NULL,
  draw = FALSE,
  ...
)
```
Arguments

- **zargs**: argument list as passed from `zenplot()`
- **loc**: (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
- **length**: length of the line (in [0,1])
- **arrow**: list describing the arrow head
- **draw**: logical indicating whether drawing should take place
- **...**: additional arguments passed to gpar()

Value

grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`, `density_1d_grid()`, `hist_1d_grid()`, `jitter_1d_grid()`, `label_1d_grid()`, `points_1d_grid()`, `rect_1d_grid()`, `rug_1d_grid()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

---

**lines_1d_loon**

*Lines plot in 1d using the interactive loon package*

Description

Lines plot in 1d using the interactive loon package

Usage

```r
lines_1d_loon(
  zargs,
  loc.x = NULL,
  loc.y = NULL,
  color = NULL,
  lwd = 1,
)```
lines_1d_loon

linkingGroup = NULL,
showLabels = FALSE,
showScales = FALSE,
showGuides = FALSE,
baseplot = NULL,
parent = NULL,
...
)

Arguments

zargs
The argument list as passed from zenplot()
loc.x
x-coordinates of the points on the line
loc.y
y-coordinates of the points on the line
color
Colour of the line
lwd
line width
linkingGroup
A string specifying the initial group of plots to be linked to this plot (ignored)
showLabels
Logical determining whether axis labels are displayed
showScales
Logical determining whether scales are displayed
showGuides
Logical determining whether the background guidelines are displayed
baseplot
If non-null the base plot on which the plot should be layered
parent
The tk parent for this loon plot widget
...
Additional parameters passed to loon::l_layer_text(...)

Value

A loon loon::l_plot(...)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using the interactive loon package: arrow_1d_loon(), boxplot_1d_loon(), density_1d_loon(), hist_1d_loon(), jitter_1d_loon(), label_1d_loon(), points_1d_loon(), rect_1d_loon(), rug_1d_loon()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), points_1d_graphics(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()
l_ispace_config

Configuring a loon plot to accommodate ispace

Description

Configuring a loon plot to accommodate ispace

Usage

l_ispace_config(
  baseplot,
  ispace = NULL,
  x = NULL,
  y = NULL,
  xlim = NULL,
  ylim = NULL,
  ...
)

Arguments

baseplot The plot to be modified
ispace The inner space (in [0,1])
x The x data
y The y data
xlim The x-axis limits; if NULL, the data limits are used
ylim The y-axis limits; if NULL, the data limits are used
... Additional arguments passed to loon::l_configure

Value

The baseplot

Author(s)

R. W. Oldford

See Also

Other graphical tools: na_omit_loon(), plot_region(), vport(), zenarrow()
move

Determine the new position when moving from the current position in a given direction

Usage

move(curpos, dir, method = c("in.occupancy", "in.plane"))

Arguments

curpos: current position (i, j) in the occupancy matrix

dir: direction in which we move ("d", "u", "r" or "l")

method: choice of method ("in.occupancy" means the (current/new) position is given in terms of (row, column) indices in the occupancy matrix; "in.plane" means the directions are interpreted as in the (x,y)-plane).

Value

new position in the occupancy matrix

Author(s)

Marius Hofert and Wayne Oldford

n2dcols_aux

Auxiliary Function for Constructing Default n2dcols

Description

Auxiliary Function for Constructing Default n2dcols

Usage

n2dcols_aux(n2dplots, method = c("letter", "square", "A4", "golden", "legal"))

Arguments

n2dplots: The number of variates (= nfaces)

method: One of "letter", "square", "A4", "golden", "legal"
Value
An odd integer for n2dcols

Author(s)
Wayne Oldford

See Also
Other zenplot technical tools: convert_occupancy(), is.standard(), num_cols(), turn_checker()

na_omit_loon
Helper function to remove NAs for loon plots

description
Helper function to remove NAs for loon plots

Usage
na_omit_loon(x, y = NULL, linkingKey = NULL, itemLabel = NULL)

Arguments
x The vector of x values (required)
y The vector of y values (optional) of the same length as x; if NULL then it’s ignored.
linkingKey The vector of keys used to define links between points, of the same length as x; if NULL it will be 0:(length(x)-1).
itemLabel The vector of labels for the points, of the same length as x; if NULL it will be constructed.

Value
A list(x, y, linkingKey, itemLabel) where any NA in x or y will have been omitted from all

Author(s)
R. W. Oldford

See Also
Other graphical tools: l_ispace_config(), plot_region(), vport(), zenarrow()
**next_move_tidy**

*Determine the next position to move to and the turn out of there*

**Description**

Determine the next position to move to and the turn out of there

**Usage**

`next_move_tidy(plotNo, nPlots, curpath)`

**Arguments**

- `plotNo`: current plot number
- `nPlots`: total number of plots
- `curpath`: the current path

**Value**

A list containing the next position to move to (`nextpos`) and the turn out of there (`nextout`); Interpretation: `nextpos`: position of plot number `plotNo+1` in the (non-trimmed) occupancy matrix `nextout`: turn out of `nextpos`

**Note**

- This assumes that the last plot is a 1d plot!
- It also assumes that first1d = TRUE; will be adapted later in `get_path()` in case first1d = FALSE.
- We start in (1, 2) and also have an additional last column in the occupancy matrix to have the first and last column left in case we end up there with the last 1d plot; this cannot happen for `zigzag` but for `tidy`.

**Author(s)**

Marius Hofert and Wayne Oldford

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**num_cols**

*Determine the number of columns if is.standard(x)*

**Description**

Determine the number of columns if `is.standard(x)`

**Usage**

`num_cols(x)`
Arguments

x

A numeric vector, matrix, data.frame or a list of such.

Value

The number of data columns of 'x'

Author(s)

Marius Hofert

See Also

Other zenplot technical tools: convert_occupancy(), is.standard(), n2dcols_aux(), turn_checker()

olive

Olive Oil Data Set

Description

Data set consisting of 572 rows and 10 columns containing data about olive oil.

Usage

data("olive")

Format

A data.frame() with 10 columns:

Area: (larger) area.
Region: (local) region.
palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic, eicosenoic: the fatty acids measured.

Source

The data set was obtained from the package pdfCluster (for convenience). It contains 572 rows of observations. The first and the second column correspond to the area (Centre-North, South, Sardinia) and the geographical region of origin of the olive oils (northern Apulia, southern Apulia, Calabria, Sicily, inland Sardinia and coast Sardinia, eastern and western Liguria, Umbria), respectively. The remaining columns represent the chemical measurements (on the acid components for the oil specimens) palmitic, palmitoleic, stearic, oleic, linoleic, linolenic, arachidic, eicosenoic.

Examples

data("olive")
plot_exists

Check whether functions (plot*d to zenplot()) exist

Description
Check whether functions (plot*d to zenplot()) exist

Usage
plot_exists(x)

Arguments
x  arguments plot1d or plot2d of zenplot()

Value
logical indicating whether x exists

Note
Check first whether it’s a function (have to rely on it being able to be evaluated, cannot do more checks then) or, if a string, whether it exists

Author(s)
Marius Hofert

plot_indices
Plot Indices of the Current Plot

Description
Determining the indices of the x and y variables of the current plot

Usage
plot_indices(zargs)

Arguments
zargs  argument list as passed from zenplot(). This must at least contain vars and num; see zenplot() for an explanation of these variables.
plot_region

Details
This is an auxiliary function useful, for example, when writing user-provided 1d and 2d plot functions.

Value
A numeric(2) containing the indices of the x and y variables to be plotted in the current plot (the plot with number num). If the current plot is a 2d plot, the same variable is used twice.

Note
This is exported so that one doesn’t always have to figure out whether the variables (axes) in the current plot need to be switched manually.

Author(s)
Marius Hofert

See Also
Other tools for constructing your own plot1d and plot2d functions: burst_aux(), burst(), check_zargs(), extract_1d(), extract_2d()

plot_region Function to set up the plot region for graphics plots

Description
Auxiliary function for setting up the plot region of 1d and 2d graphics plots.

Usage
plot_region(xlim, ylim, plot... = NULL)

Arguments
xlim x-axis limits
ylim y-axis limits
plot... arguments passed to the underlying plot()

Details
This is an auxiliary function used by the provided graphics-related 1d and 2d plots.

Value
invisible()
Points 1d Graphics

Author(s)
Marius Hofert

See Also
Other graphical tools: l_ispace_config(), na_omit_loon(), vport(), zenarrow()

Points 1d Graphics

Dot plot in 1d using R’s base graphics

Description

Dot plot in 1d using R’s base graphics

Usage

points_1d_graphics(
  zargs,
  loc = 0.5,
  cex = 0.4,
  add = FALSE,
  plot... = NULL,
  ...
)

Arguments

  zargs          argument list as passed from zenplot()
  loc           location in [0,1]; 0 corresponds to left, 1 to right (in the direction of the path)
  cex           character expansion factor
  add           logical indicating whether this plot should be added to the last one
  plot...       additional arguments passed to plot_region()
  ...           additional arguments passed to points()

Value

invisible()

Author(s)
Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using R’s base graphics: `arrow_1d_graphics()`, `boxplot_1d_graphics()`, `density_1d_graphics()`, `hist_1d_graphics()`, `jitter_1d_graphics()`, `label_1d_graphics()`, `lines_1d_graphics()`, `rect_1d_graphics()`, `rug_1d_graphics()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

points_1d_grid  
\textit{Dot plot in 1d using the grid package}

Description

Dot plot in 1d using the grid package

Usage

points_1d_grid(zargs, loc = 0.5, pch = 21, size = 0.02, draw = FALSE, ...)

Arguments

- \texttt{zargs}: argument list as passed from \texttt{zenplot()}
- \texttt{loc}: location in [0,1]: 0 corresponds to left, 1 to right (in the direction of the path)
- \texttt{pch}: plotting symbol
- \texttt{size}: size of the plotting symbol
- \texttt{draw}: logical indicating whether drawing should take place
- ...: additional arguments passed to \texttt{gpar()}

Value

\texttt{invisible()}

Note

The default point size was chosen to match the default of graphics

Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using the grid package: `arrow_1d_grid()`, `boxplot_1d_grid()`,
`density_1d_grid()`, `hist_1d_grid()`, `jitter_1d_grid()`, `label_1d_grid()`, `lines_1d_grid()`,
`rect_1d_grid()`, `rug_1d_grid()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`,
`boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`,
`density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`,
`hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`,
`label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`,
`points_1d_graphics()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`,
`rug_1d_graphics()`, `rug_1d_grid()`, `rug_1d_loon()`

Description

Dot plot in 1d using the interactive loon package

Usage

```r
points_1d_loon(
  zargs,
  linkingGroup = NULL,
  linkingKey = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  glyph = "ocircle",
  itemLabel = NULL,
  showItemLabels = TRUE,
  parent = NULL,
  ...)
```

Arguments

- `zargs`: The argument list as passed from `zenplot()`
- `linkingGroup`: A string specifying the initial group of plots to be linked to this plot
- `linkingKey`: List of IDs to link on
- `showLabels`: Logical determining whether axis labels are displayed
- `showScales`: Logical determining whether scales are displayed
- `showGuides`: Logical determining whether the background guidelines are displayed
- `glyph`: The plot glyph
itemLabel  A vector of strings to serve as the item labels
showItemLabels Logical determining whether item labels display on mouse hover
parent  The tk parent for this loon plot widget
...  Additional parameters passed to loon::l_plot()

Value
A loon loon::l_plot(...)

Author(s)
Marius Hofert and Wayne Oldford

See Also
Other default 1d plot functions using the interactive loon package: arrow_1d_loon(), boxplot_1d_loon(), density_1d_loon(), hist_1d_loon(), jitter_1d_loon(), label_1d_loon(), lines_1d_loon(), rect_1d_loon(), rug_1d_loon()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_graphics(), points_1d_grid(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()

---

points_2d_graphics  Point plot in 2d using R’s base graphics

Description
Point plot in 2d using R’s base graphics

Usage

points_2d_graphics(
  zargs,
  cex = 0.4,
  box = FALSE,
  add = FALSE,
  group... = NULL,
  plot... = NULL,
  ...
)
points_2d_grid

Point plot in 2d using the grid package

Description

Point plot in 2d using the grid package

Usage

```r
points_2d_grid(
  zargs,
  type = c("p", "l", "o"),
  pch = NULL,
  size = 0.02,
  box = FALSE,
  box.width = 1,
  box.height = 1,
)```

Arguments

- `zargs` argument list as passed from `zenplot()`
- `cex` character expansion factor
- `box` logical indicating whether a box should be drawn
- `add` logical indicating whether this plot should be added to the last one
- `group...` list of arguments passed to `group_2d_graphics` (or NULL)
- `plot...` additional arguments passed to `plot_region()`
- `...` additional arguments passed to `points()`

Value

`invisible()`

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using R’s base graphics: `arrow_2d_graphics()`, `axes_2d_graphics()`, `density_2d_graphics()`, `group_2d_graphics()`, `label_2d_graphics()`, `qq_2d_graphics()`, `rect_2d_graphics()`

Other default 2d plot functions: `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_grid()`, `rect_2d_loon()`
group... = list(cex = 0.66),
draw = FALSE,
...
)

Arguments

zargs argument list as passed from zenplot()
type line type
pch plot symbol
size size of the plot symbol
box logical indicating whether a box should be drawn
box.width width of the box
box.height height of the box
group... list of arguments passed to group_2d_grid (or NULL)
draw logical indicating whether drawing should take place
... additional arguments passed to gpar()

Value
grob (invisibly)

Note

- We use names depending on the 'type' here since otherwise, if one calls it once for 'p' and once for 'l', only one of them is plotted - The default point size was chosen to match the default of graphics

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the grid package: arrow_2d_grid(), axes_2d_grid(), density_2d_grid(), group_2d_grid(), label_2d_grid(), qq_2d_grid(), rect_2d_grid()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()
points_2d_loon  

Point plot in 2d using the interactive loon package

Description

Point plot in 2d using the interactive loon package

Usage

```r
points_2d_loon(
  zargs,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  linkingGroup = NULL,
  linkingKey = NULL,
  glyph = "ocircle",
  itemLabel = NULL,
  showItemLabels = TRUE,
  parent = NULL,
  group... = NULL,
  ...
)
```

Arguments

- **zargs**: The argument list as passed from `zenplot()`
- **showLabels**: Logical determining whether axis labels are displayed
- **showScales**: Logical determining whether scales are displayed
- **showGuides**: Logical determining whether the background guidelines are displayed
- **linkingGroup**: The initial linking group
- **linkingKey**: List of IDs to link on
- **glyph**: String determining the glyph type to be displayed for points, default is an open circle: "ocircle"
- **itemLabel**: A vector of strings to serve as the item label
- **showItemLabels**: Logical determining whether item labels display on mouse hover
- **parent**: The tk parent for this loon plot widget
- **group...**: A list of arguments passed to `group_2d_loon` (or NULL)
- **...**: Additional arguments passed to `loon::l_plot()`

Value

A loon plot
Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the interactive loon package: arrow_2d_loon(), axes_2d_loon(), density_2d_loon(), group_2d_loon(), label_2d_loon(), rect_2d_loon()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()

qq_2d_graphics

Quantile-quantile plot in 2d using R’s base graphics

Description

Quantile-quantile plot in 2d using R’s base graphics

Usage

qq_2d_graphics(
  zargs,
  do.line = TRUE,
  lines... = NULL,
  cex = 0.4,
  box = FALSE,
  add = FALSE,
  group... = NULL,
  plot... = NULL,
  ...
)

Arguments

zargs argument list as passed from zenplot()

do.line logical indicating whether a line is drawn (through both empirical c(0.25, 0.75)-quantiles)

lines... additional arguments passed to lines()

cex character expansion factor

box logical indicating whether a box should be drawn

add logical indicating whether this plot should be added to the last one

group... list of arguments passed to group_2d_graphics (or NULL)

plot... additional arguments passed to plot_region()

... additional arguments passed to qqplot()
qq_2d_grid

Value

invisible()

Note

line iff both margins are of the same *type*

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using R’s base graphics: arrow_2d_graphics(), axes_2d_graphics(),
density_2d_graphics(), group_2d_graphics(), label_2d_graphics(), points_2d_graphics(),
rect_2d_graphics()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(),
axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(),
density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(),
label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(),
points_2d_loon(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()

qq_2d_grid

Quantile-quantile plot in 2d using the grid package

Description

Quantile-quantile plot in 2d using the grid package

Usage

qq_2d_grid(
  zargs,
  do.line = TRUE,
  lines... = NULL,
  pch = NULL,
  size = 0.02,
  box = FALSE,
  box.width = 1,
  box.height = 1,
  group... = list(cex = 0.66),
  draw = FALSE,
  ...
)
Arguments

zargs argument list as passed from zenplot()

do.line logical indicating whether a line is drawn (through both empirical c(0.25, 0.75)-quantiles)

lines... additional arguments passed to lines()
pch plot symbol

size size of the plot symbol

box logical indicating whether a box should be drawn

box.width width of the box

box.height height of the box

group... list of arguments passed to group_2d_grid (or NULL)
draw logical indicating whether drawing should take place

... additional arguments passed to gpar()

Value

grob (invisibly)

Note

- line iff both margins are of the same *type* - The default point size was chosen to match the default of graphics

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the grid package: arrow_2d_grid(), axes_2d_grid(), density_2d_grid(), group_2d_grid(), label_2d_grid(), points_2d_grid(), rect_2d_grid()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), rect_2d_graphics(), rect_2d_grid(), rect_2d_loon()
Description

Rectangle plot in 1d using R’s base graphics

Usage

rect_1d_graphics(
  zargs,
  loc = c(0.5, 0.5),
  width = 1,
  height = 1,
  add = FALSE,
  plot... = NULL,
  ...
)

Arguments

    zargs         argument list as passed from zenplot()
    loc           (x,y)-location in [0,1]^2; 0 corresponds to left, 1 to right (in the direction of the path)
    width         width of the rectangle (when viewed in walking direction)
    height        height of the rectangle (when viewed in walking direction)
    add           logical indicating whether this plot should be added to the last one
    plot...       additional arguments passed to plot_region()
    ...           additional arguments passed to lines()

Value

invisible()

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using R’s base graphics: arrow_1d_graphics(), boxplot_1d_graphics(), density_1d_graphics(), hist_1d_graphics(), jitter_1d_graphics(), label_1d_graphics(), lines_1d_graphics(), points_1d_graphics(), rug_1d_graphics()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics()
rect_1d_grid

Rectangular plot in 1d using the grid package

Description

Rectangular plot in 1d using the grid package

Usage

rect_1d_grid(
  zargs,
  loc = c(0.5, 0.5),
  width = 1,
  height = 1,
  draw = FALSE,
  ...
)

Arguments

zargs argument list as passed from zenplot()
loc (x,y)-location of the rectangle
width width of the rectangle (when viewed in walking direction)
height height of the rectangle (when viewed in walking direction)
draw logical indicating whether drawing should take place
... additional arguments passed to gpar()

Value

grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using the grid package: arrow_1d_grid(), boxplot_1d_grid(), density_1d_grid(), hist_1d_grid(), jitter_1d_grid(), label_1d_grid(), lines_1d_grid(), points_1d_grid(), rug_1d_grid()

Other default 1d plot functions: arrow_1d_graphics(), arrow_1d_grid(), arrow_1d_loon(), boxplot_1d_graphics(), boxplot_1d_grid(), boxplot_1d_loon(), density_1d_graphics(), density_1d_grid(), density_1d_loon(), extract_1d(), hist_1d_graphics(), hist_1d_grid(), hist_1d_loon(), jitter_1d_graphics(), jitter_1d_grid(), jitter_1d_loon(), label_1d_graphics(), label_1d_grid(), label_1d_loon(), lines_1d_graphics(), lines_1d_grid(), lines_1d_loon(), points_1d_graphics(), points_1d_grid(), points_1d_loon(), rect_1d_graphics(), rect_1d_grid(), rect_1d_loon(), rug_1d_graphics(), rug_1d_grid(), rug_1d_loon()

rect_1d_loon

Rectangle plot in 1d using the interactive loon package

Description

Rectangle plot in 1d using the interactive loon package

Usage

rect_1d_loon()
  zargs,
  loc.x = NULL,
  loc.y = NULL,
  color = NULL,
  fill = NULL,
  lwd = 1,
  linkingGroup = NULL,
  showLabels = FALSE,
  showScales = FALSE,
  showGuides = FALSE,
  baseplot = NULL,
  parent = NULL,
  ...
)

Arguments

zargs The argument list as passed from zenplot()
loc.x x-location of rectangle
loc.y y-location of rectangle
color Colour of the rectangle outline
fill Colour of the rectangle interior
lwd line width for rectangle outline
Description

Rectangle plot in 2d using R’s base graphics

Usage

```r
rect_2d_graphics(
  zargs,
  loc = c(0.5, 0.5),
  width = 1,
  height = 1,
  add = FALSE,
  group... = NULL,
  plot... = NULL,
  ...
)
```
Arguments

zargs  argument list as passed from zenplot()
loc   (x,y)-location (in (0,1)^2) of the center of the rectangle
width  width of the rectangle as a fraction of 1
height  height of the rectangle as a fraction of 1
add    logical indicating whether this plot should be added to the last one
group...  list of arguments passed to group_2d_graphics (or NULL)
plot...  additional arguments passed to plot_region()
...     additional arguments passed to rect()

Value

invisible()

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using R’s base graphics: arrow_2d_graphics(), axes_2d_graphics(), density_2d_graphics(), group_2d_graphics(), label_2d_graphics(), points_2d_graphics(), qq_2d_graphics()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(), axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(), density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(), label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(), points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_grid(), rect_2d_loon()

Description

Rectangle plot in 2d using the grid package

Usage

rect_2d_grid(
  zargs,
  loc = c(0.5, 0.5),
  width = 1,
  height = 1,
  group... = list(cex = 0.66),
  draw = FALSE,
  ...
)
Arguments

- `zargs`: argument list as passed from `zenplot()`
- `loc`: (x,y)-location of the rectangle
- `width`: rectangle width as a fraction of 1
- `height`: rectangle height as a fraction of 1
- `group...`: list of arguments passed to `group_2d_grid` (or NULL)
- `draw`: logical indicating whether drawing should take place
- `...`: additional arguments passed to `gpar()`

Value

grob (invisibly)

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the grid package: `arrow_2d_grid()`, `axes_2d_grid()`, `density_2d_grid()`, `group_2d_grid()`, `label_2d_grid()`, `points_2d_grid()`, `qq_2d_grid()`

Other default 2d plot functions: `arrow_2d_graphics()`, `arrow_2d_grid()`, `arrow_2d_loon()`, `axes_2d_graphics()`, `axes_2d_grid()`, `axes_2d_loon()`, `density_2d_graphics()`, `density_2d_grid()`, `density_2d_loon()`, `extract_2d()`, `group_2d_graphics()`, `group_2d_grid()`, `group_2d_loon()`, `label_2d_graphics()`, `label_2d_grid()`, `label_2d_loon()`, `points_2d_graphics()`, `points_2d_grid()`, `points_2d_loon()`, `qq_2d_graphics()`, `qq_2d_grid()`, `rect_2d_graphics()`, `rect_2d_loon()`

rect_2d_loon

Rectangle plot in 2d using the interactive loon package

Description

Rectangle plot in 2d using the interactive loon package

Usage

```r
rect_2d_loon(
  zargs,
  loc.x = NULL,
  loc.y = NULL,
  color = NULL,
  fill = NULL,
  lwd = 1,
  linkingGroup = NULL,
  showLabels = FALSE,
)```
rect_2d_loon

showScales = FALSE,
showGuides = FALSE,
baseplot = NULL,
parent = NULL,
group... = NULL,
...
)

Arguments

zargs
loc.x
loc.y
color
fill
lwd
linkingGroup
showLabels
showScales
showGuides
baseplot
parent
group...
...

Value

The base loon::l_plot with the added text layer

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 2d plot functions using the interactive loon package: arrow_2d_loon(), axes_2d_loon(),
density_2d_loon(), group_2d_loon(), label_2d_loon(), points_2d_loon()

Other default 2d plot functions: arrow_2d_graphics(), arrow_2d_grid(), arrow_2d_loon(),
axes_2d_graphics(), axes_2d_grid(), axes_2d_loon(), density_2d_graphics(), density_2d_grid(),
density_2d_loon(), extract_2d(), group_2d_graphics(), group_2d_grid(), group_2d_loon(),
label_2d_graphics(), label_2d_grid(), label_2d_loon(), points_2d_graphics(), points_2d_grid(),
points_2d_loon(), qq_2d_graphics(), qq_2d_grid(), rect_2d_graphics(), rect_2d_grid()
rug_1d_graphics

Rug plot in 1d using R’s base graphics

Description

Rug plot in 1d using R’s base graphics

Usage

rug_1d_graphics(
  zargs,
  loc = 0.5,
  length = 0.5,
  width = 1,
  col = par("fg"),
  add = FALSE,
  plot... = NULL,
  ...
)

Arguments

zargs argument list as passed from zenplot()
loc location in [0,1]; 0 corresponds to left, 1 to right (in the direction of the path)
length length of the rugs
width line width of the rugs
col color of the rugs
add logical indicating whether this plot should be added to the last one
plot... additional arguments passed to plot_region()
... additional arguments passed to segments()

Value

invisible()

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other default 1d plot functions using R’s base graphics: arrow_1d_graphics(), boxplot_1d_graphics(), density_1d_graphics(), hist_1d_graphics(), jitter_1d_graphics(), label_1d_graphics(), lines_1d_graphics(), points_1d_graphics(), rect_1d_graphics()
rug_1d_grid

Rug plot in 1d using the grid package

Description

Rug plot in 1d using the grid package

Usage

rug_1d_grid(
  zargs,
  loc = 0.5,
  length = 0.5,
  width = 0.001,
  col = par("fg"),
  draw = FALSE,
  ...
)

Arguments

zargs argument list as passed from zenplot()
loc location in [0,1]; 0 corresponds to left, 1 to right (in the direction of the path)
length length of the rugs
width line width of the rugs
col default color of the rectangles/rugs
draw logical indicating whether drawing should take place
... additional arguments passed to gpar()

Value
grob (invisibly)

Note

The choice of width and height is to leave the rugs enough space to not touch points (so to avoid points and rugs overplotting).
rug_1d_loon

Description

Rug plot in 1d using the interactive loon package

Usage

rug_1d_loon(zargs, ...)

Arguments

zargs The argument list as passed from zenplot()
...

Value

A loon loon::l_plot(…)

Note

Just calls points_1d_loon with glyph = "osquare" to preserve linking

Author(s)

Marius Hofert and Wayne Oldford
See Also

Other default 1d plot functions using the interactive loon package: `arrow_1d_loon()`, `boxplot_1d_loon()`, `density_1d_loon()`, `hist_1d_loon()`, `jitter_1d_loon()`, `label_1d_loon()`, `lines_1d_loon()`, `points_1d_loon()`, `rect_1d_loon()`

Other default 1d plot functions: `arrow_1d_graphics()`, `arrow_1d_grid()`, `arrow_1d_loon()`, `boxplot_1d_graphics()`, `boxplot_1d_grid()`, `boxplot_1d_loon()`, `density_1d_graphics()`, `density_1d_grid()`, `density_1d_loon()`, `extract_1d()`, `hist_1d_graphics()`, `hist_1d_grid()`, `hist_1d_loon()`, `jitter_1d_graphics()`, `jitter_1d_grid()`, `jitter_1d_loon()`, `label_1d_graphics()`, `label_1d_grid()`, `label_1d_loon()`, `lines_1d_graphics()`, `lines_1d_grid()`, `lines_1d_loon()`, `points_1d_graphics()`, `points_1d_grid()`, `points_1d_loon()`, `rect_1d_graphics()`, `rect_1d_grid()`, `rect_1d_loon()`, `rug_1d_graphics()`, `rug_1d_grid()`

---

turn_checker

Check the Turns (Number/Type)

Description

Check the Turns (Number/Type)

Usage

`turn_checker(turns, n2dplots, first1d, last1d)`

Arguments

- `turns`: The turns
- `n2dplots`: The number of 2d plots
- `first1d`: A logical indicating whether the first 1d plot should be plotted
- `last1d`: A logical indicating whether the last 1d plot should be plotted

Value

TRUE (unless it fails)

Author(s)

Marius Hofert

See Also

Other zenplot technical tools: `convert_occupancy()`, `is.standard()`, `n2dcols_aux()`, `num_cols()`
Unfold the hypercube and produce all information concerning the zen-path and zenplot layout

Description

The `unfold()` function imagines each pair of variables/dimensions as a "face" of a high dimensional cube. These faces are "unfolded" from one 2d space or "face" to the next about the 1d face or "edge" they share. The `unfold()` function takes, as first argument, `nfaces`, the number of 2d plots/spaces to be "unfolded" and produces the zenpath and zenplot layout required for the function `zenplot()`. Laying out these pairs with a zenplot is what is alluded to as an "unfolding" of (at least a part of) the high dimensional space.

Usage

```r
unfold(nfaces, turns = NULL,
       n2dcols = c("letter", "square", "A4", "golden", "legal"),
       method = c("tidy", "double.zigzag", "single.zigzag", "rectangular"),
       first1d = TRUE, last1d = TRUE, width1d = 1, width2d = 10)
```

Arguments

- `nfaces` The number of faces of the hypercube to unfold
- `turns` A character vector (of length two times the number of variables to be plotted minus 1) consisting of "d", "u", "r" or "l" indicating the turns out of the current plot position; if `NULL`, the turns are constructed.
- `n2dcols` number of columns of 2d plots (≥ 1) or one of "letter", "square", "A4", "golden" or "legal" in which case a similar layout is constructed. Note that `n2dcols` is ignored if `!is.null(turns)`.
- `method` The type of zigzag plot (a character).
  Available are:
  - `tidy`: more tidied-up `double.zigzag` (slightly more compact placement of plots towards the end).
  - `double.zigzag`: zigzag plot in the form of a flipped “S”. Along this path, the plots are placed in the form of an “S” which is rotated counterclockwise by 90 degrees.
  - `single.zigzag`: zigzag plot in the form of a flipped “S”.
  - `rectangular`: plots that fill the page from left to right and top to bottom. This is useful (and most compact) for plots that do not share an axis.
  Note that `method` is ignored if `turns` are provided.
- `first1d` A logical indicating whether the first one-dimensional (1d) plot should be plotted.
- `last1d` A logical indicating whether the last one-dimensional (1d) plot should be plotted
- `width1d` A graphical parameter > 0 giving the width of 1d plots.
- `width2d` A graphical parameter > 0 giving the width of 2d plots.
Value

A list describing the unfolded path and its layout as a list of named components:

path: the path of the unfolding, itself given as a structured list having components
  turns: the sequence of turns – each being one of “l” (for left), “r” (for right), “d” (for down),
      and “u” (for up) – required to move from the current plot location in the display to the
      next along the unfolded path.
  positions: the path as a matrix of (x,y) positions giving the indices in the occupancy
      matrix of each plot in the path.
  occupancy: A rectangular array whose cells indicate the positions of the plots on the page.
layout: the details of the visual layout of the plots and given as a structured list having compo-
  nents
  orientations: a vector indicating the orientation of each of the displays in order – “h” for
      horizontal, “v” for vertical, and “s” for square.
  dimensions: a vector giving the dimensionality of each plot in order.
  vars: A matrix of the variable indices to be used in each plot – x being the horizontal variable
      and y the vertical.
  layoutWidth: A positive integer giving the display width of a 2d plot.
  layoutHeight: A positive integer giving the display height of a 2d plot.
  boundingBoxes: A matrix of 4 columns giving locations (left, right, bottom, and top) of
      the box which bound each of the plots in order.

Note

Although unfold() is probably rather rarely used directly by a user, it provides insight into how
zenplots are constructed.

Author(s)

Marius Hofert and Wayne Oldford

See Also

Other creating zenplots: zenplot()

Examples

dim <- 20
unfolding <- unfold(nfaces = dim -1)
names(unfolding)
**vport**

*Viewport Constructing Function for Grid Functions*

**Description**

Auxiliary function for constructing viewports for 1d and 2d (default) plots.

**Usage**

```r
vport(ispace, xlim = NULL, ylim = NULL, x = NULL, y = NULL, ...)
```

**Arguments**

- `ispace`: inner space (in \([0, 1]\))
- `xlim`: x-axis limits; if NULL, the data limits are used.
- `ylim`: y-axis limits; if NULL, the data limits are used.
- `x`: x data (only used if is.null(xlim)); if NULL, 0:1 is used.
- `y`: y data (only used if is.null(ylim)); if NULL, 0:1 is used.
- `...`: additional arguments passed to the underlying `viewport()`.

**Details**

This is an auxiliary function used by the provided `grid`-related 1d and 2d plots.

**Value**

The `viewport`.

**Note**

Ideas from `dataViewport()` and `extendrange()` Omitted check: if(length(ispace) != 4) ispace <- rep(ispace, length.out = 4) stopifnot(0 <= ispace, ispace <= 1)

**Author(s)**

Marius Hofert

**See Also**

Other graphical tools: `l_ispace_config()`, `na_omit_loon()`, `plot_region()`, `zenarrow()`
Wine Data Set

Description

Data set consisting of 178 rows and 27 columns containing data about wine from the Piedmont region of Italy.

Usage

data("wine")

Format

data.frame() with 27 columns:

- **wine**: wine name (categorical variable with levels Barbera, Barolo, Grignolino).
- **alcohol**: alcohol percentage (numeric).
- **sugar**: sugar-free extract (numeric).
- **acidity**: fixed acidity (numeric).
- **tartaric**: tartaric acid (numeric).
- **malic**: malic acid (numeric).
- **uronic**: uronic acids (numeric).
- **pH**: pH (numeric).
- **ash**: ash (numeric).
- **alcal_ash**: alcalinity of ash (numeric).
- **potassium**: potassium (numeric).
- **calcium**: calcium (numeric).
- **magnesium**: magnesium (numeric).
- **phosphate**: phosphate (numeric).
- **chloride**: chloride (numeric).
- **phenols**: total phenols (numeric).
- **flavanoids**: flavanoids (numeric).
- **nonflavanoids**: nonflavanoid phenols (numeric).
- **proanthocyanins**: proanthocyanins (numeric).
- **colour**: colour intensity (numeric).
- **hue**: hue (numeric).
- **OD_dw**: $OD_{280}/OD_{315}$ of diluted wines (numeric).
- **OD_fl**: $OD_{280}/OD_{315}$ of flavanoids (numeric).
- **glycerol**: glycerol (numeric).
- **butanediol**: 2,3-butanediol (numeric).
- **nitrogen**: total nitrogen (numeric).
- **proline**: proline (numeric).
- **methanol**: methanol (numeric).
Source

The data set was obtained from the \texttt{R} package \texttt{sn} (for convenience). It represents chemical measurements on each of 178 wine specimens belonging to three types of wine produced in the Piedmont region of Italy. The data set includes all variables listed by Forina \textit{et al.} (1986) with the exception of ‘Sulphate’. The first variable is categorical, all others are numeric.


References


Examples

data("wine")

zenarrow

\textit{Defining an arrow}

Description

Defining an arrow

Usage

zenarrow(turn, angle = 80, length = 1, coord.scale = 1)

Arguments

- \texttt{turn}: The direction in which the arrow will point ("l", "r", "d", "u")
- \texttt{angle}: The angle
- \texttt{length}: The length of the arrow in [0,1] from tip to base
- \texttt{coord.scale}: Scale the coordinates of the arrow

Value

A 3-column matrix containing the (x,y) coordinates of the left edge end point, the arrow head and the right edge end point

Author(s)

Marius Hofert
zenpath

Construct a Path of Indices to Order Variables

Description

Constructing zenpaths and tools for extracting, connecting and displaying pairs, as well as grouping and indexing data structures.

Usage

zenpath(x, pairs = NULL, method = c("front.loaded", "back.loaded", "balanced", "eulerian.cross", "greedy.weighted", "strictly.weighted"), decreasing = TRUE)

Arguments

x

for method

single integer >= 1.
"front.loaded": as for method = "front.loaded".
"back.loaded": as for method = "front.loaded".
"eulerian.cross": two integers >= 1 representing the group sizes.
"greedy.weighted": numeric weight vector (or matrix or distance matrix).
"strictly.weighted": as for method = "greedy.weighted".

pairs

a two-column matrix containing (row-wise) the pairs of connected variables to be sorted according to the weights. Note that the resulting graph must be connected (i.e. any variable can be reached from any other variable following the connections given by pairs). The pairs argument is only used for the methods greedy.weighted and strictly.weighted and can be NULL (in which case a default is constructed in lexicographical order).

method

character string indicating the sorting method to be used. Available methods are:

"front.loaded": Sort all pairs such that the first variables appear the most frequently early in the sequence; an Eulerian path; note that it might be slightly longer than the number of pairs because, first, an even graph has to be made.
"back.loaded": Sort all pairs such that the later variables appear the most frequently later in the sequence; an Eulerian path (+ see front.loaded concerning length)

See Also

Other graphical tools: 1_ispace_config(), na_omit_loon(), plot_region(), vport()
"balanced": Sort all pairs such that all variables appear in balanced blocks throughout the sequence (a Hamiltonian Decomposition; Eulerian, too).

"eulerian.cross": Generate a sequence of pairs such that each is formed with one variable from each group.

"greedy.weighted": Sort all pairs according to a greedy (heuristic) Euler path with \( x \) as weights visiting each edge precisely once.

"strictly.weighted": Strictly respect the order of the weights - so the first, second, third, and so on, adjacent pair of numbers of the output of \( \text{zenpath()} \) corresponds to the pair with largest, second-largest, third-largest, and so on, weight.

decreasing A logical indicating whether the sorting is done according to increasing or decreasing weights.

Value

Returns a sequence of variables (indices or names, possibly a list of such), which can then be used to index the data (via \( \text{groupData()} \) for plotting via \( \text{zenplot()} \).

Author(s)

Marius Hofert and Wayne Oldford

See Also

\( \text{zenplot()} \) which provides the zenplot.

Other tools related to constructing zenpaths: \( \text{connect_pairs()}, \text{extract_pairs()}, \text{graph_pairs()} \), \( \text{groupData()}, \text{indexData()} \)

Examples

```r
## Some calls of zenpath()
zenpath(10) # integer argument
## Note that the result is of length 50 > 10 choose 2 as the underlying graph has to
## be even (and thus edges are added here)
(zp <- zenpath(c(3, 5), method = "eulerian.cross")) # integer(2) argument
```

---

\( \text{zenplot} \quad \text{Main function to create a zenplot} \)

Description

Constructs and draws a zigzag expanded navigation plot for a graphical exploratory analysis of a path of variables. The result is an alternating sequence of one-dimensional (1d) and two-dimensional (2d) plots laid out in a zigzag-like structure so that each consecutive pair of 2d plots has one of its variates (or coordinates) in common with that of the 1d plot appearing between them.
Usage

zenplot(x, turns = NULL,
        first1d = TRUE, last1d = TRUE,
        n2dcols = c("letter", "square", "A4", "golden", "legal"),
        n2dplots = NULL,
        plot1d = c("label", "points", "jitter", "density", "boxplot", "hist",
                   "rug", "arrow", "rect", "lines", "layout"),
        plot2d = c("points", "density", "axes", "label", "arrow", "rect", "layout"),
        zargs = c(x = TRUE, turns = TRUE, orientations = TRUE,
                  vars = TRUE, num = TRUE, lim = TRUE, labs = TRUE,
                  width1d = TRUE, width2d = TRUE,
                  ispace = match.arg(pkg) != "graphics"),
        lim = c("individual", "groupwise", "global"),
        labs = list(group = "G", var = "V", sep = ", ", group2d = FALSE),
        pkg = c("graphics", "grid", "loon"),
        method = c("tidy", "double.zigzag", "single.zigzag", "rectangular"),
        width1d = if(is.null(plot1d)) 0.5 else 1,
        width2d = 10,
        ospace = if(pkg == "loon") 0 else 0.02,
        ispace = if(pkg == "graphics") 0 else 0.037,
        draw = TRUE,
        ...)  

Arguments

x
  A data object of "standard forms", being a vector, or a matrix, or a data.frame,
  or a list of any of these. In the case of a list, the components of x are inter-
  preted as groups of data which are visually separated by a two-dimensional
  (group) plot.

turns
  A character vector (of length two times the number of variables to be plotted
  minus 1) consisting of "d", "u", "r" or "l" indicating the turns out of the current
  plot position; if NULL, the turns are constructed (if x is of the "standard form"
  described above).

first1d
  A logical indicating whether the first one-dimensional plot is included.

last1d
  A logical indicating whether the last one-dimensional plot is included.

n2dcols
  number of columns of 2d plots (\(\geq 1\)) or one of "letter", "square", "A4",
  "golden" or "legal" in which case a similar layout is constructed. Note that
  n2dcols is ignored if !is.null(turns).

n2dplots
  The number of 2d plots.

plot1d
  A function to use to return a one-dimensional plot constructed with package pkg. Alternatively, a character string of an existing function. For the defaults provided, the corresponding functions are obtained when appending _1d_graphics, _1d_grid or _1d_loon depending on which pkg is used.
  If plot1d = NULL, then no 1d plot is produced in the zenplot.

plot2d
  A function returning a two-dimensional plot constructed with package pkg. Alternatively, a character string of an existing function. For the defaults pro-
vided, the corresponding functions are obtained when appending \_2d\_graphics, \_2d\_grid or \_2d\_loon depending on which pkg is used.

As for plot1d, plot2d omits 2d plots if plot2d = NULL.

**zargs**
A fully named logical vector indicating whether the respective arguments are (possibly) passed to plot1d() and plot2d() (if the latter contain the formal argument zargs, which they typically do/should, but see below for an example in which they do not).

zargs can maximally contain all variables as given in the default. If one of those variables does not appear in zargs, it is treated as TRUE and the corresponding arguments are passed on to plot1d and plot2d. If one of them is set to FALSE, the argument is not passed on.

**lim**
(x-/y-)axis limits. This can be a character string or a numeric(2).
If lim = "groupwise" and x does not contain groups, the behaviour is equivalent to lim = "global".

**labs**
The plot labels to be used; see the argument labs of burst() for the exact specification. labs can, in general, be anything as long as plot1d and plot2d know how to deal with it.

**pkg**
The R package used for plotting (depends on how the functions plot1d and plot2d were constructed; the user is responsible for choosing the appropriate package among the supported ones).

**method**
The type of zigzag plot (a character).
Available are:
- tidy: more tidied-up double.zigzag (slightly more compact placement of plots towards the end).
- double.zigzag: zigzag plot in the form of a flipped “S”. Along this path, the plots are placed in the form of an “S” which is rotated counterclockwise by 90 degrees.
- single.zigzag: zigzag plot in the form of a flipped “S”.
- rectangular: plots that fill the page from left to right and top to bottom. This is useful (and most compact) for plots that do not share an axis.

Note that method is ignored if turns are provided.

**width1d**
A graphical parameter > 0 giving the width of 1d plots.

**width2d**
A graphical parameter > 0 giving the height of 2d plots.

**ospace**
The outer space around the zenplot. A vector of length four (bottom, left, top, right), or one whose values are repeated to be of length four, which gives the outer space between the device region and the inner plot region around the zenplot.
Values should be in [0, 1] when pkg is "graphics" or "grid", and as number of pixels when pkg is "loon".

**ispace**
The inner space in [0, 1] between the each figure region and the region of the (1d/2d) plot it contains. Again, a vector of length four (bottom, left, top, right) or a shorter one whose values are repeated to produce a vector of length four.

**draw**
A logical indicating whether a the zenplot is immediately displayed (the default) or not.
... arguments passed to the drawing functions for both plot1d and plot2d. If you need to pass certain arguments only to one of them, say, plot2d, consider providing your own plot2d; see the examples below.

Value

(besides plotting) invisibly returns a list having additional classnames marking it as a zenplot and a zenPkg object (with Pkg being one of Graphics, Grid, or Loon, so as to identify the package used to construct the plot).

As a list it contains at least the path and layout (see unfold for details).

Depending on the graphics package pkg used, the returned list includes additional components. For pkg = "grid", this will be the whole plot as a grob (grid object). For pkg = "loon", this will be the whole plot as a loon plot object as well as the toplevel tk object in which the plot appears.

Author(s)

Marius Hofert and Wayne Oldford

See Also

All provided default plot1d and plot2d functions. extract_1d() and extract_2d() for how zargs can be split up into a list of columns and corresponding group and variable information.

burst() for how x can be split up into all sorts of information useful for plotting (see our default plot1d and plot2d). vport() for how to construct a viewport for (our default) grid (plot1d and plot2d) functions.

extract_pairs(), connect_pairs(), group() and zenpath() for (zen)path-related functions.

The various vignettes for additional examples.

Other creating zenplots: unfold()

Examples

### Basics #####################################################################

```r
## Generate some data
n <- 1000 # sample size
d <- 20 # dimension
set.seed(271) # set seed (for reproducibility)
x <- matrix(rnorm(n * d), ncol = d) # i.i.d. N(0,1) data

## A basic zenplot
res <- zenplot(x)
uf <- unfold(nfaces = d - 1)

## 'res' and 'uf' is not identical as 'res' has specific # class attributes.
for(name in names(uf)) {
  stopifnot(identical(res[[name]], uf[[name]]))
}
```
The return value of `zenplot()` is the underlying `unfold()`.

Some missing data
```
z <- x
z[seq_len(n-10), 5] <- NA # all NA except 10 points
zenplot(z)
```

Another column with fully missing data (use arrows)
```
z[, 6] <- NA # all NA
zenplot(z)
```

Lists of vectors, matrices and data frames as arguments (=> groups of data)
```
## Only two vectors
z <- list(x[,1], x[,2])
zenplot(z)

## A matrix and a vector
z <- list(x[,1:2], x[,3])
zenplot(z)

## A matrix, NA column and a vector
z <- list(x[,1:2], NA, x[,3])
zenplot(z)

## Without labels or with different labels
z <- list(A = x[,1:2], B = cbind(NA, NA), C = x[,3])
zenplot(z, labs = NULL) # without any labels
zenplot(z, labs = list(group = NULL, group2d = TRUE)) # without group labels
zenplot(z, labs = list(group = NULL)) # without group labels unless groups change
zenplot(z, labs = list(var = NULL)) # without variable labels
zenplot(z, labs = list(var = “Variable “, sep = “ - “)) # change default labels

## Example with a factor
zenplot(iris)
zenplot(iris, lim = "global") # global scaling of axis
zenplot(iris, lim = "groupwise") # acts as 'global' here (no groups in the data)

More sophisticated examples

Note: The third component (data.frame) naturally has default labels.
```
z <- list(x[,1:5], x[1:10, 6:7], NA,
         data.frame(x[seq_len(round(n/5)), 8:19]), cbind(NA, NA), x[1:10, 20])
zenplot(z, labs = list(group = "Group ")) # change the group label (var and sep are defaults)

Alternatively, give z labels
```
```
names(z) <- paste("Group", LETTERS[seq_len(length(z))]) # give group names
zenplot(z) # uses given group names
## Now let's change the variable labels
z. <- lapply(z, function(z.) {
  if(!is.matrix(z.)) z. <- as.matrix(z.)
  colnames(z.) <- paste("Var.", seq_len(ncol(z.)))
  z.
})
zenplot(z.)

### A dynamic plot based on 'loon' (if installed and R compiled with tcl support)

## Not run:
  if(requireNamespace("loon", quietly = TRUE))
    zenplot(x, pkg = "loon")
## End(Not run)

### Providing your own turns #~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

## A basic example
turns <- c("l","d","d","r","r","d","d","r","r","d","d",
  "u","u","u","u","u","u","u","u","u","u","u","u","u","u","u","u",
  "d","d","d","d","d","d","d","d")
zenplot(x, plot1d = "layout", plot2d = "layout", turns = turns) # layout of plot regions
## => The tiles stick together as ispace = 0.
zenplot(x, plot1d = "layout", plot2d = "layout", turns = turns,
  pkg = "grid") # layout of plot regions with grid
## => Here the tiles show the small (default) ispace

## Another example (with own turns and groups)
zenplot(list(x[,1:3], x[,4:7]), plot1d = "arrow", plot2d = "rect",
  turns = c("d","r","r","r","r","d",
    "d","1","1","1","1","1"), last1d = FALSE)

### Providing your own plot1d() or plot2d() #~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

## Creating a box
zenplot(x, plot1d = "label", plot2d = function(zargs)
  density_2d_graphics(zargs, box = TRUE))

## With grid
zenplot(x, plot1d = "label", plot2d = function(zargs)
  density_2d_grid(zargs, box = TRUE), pkg = "grid")

## An example with width1d = width2d and where no zargs are passed on.
## Note: This could have also been done with 'rect_2d_graphics(zargs, col = ...)'
## as plot1d and plot2d.
myrect <- function(...) {
  plot(NA, type = "n", ann = FALSE, axes = FALSE, xlim = 0:1, ylim = 0:1)
  rect(xleft = 0, ybottom = 0, xright = 1, ytop = 1, ...)
}

zenplot(matrix(0, ncol = 15),
  n2dcol = "square", width1d = 10, width2d = 10,
  plot1d = function(...) myrect(col = "royalblue3"),
  plot2d = function(...) myrect(col = "maroon3"))

## Colorized rugs as plot1d()
basecol <- c("royalblue3", "darkorange2", "maroon3")
palette <- colorRampPalette(basecol, space = "Lab")
cols <- palette(d) # different color for each 1d plot

zenplot(x, plot1d = function(zargs) {
  rug_1d_graphics(zargs, col = cols[(zargs$num+1)/2])
})

## With grid
library(grid) # for gTree() and gList()

zenplot(x, pkg = "grid", # you are responsible for choosing the right pkg (cannot be tested!)
  plot1d = function(zargs) {
    rug_1d_grid(zargs, col = cols[(zargs$num+1)/2])
  })

## Rectangles with labels as plot2d() (shows how to overlay plots)
## With graphics
## Note: myplot2d() could be written directly in a simpler way, but is
## based on the two functions here to show how they can be combined.
zenplot(x, plot1d = "arrow", plot2d = function(zargs) {
  rect_2d_graphics(zargs)
  label_2d_graphics(zargs, add = TRUE)
})

## With grid

zenplot(x, pkg = "grid", plot1d = "arrow", plot2d = function(zargs)
  gTree(children = gList(rect_2d_grid(zargs),
                        label_2d_grid(zargs))))

## Rectangles with labels outside the 2d plotting region as plot2d()
## With graphics
zenplot(x, plot1d = "arrow", plot2d = function(zargs) {
  rect_2d_graphics(zargs)
  label_2d_graphics(zargs, add = TRUE, xpd = NA, srt = 90,
                    loc = c(1.04, 0), adj = c(0,1), cex = 0.7)
})

## With grid

zenplot(x, pkg = "grid", plot1d = "arrow", plot2d = function(zargs)
## 2d density with points, 1d arrows and labels

zenplot(x, plot1d = function(zargs) {
  rect_1d_graphics(zargs)
  arrow_1d_graphics(zargs, add = TRUE, loc = c(0.2, 0.5))
  label_1d_graphics(zargs, add = TRUE, loc = c(0.8, 0.5))
}, plot2d = function(zargs) {
  points_2d_graphics(zargs, col = adjustcolor("black", alpha.f = 0.4))
  density_2d_graphics(zargs, add = TRUE)
})

## 2d density with labels, 1d histogram with density and label

### Example: Overlaying histograms with densities (the *proper* way)

### Define proper 1d plot for overlaying histograms with densities

### More sophisticated examples

### Example: Overlaying histograms with densities (the *proper* way)
# the indices of the 'x' variable to be displayed in the current plot
ii <- plot_indices(zargs)
label <- paste0("V", ii[1]) # label
srt <- if(horizontal) 0 else if(turn.out == "r") -90 else 90 # label rotation
x <- zargs$x[, ii[1]] # data
lim <- range(x) # data limits
## Compute histogram information
breaks <- seq(from = lim[1], to = lim[2], length.out = 21)
binInfo <- hist(x, breaks = breaks, plot = FALSE)
binBoundaries <- binInfo$breaks
widths <- diff(binBoundaries)
heights <- binInfo$density
## Compute density information
dens <- density(x)
xvals <- dens$x
keepers <- (min(x) <= xvals) & (xvals <= max(x)) # keep those within the range of the data
x. <- xvals[keepers]
y. <- dens$y[keepers]
## Determine plot limits and data
if(turn.out == "d" || turn.out == "l") { # flip density/histogram
  heights <- -heights
  y. <- -y.
}
if(horizontal) {
  xlim <- lim
  xlim.bp <- xlim - xlim[1] # special for barplot(); need to shift the bars
  ylim <- range(0, heights, y.)
  ylim.bp <- ylim
  x <- c(xlim[1], x., xlim[2]) - xlim[1] # shift due to plot region set up by barplot()
  y <- c(0, y., 0)
} else {
  xlim <- range(0, heights, y.)
  xlim.bp <- xlim
  ylim <- lim
  ylim.bp <- ylim - ylim[1] # special for barplot(); need to shift the bars
  x <- c(0, y., 0)
  y <- c(xlim[1], x., xlim[2]) - ylim[1] # shift due to plot region set up by barplot()
}
## Determining label position relative to the zenpath
loc <- c(0.1, 0.6)

# when walking downwards, change both left/right and up/down
if(turn.out == "d") loc <- 1-loc

# when walking to the right, coordinates change and 2nd is flipped
if(turn.out == "r") {
  loc <- rev(loc)
}

# when walking to the left, coordinates change and 1st is flipped
if(turn.out == "l") {
  loc <- rev(loc)
loc[1] <- 1-loc[1]
}

## Plotting
barplot(heights, width = widths, xlim = xlim.bp, ylim = ylim.bp,
    space = 0, horiz = !horizontal, main = "", xlab = "", axes = FALSE) # histogram
polygon(x = x, y = y, border = "royalblue3", lwd = 1.4) # density
opar <- par(usr = c(0, 1, 0, 1)) # switch to relative coordinates for text
on.exit(par(opar))
text(x = loc[1], y = loc[2], labels = label, cex = 0.7, srt = srt, font = 2,
    col = "darkorange2") # label
}

## Zenplot
zenplot(x,
    plot1d = "hist_with_density_1d",
    plot2d = function(zargs) {
        density_2d_graphics(zargs)
        points_2d_graphics(zargs,
            add = TRUE,
            col = adjustcolor("black", alpha.f = 0.3))
    })
)

### Example: A path through pairs of a grouped t copula sample

## 1) Build a random sample from a 17-dimensional grouped t copula
d. <- c(8, 5, 4) # sector dimensions
d <- sum(d.) # total dimension
nu <- rep(c(12, 1, 0.25), times = d.) # d.o.f. for each dimension
n <- 500 # sample size
set.seed(271)
Z <- matrix(rnorm(n * d), ncol = n) # (d,n)-matrix
P <- matrix(0.5, nrow = d, ncol = d)
diag(P) <- 1
L <- t(chol(P)) # L; LL^T = P
Y <- t(L %*% Z) # (n,d)-matrix containing n d-vectors following N(0,P)
U. <- runif(n)
W <- sapply(nu, function(nu.) 1/qgamma(U., shape = nu./2, rate = nu./2)) # (n,d)-matrix
X <- sqrt(W) * Y # (n,d)-matrix
U <- sapply(1:d, function(j) pt(X[,j], df = nu[j])) # (n,d)-matrix

## 2) Plot the data with a pairs plot, colorizing the groups
cols <- matrix("black", nrow = d, ncol = d) # colors
start <- c(1, cumsum(head(d., n = -1))+1) # block start indices
end <- cumsum(d.) # block end indices
for(j in seq_along(d.)) {
    cols[start[j]:end[j], start[j]:end[j]] <- basecol[j] # colors
diag(cols) <- NA # remove colors corresponding to diagonal entries
cols <- as.vector(cols) # convert to a vector
cols <- cols[!is.na(cols)] # remove NA entries corresponding to diagonal entries
count <- 0 # panel number
my_panel <- function(x, y, ...) # panel function for colorizing groups
{ count <<- count + 1; points(x, y, pch = ".", col = cols[count]) }
pairs(U, panel = my_panel, gap = 0,
   labels = as.expression( sapply(1:d, function(j) bquote(italic(U[.(j)]))) )
)

## 3) Zenplot of a random path through all pairs, colorizing the respective group
## Define our own points_2d_grid() for colorizing the groups
my_points_2d_grid <- function(zargs, basecol, d.) {
  r <- extract_2d(zargs) # extract information from zargs
  x <- r$x
  y <- r$y
  xlim <- r$xlim
  ylim <- r$ylim
  num2d <- zargs$num/2
  vars <- as.numeric(r$vlab[num2d:(num2d+1)]) # two variables to be plotted
  if( all(1 <= vars & vars <= d.[1] ) ) { basecol[1] } else {
      if( all(d.[1]+d.[2]+1 <= vars & vars <= d) ) basecol[3] else "black"
    }
  }
  # determine the colors
  vp <- vport(zargs$ispace, xlim = xlim, ylim = ylim, x = x, y = y) # viewport
  pointsGrob(x = x[[1]], y = y[[1]], pch = 21, size = unit(0.02, units = "npc"),
             name = "points_2d", gp = gpar(col = col), vp = vp)
}

## Plot a random permutation of columns via a zenplot
## Note: We set column labels here, as otherwise the labels can only
## show *indices* of the variables to be plotted, i.e., the column
## number in U[,ord], and not the original column number in U (which
## is what we want to see in order to see how our 'path' through
## the pairs of variables looks like).
colnames(U) <- 1:d
set.seed(1)
(ord <- sample(1:d, size = d)) # path; 1:d would walk parallel to the secondary diagonal
zenplot(U[,ord], plot1d = "layout", plot2d = "layout", pkg = "grid") # layout
zenplot(U[,ord], # has correct variable names as column names
        pkg = "grid",
        plot1d = function(zargs) arrow_1d_grid(zargs, col = "grey50"),
        plot2d = function(zargs)
          gTree(children = gList(
            my_points_2d_grid(zargs, basecol = basecol, d. = d.),
            rect_2d_grid(zargs, width = 1.05, height = 1.05,
                         col = "grey50", lty = 3),
            label_2d_grid(zargs, loc = c(1.06, -0.03),
                           just = c("left", "top"), rot = 90, cex = 0.45,
                           fontface = "bold") )))

## => The points are colorized correctly (compare with the pairs plot).

### Using ggplot2 ##################################################################

## Although not thoroughly tested, in principle ggplot2 can also be used via
## pkg = "grid" as follows.

```r
library(ggplot2)

## Define our own 2d plot
my_points_2d_ggplot <- function(zargs, extract2d = TRUE)
{
  if(extract2d) {
    r <- extract_2d(zargs) # extract results from zargs
df <- data.frame(r$x, r$y) # data frame
    names(df) <- c("x", "y")
    cols <- zargs$x[, "Species"]
  } else {
    ii <- plot_indices(zargs) # the indices of the variables to be plotted
    irs <- zargs$x # iris data
df <- data.frame(x = irs[, ii[1]], y = irs[, ii[2]]) # data frame
    cols <- irs[, "Species"]
  }
  num2d <- zargs$num/2 # plot number among all 2d plots
  p <- ggplot() + geom_point(data = df, aes(x = x, y = y, colour = cols),
                           show.legend = num2d == 3) +
    labs(x = "", y = "") # 2d plot
  if(num2d == 3) p <- p + theme(legend.position = "bottom", # legend for last 2d plot
                                legend.title = element_blank())
  ggplot_gtable(ggplot_build(p)) # 2d plot as grob
}

## Plotting
iris. <- iris
colnames(iris.) <- gsub("\\\.", " ", x = colnames(iris)) # => nicer 1d labels
zenplot(iris., n2dplots = 3, plot2d = "my_points_2d_ggplot", pkg = "grid")
zenplot(iris., n2dplots = 3,
       plot2d = function(zargs) my_points_2d_ggplot(zargs, extract2d = FALSE),
       pkg = "grid")

### Providing your own data structure ##########################################

### Danger zone: An example with a new data structure (here: a list of *lists*)
### Note: - In this case, we most likely need to provide both plot1d and plot2d
### (but not in this case here since arrow_1d_graphics() does not depend
### on the data structure)
### - Note that we still make use of zargs here.
### - Also note that the variables are not correctly aligned anymore:
###   In the ggplot2 examples we guaranteed this by plot_indices(),
###   but here we don’t. This then still produces our layout but the
###   x/y axis of adjacent plots might not be the same anymore. This is
###   fine if only a certain order of the plots is of interest, but
###   not a comparison between adjacent plots.
z <- list(list(1:5, 2:1, 1:3), list(1:5, 1:2))
zenplot(z, n2dplots = 4, plot1d = "arrow", last1d = FALSE,
plot2d = function(zargs, ...) {
  r <- unlist(zargs$x, recursive = FALSE)
  num2d <- zargs$num/2 # plot number among 2d plots
  x <- r[[num2d]]
  y <- r[[num2d + 1]]
  if(length(x) < length(y)) x <- rep(x, length.out = length(y))
  else if(length(y) < length(x)) y <- rep(y, length.out = length(x))
  plot(x, y, type = "b", xlab = "", ylab = "")
}

### Zenplots based on 3d lattice plots

library(lattice)
library(grid)
library(gridExtra)

## Build a list of cloud() plots (trellis objects)
## Note:
## - 'grid' problem: Without print(), the below zenplot() may fail (e.g.,
##   in fresh R sessions) with: 'Error in UseMethod("depth"):
##   no applicable method for 'depth' applied to an object of class "NULL"
## - col = "black" inside scales is needed to make the ticks show
mycloud <- function(x, num) {
  lim <- extendrange(0:1, f = 0.04)
  print(cloud(x[, 3] ~ x[, 1] * x[, 2], xlim = lim, ylim = lim, zlim = lim,
             xlab = substitute(U[i., list(i. = num)),
             ylab = substitute(U[i., list(i. = num + 1)),
             zlab = substitute(U[i., list(i. = num + 2)),
             zoom = 1, scales = list(arrows = FALSE, col = "black"),
             col = "black",
             par.settings = list(standard.theme(color = FALSE),
             axis.line = list(col = "transparent"),
             clip = list(panel = "off")))
}

plst.3d <- lapply(1:4, function(i) mycloud(x[, i:(i+2)], num = i)) # list of trellis objects

## Preparing the zenplot
num <- length(plst.3d)
ncols <- 2
turns <- c(rep("r", 2*(ncols-1)), "d", "d",
            rep("l", 2*(ncols-1)), "d")

plot2d <- function(zargs) {
  num2d <- (zargs$num+1)/2
  vp <- vport(zargs$ispace, xlim = 0:1, ylim = 0:1)
  grob(p = zargs$x[[num2d]], vp = vp, cl = "lattice") # convert trellis to grid object
  ## Note: For further plots, Work with
  gTree(children = gList(grob(zargs$x[[num2d]], vp = vp,
  cl = "lattice")))
}
## Zenplot

**Note:** We use a list of *plots* here already (not data)

```r
zenplot(plst.3d, turns = turns, n2dplots = num, pkg = "grid", first1d = FALSE,
last1d = FALSE, plot1d = "arrow_1d_grid", plot2d = plot2d)
```

---

### zenplots

#### zenplots: Zigzag Expanded Navigation Plots

---

**Description**

Zenplots, like pairs plots (scatterplot matrices), lay out a large number of one- and two-dimensional plots in an organized way.

**Details**

Unlike pairs plots, zenplots can lay out a much larger number of plots by pursuing a zigzagging layout (following a zenpath) of alternating one- and two-dimensional plots.

The plots can be created by R’s base graphics package, by the grid graphics package, or even made interactive (brushing, etc.) by using using the loon package.
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