Package: luplot (via r-universe)

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Type Package

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Description Some useful functions to plot data such as a map plot function for MAgPIE objects.

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URL https://github.com/pik-piam/luplot

Depends magclass, R (>= 2.15.1)

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Repository https://pik-piam.r-universe.dev

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`luplot-package` *Landuse Plot Library*

Description

Some useful functions to plot data such as a map plot function for MAgPIE objects

Details

Package:	luplot
Type:	Package
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Author(s)

Benjamin Bodirsky, Jan Philipp Dietrich, Michael Krause, Miodrag Stevanovic, Florian Humpenoeder

Maintainer: Benjamin Bodirsky <bodirsky@pik-potsdam.de>

See Also

Useful links:

- https://github.com/pik-piam/luplot

aggregateForPlot *aggregateForPlot*

Description

Aggregates Data for an area chart. The value of all underlying regions/years/timesteps are added to the value of the current region/year/timestep.

Usage

```
aggregateForPlot(plotdata,
dimension="region",regionPlotorder=NULL)
```

Arguments

plotdata	An MAgPIE object
dimension	by "region", "name" or "year"
regionPlotorder	allows to change the order of the regions by giving a vector with the order

Value

A MAgPIE object of the same dimensions as plotdata

Author(s)

Benjamin Bodirsky

Examples

```
## Not run:
data(population_magpie)
#no aggregation
scratch_plot(population_magpie[,,2])
#aggregation
scratch_plot(aggregateForPlot(population_magpie[,,2],regionPlotorder=c(10,1:9)))

## End(Not run)
```

as.ggplot *as.ggplot*

Description

Converts a MAgPIE object or a list of MAgPIE objects into a dataframe usable for ggplot

Usage

```
as.ggplot(x,scenario="default",asDate=T,rev=F,useDimNames=FALSE)
```

Arguments

x	MAgPIE object or list of MAgPIE objects. For a list of MAgPIE objects the name of the list entry (has to be character) is used as scenario name.
scenario	Name of the scenario (only used if x is not a list) or position of the entry in the third dimension that contains the scenario name (only if the scenario name is stored in the third dimension) or NULL (automatic detection)
asDate	Format the years as date (TRUE) or keep as is (FALSE); deprecated (only kept for compatibility with older scripts)
rev	reverse legend order (TRUE) or not (FALSE)
useDimNames	Use dim names of 3rd dimension instead Data1, Data2, Data3, Data4; works only if x is a MAgPIE object (no list) and scenario=NULL

Value

Dataframe usable for ggplot

Author(s)

Florian Humpenoeder, David Klein

Examples

```
## Not run:
as.ggplot(croparea(gdx))
## End(Not run)
## Not run:
prices <- list()
prices[["Scenario1"]] <- prices("Scenario1.gdx",crops=c("tece","maiz"))
prices[["Scenario2"]] <- prices("Scenario2.gdx",crops=c("tece","maiz"))
as.ggplot(prices)
## End(Not run)
```

deco_plot *deco_plot*

Description

Plot for decomposition analysis. Use function deco in library magpie4 to create the necessary object.

Usage

```
deco_plot(x, color = gray.colors(6))
```

Arguments

x	magpie object with decomposition data (e.g. from the function magpie4:::deco)
color	color vector

Value

a ggplot object

Author(s)

Benjamin Leon Bodirsky, Ina Neher

gginput *gginput*

Description

Converts a MAgPIE object into a dataframe usable for ggplot

Usage

```
gginput(data, scatter=NULL, mappings=NULL, na.rm=FALSE, verbose=TRUE)
```

Arguments

data	MAgPIE object which provides the data for ggplot
scatter	In the case you want to make a scatterplot you have to specify here which data dimension of the MAgPIE object should be used for the scatter plot (name of the dimension)
mappings	A list of mappings used to create combinations of columns which then can be used for aesthetics in ggplot
na.rm	Boolean which decides whether NA values should be removed from the data.
verbose	Boolean which decides whether info messages should be printed to screen or not.

Value

Dataframe usable for ggplot

Author(s)

Jan Philipp Dietrich

Examples

```
## Not run:
library(ggplot2)
data(population_magpie)
ggplot(gginput(population_magpie,scatter="scenario"),aes(x=.value.A2,y=.value.B1,color=i))
+ geom_point() + geom_smooth(method="loess") + facet_wrap(~.spat1)

## End(Not run)
```

`magpie2ggplot2` *magpie2ggplot2*

Description

Function for plotting MAgPIE objects with ggplot2

Usage

```
magpie2ggplot2(data,scenario="default",ylab="Value",title=NULL,
xaxis="Year",yaxis="Value",facet_x="Region", facet_y=NULL,
geom="line",stack=F,color="Scenario",fill="Region",
shape=NULL,linetype=NULL,alpha=NULL,labs=NULL,stat=NULL,
text_size=11,hline=NULL,legend_position="right",
scales="fixed",ncol=5,xlim=NULL,ylim=NULL,file=NULL,
scale=NULL, breaks_x=waiver(),breaks_y=waiver(),
xaxis_angle=90,xlab="Year",linewidth=1,pointwidth=2,
color_pal=NULL,bar_width=NULL,show_grid=FALSE,
group="Region",axis_text_col="black",zoom=FALSE,
space="fixed",legend_nrow=NULL,legend_ncol=NULL,
facet_style="default",na.rm=FALSE,
stack_share=FALSE,point_position="identity",
normalize=NULL,...)
```

Arguments

`data`	MAgPIE object or list of MAgPIE objects or dataframe of MAgPIE object(s); the name of the list entries is used as scenario name in the legend
`scenario`	If the scenario name is stored in the third dimension: position of the entry in the third dimension that contains the scenario name. Default: "default"

ylab	y-axis text
title	title appering at the top of the plot
xaxis	x-axis of the plot, default: "Year"
yaxis	y-axis of the plot, default: "Value"
facet_x	x-axis facet, default: "Region"
facet_y	y-axis facet, default: NULL
geom	"line","point","bar", or "area". If "none" only the ggplot base object is returned.
stack	stacked bar plot (TRUE) or not (FALSE)
color	Dimension to be colored, default: "Scenario"
fill	Dimension to be filled in stacked plots, default: NULL
shape	Dimension to be shaped, default: NULL
linetype	Dimension to differ in linetypes, default: NULL
alpha	Dimension to be transparent in stacked plots, default: NULL
labs	vector with legend titles for color,fill,shape,alpha,linetype
stat	adds statistics (e.g. "sum" or "mean"), default: NULL
text_size	text size of axis, legend and title
hline	NULL or MAgPIE objects. Adds a horizontal line.
legend_position	right (default), left, top, bottom or none
scales	fixed (default), free, free_y or free_x; ?facetgrid for details
ncol	Number of columns used in facet_wrap function
xlim	x axis limits; NULL or vector with limits
ylim	y axis limits; NULL or vector with limits
file	File name the output should be written to using ggsave
scale	scaling of ggplot2 object before saving to file
breaks_x	Vector of x-axis breaks, by default ggplot2 takes the decision
breaks_y	Vector of y-axis breaks, by default ggplot2 takes the decision
xaxis_angle	Angle of xaxis text in degree, default=90
xlab	x-axis text
linewidth	linewidth, default=1
pointwidth	pointwidth, default=3
color_pal	vector of colors defining the color palette, if NULL colors are chosen automaticly
bar_width	width of bars in geom bar, default value: NULL
show_grid	show minor and major grid lines; FALSE (default) or TRUE
group	dimension used for grouping; default value: "Region"
axis_text_col	color of axis text and ticks; default value: "black"

zoom	TRUE zooms the plot according to xlim and ylim, FALSE omits values not the range of xlim and ylim
space	fixed (default), free, free_y or free_x; ?facetgrid for details
legend_nrow	Number of rows used in legend
legend_ncol	Number of columns used in legend
facet_style	style of facets, default or paper
na.rm	Boolean deciding whether NA values should be filtered out of the data or not.
stack_share	stacked bar plot showing shares (TRUE) or absolut values (FALSE)
point_position	position of points; "identity" or position_dodge(width = 1)
normalize	NULL (default) or year which should be used to normalize the data
...	Further options passed to as.ggplot

Value

ggplot2 object representing one or more MAgPIE objects.

Author(s)

Florian Humpenoeder, David Klein

Examples

```
## Not run:
crop_area_reg <- list()
crop_area_reg[["scenario_name"]] <- croparea("fulldata.gdx")
magpie2ggplot2(crop_area_reg,ylab="10^6 ha",title="Croparea",stack=T,facet_x="Scenario",color=NULL)
## End(Not run)
## Not run:
prices <- list()
prices[["Scenario1"]] <- prices("Scenario1.gdx",crops=c("tece","maiz"))
prices[["Scenario2"]] <- prices("Scenario2.gdx",crops=c("tece","maiz"))
magpie2ggplot2(prices,ylab="US$/ton DM",title="Agricultural prices")
## End(Not run)
```

---

magpieResolution *magpieResolution*

Description

Returns the Resolution of a MAgPIE object

Usage

```
magpieResolution(object)
```

Arguments

object	An MAgPIE object

Value

"glo", "reg" or "cell"

Author(s)

Benjamin Bodirsky

---

nice_colors *nice_colors*

Description

Nice Color Schemes

Usage

```
nice_colors(style="contrast_area",saturation=1,alpha=1,value=1)
```

Arguments

style	pre-defined Color-Scheme. "contrast_area" returns partial-complementary colors, with reduced saturation with rising number of colors. This is useful for area-diagramms, where the focus of the eye shall be forced to the bottom of the diagramm.
saturation	saturation (0-1)
alpha	Transparency (Attention, there are problems with certain graphic devices or printers!
value	Brightness. If brightness is part of the color-scheme, value is a reduction factor of existing brightness.

Value

Vector of Hexa-Format of colors.

Author(s)

Benjamin Bodirsky

Examples

```
## Not run:
pie(1:12,col=nice_colors())

## End(Not run)
```

plotCorrHist2D *correlationDataSets*

Description

Plots 2D density plots to evaluate the relationship between two datasets. It also returns the R-square for the correlation

Usage

```
plotCorrHist2D(
  x,
  y,
  title = NULL,
  xlab = "x",
  ylab = "y",
  bins = 40,
  limx = NULL,
  limy = NULL,
  folder = NULL,
  file = "",
  breaks = waiver(),
  nrows = 2,
  ncols = 2,
  axisFont = 13,
  axisTitleFont = 13,
  TitleFontSize = 15,
  legendTitleFont = 12,
  legendTextFont = 10,
  statFont = 4,
  table = FALSE,
  stat = TRUE,
  palette = "RdYlBu",
  tag = NULL
)
```

Arguments

x	First data set (x axis) (observed) as magpie object with one or more items in 3rd dimension
y	Second data set (y axis) (predicted) as magpie object with one or more items in 3rd dimension
title	title of plot
xlab	x axis title
ylab	y axis title

bins	number of bins in histogram
limx	limits y axis (if NULL, fitting limits are calculated within the function)
limy	limits x axis (if NULL, fitting limits are calculated within the function)
folder	path in which to save the plots. if "." is used, it is saved in the current working directory. If NULL, no plots are saved.
file	name of file
breaks	breaks of the legend. It can be a vector, waiver()=the ones from the transformation, NULL for no breaks
nrows	number of rows in pdf file where plots are printed
ncols	number of columns in pdf file where plots are printed
axisFont	Font size of text of axis of the correlation plot
axisTitleFont	Font size of title of axis of the correlation plot
TitleFontSize	Font size of title of correlation plot
legendTitleFont	Font size of the title of the legend
legendTextFont	Font size of legend
statFont	font size r2-MAE label
table	Conditional to include table with statistics in the output. TRUE (includes it), FALSE (it doesn't)
stat	Conditional to include R2 and MAE on the fiure. TRUE (includes it), FALSE (it doesn't)
palette	palette selection for heatd maps based on the RColorBrewer library
tag	for multiple items in the second and third dimensions of the magpie object, should the title include "year", "item", "year-item".

Author(s)

Edna Molina Bacca

Examples

```
## Not run:
x <- plotCorrHist2D(x, y, folder = ".")

## End(Not run)
```

plotcountrymap *Function to plot maps*

Description

Plots maps of map objects or MAgPIE objects

Usage

```
plotcountrymap(x, hatching=FALSE, ...)
```

Arguments

x	a magpie object with ISO3 country names, one year and one name dimension
hatching	if hatching is activated, the second name column will be used for hatching (stripes)
...	Further attributes which are passed on to the function mapCountryData of the package rworldmap

Details

This function is an easy application of the mapCountryData function for ISO3 country-level magpie objects

Author(s)

Benjamin Leon Bodirsky

See Also

plotmap2

Examples

```
## Not run:
data(population_magpie)
test<-population_magpie
dimnames(test)[[1]]<-c("AFG","DEU","FRA","EGY","IND","IDN","RUS","CHN","USA","YEM")
plotcountrymap(test[,"y2005",1])

## End(Not run)
```

plotmap2 *Function to plot maps using ggplot2*

Description

Plots maps MAgPIE objects

Usage

```
plotmap2(data,file=NULL,title="World map",legend_range=NULL,
legendname="Cell share",lowcol="grey95",midcol="orange",
highcol="darkred",midpoint=0.5, facet_grid="Year~Data1", nrow=NULL, ncol=NULL,
scale=2,breaks=TRUE,labs=TRUE,borders=TRUE,MAgPIE_regions=FALSE,
axis_text_col="black",legend_discrete=FALSE,legend_breaks=NULL,
show_percent=FALSE, sea=TRUE,land_colour="white",
legend_height=2,legend_width=NULL,text_size=12,
legend_position="right",facet_style="default",plot_height=10,plot_width=20)
```

Arguments

data	MAgPIE object
file	File name the output should be written to using ggsave
title	Title of the map
legend_range	Legend range. Vector with minimum and maximum.
legendname	Name of the legend
lowcol	color for low values
midcol	color for medium values
highcol	color for high values
midpoint	Value indicating where the transformation from lowcol to highcol takes place.
facet_grid	facets formula used in ggplot2 with default "Year~Data1". Falls back to facet_wrap for "Data1".
nrow	number rows for facet_wrap
ncol	number columns for facet_wrap
scale	scaling of ggplot2 object before saving to file
breaks	TRUE or FALSE
labs	TRUE or FALSE
borders	TRUE or FALSE
MAgPIE_regions	TRUE or FALSE, if TRUE data is ignored
axis_text_col	color of axis text and ticks; default value: "black"
legend_discrete	TRUE or FALSE, discrete or continous legend

legend_breaks	NULL (automatically) or vector with breaks
show_percent	TRUE or FALSE, percent values for discrete lengeds
sea	TRUE or FALSE, blue sea or just white background
land_colour	Background colour for all land area. Defaults to white.
legend_height	NULL or legend height in cm
legend_width	NULL or legend width in cm
text_size	text size of axis, legend and title
legend_position	right (default), left, top, bottom or none
facet_style	style of facets, default or paper
plot_height	plot height in cm
plot_width	plot width in cm

Details

Makes use of ggplot2 map plotting capabilites

Author(s)

Florian Humpenoeder, David M Chen

Examples

```
# plotmap2(data)
#' #@importFrom  RColorBrewer
```

`plotRegionMapping` *Function to plot maps*

Description

This function plots a world region map directly from .csv files

Usage

```
plotRegionMapping(file, col = NULL, ...)
```

Arguments

file	a .csv file
col	color
...	Further attributes such as color palette and map name

Author(s)

Jan Philipp Dietrich, Ewerton Araujo

See Also

plotcountrymap,plotmap2

Examples

```
## Not run:
plotRegionMapping("../regionmapping.csv", col = NULL, mapTitle = "")

## End(Not run)
```

---

plotregionscluster *plotregionscluster*

Description

Plots world map showing world regions and cluster.

Usage

```
plotregionscluster(x, cells = "magpiecell")
```

Arguments

x	data frame with 59199 or 67420 cells in MAgPIE order that contains regional and cluster information. For 59199 cells: format of cluster dimension `region.cluster` where `region` is the name of the region and `cluster` is the number of the cluster. For 67420 cells: cell dimension with coordinate and country name information and format of cluster dimension `region.cluster`
cells	"magpiecell" for 59199 cells and "lpjcell" for 67420 cells

Examples

```
x <- paste(rep(paste0("REG", 1:5), each = 12000), rep(1:25, each = 2400), sep = ".")[1:59199]
plotregionscluster(x)
```

qualityMeasure *qualityMeasure*

Description

Function that returns several efficiency indices of model performance wrt observed data

Usage

```
qualityMeasure(pd, od, wt, measures=c("Willmott",
"Nash Sutcliffe"),p_value=FALSE)
```

Arguments

pd	Predicted data. Format required: numeric vector.
od	Observed data. Must be the same format and length as pd.
wt	A vector of weights. The same length as pd and od. Missing weights are interprated as all weights equal to 1.
measures	A vector of supported statistical measures. Currently available are: "Willmott", "Willmott refined", "Nash Sutcliffe", "RMSE", "MAE", "Pearson","Kendall","Spearman".
p_value	p_value=TRUE,reports significance level of Pearson, Kendall and Spearmann coefficients.

Value

Returns a numeric vector with calculated measures. Names of vector elements are the measures applied.

Author(s)

Misko Stevanovic,Xiaoxi Wang

Examples

```
## Not run:
od <- rnorm(1000)
pd <- rnorm(1000)

qualityMeasure(pd,od)
qualityMeasure(pd,od,measures=c("RMSE","Pearson","Willmott refined"))

## End(Not run)
```

showcolors *Creates bar plot to display given colors*

Description

For a quick translation of hexadecimal color codes into visible colors this function simply creates a bar plot with the hexadecimal colors specified by the user. It takes a vector of strings containing the hexadecimal color codes, e.g. "#D0DD1E".

Usage

```
showcolors(...)
```

Arguments

...	One ore more strings or a vector of strings containing hexadecimal color codes.

Author(s)

David Klein

Examples

```
## Not run: showcolors("#D0DD1E")
## Not run: showcolors("#beefee")
## Not run: showcolors(c("#beefee","#D0DD1E"),"#FFFFFF")
```

swoutput *swoutput*

Description

Creates LaTeX code for plot (magpie2ggplot2) and data table (print.xtable) based on MAgPIE objects and adds it to a "swStream" object.

Usage

```
swoutput(stream,data,unit="unit",plot=TRUE,table=TRUE,scenarioName="default",
textSize=16,digits=0,plotLevel=NULL,...)
```

Arguments

stream	The swStream object to be modified
data	MAgPIE object or list of MAgPIE objects. For a list of MAgPIE objects the name of the list entry (has to be character) is used as scenario name.
unit	unit of data (Character). Used as ylab in magpie2ggplot2 and table caption in print.xtable
plot	TRUE or FALSE. If TRUE, LaTeX code for plot (magpie2ggplot2) is added
table	TRUE or FALSE. If TRUE, LaTeX code for data table (print.xtable) is added
scenarioName	Name of the scenario. Only used if data is not a list.
textSize	Size of text used in magpie2ggplot2
digits	Number of digits for rounding. Used in xtable
plotLevel	NULL for all (default), reg or glo
...	Further options passed to magpie2ggplot2 and print.xtable

Details

Creates preformatted plots and data tables based on MAgPIE objects. Format is optimized for readability. Data tables with more than 12 columns are rescaled for fitting on portrait pages.

Value

No return value

Author(s)

Florian Humpenoeder

See Also

"swStream",swopen,swclose,swR,swtable,swfigure

Examples

```
## Not run:
sw<-swopen("croparea_reg.pdf")
swlatex(sw,"\newpage")
swlatex(sw,"\section{Croparea - regional}")
swoutput(sw,croparea(gdx),"mio. ha",scenario="test")
swclose(sw)
## End(Not run)
```

whereplot *whereplot*

Description

Plots the results of a logical question on a mpa

Usage

```
whereplot(x)
```

Arguments

x	A logical statement with a magpie object on country resolution

Value

A map. Green is true, red is false, orange is true and false in the same country, purple is NA, and striped indicates a country that includes some NAs.

Author(s)

Benjamin Leon Bodirsky

Examples

```
## Not run:
data(population_magpie)
 test<-population_magpie
 dimnames(test)[[1]]<-c("AFG","DEU","FRA","EGY","IND","IDN","RUS","CHN","USA","YEM")
 whereplot(test>500)

## End(Not run)
```

world_map_water *Water area map*

Description

A map containing the water area (only used internally by plotmap)

wrld_simpl *World countries' boundaries*

Description

A shapefile dataframe containing up to date countriy borders (only used internally by plotmap). The file is from the data provided in the maptools package

Author(s)

Miodrag Stevanovic

wrld_simpl_df *World countries' boundaries and MAgPIE mapping*

Description

A dataframe containing up to date country borders and MAgPIE region mapping (only used internally by plotmap2). The file is based on the wrld_simpl dataset

Author(s)

Miodrag Stevanovic, Florian Humpenoeder

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