Package 'binaryTimeSeries'

October 12, 2022

Type Package

Title Analyzes a Binary Variable During a Time Series

Version 1.0.2

Description A procedure to create maps, pie charts, and stacked bar plots showing the trajectory of a binary variable during a time series. You provide a time series of data sets as a stack of raster files or a data frame and call the various functions in 'binaryTimeSeries' to create your desired graphics.For more information please consult: Pontius Jr, R. G. (2022). ``Metrics That Make a Difference: How to Analyze Change and Error'' Springer Nature Switzerland AG <doi:10.1007/978-3-030-70765-1> and Bilintoh, T.M., (2022). ``Intensity Analysis to Study the Dynamics of reforestation in the Rio Doce Water Basin, Brazil''. Frontiers in Remote Sensing, 3 (873341), 13. <doi:10.3389/frsen.2022.873341>.

License AGPL (>= 3)

Depends R (>= 3.3.0), rgdal

Imports dplyr, ggnewscale, ggplot2, graphics, grDevices, magrittr, mice, prettymapr, raster, reshape2, stats, terra, utils

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R topics documented:

`changeData` *Creates a list containing the raster data sets concerning the number of times the category of interest is present and the number of times the category of interest changes during the time series.*

Description

Creates a list containing the raster data sets concerning the number of times the category of interest is present and the number of times the category of interest changes during the time series.

Usage

```
changeData(x, nodata, category, spres, datacrs = NULL)
```

Arguments

`x`	is the data, which must be a RasterStack,RasterBrick,SpatRaster or data frame.
`nodata`	is alphanumeric, which denotes no data in the data set.
`category`	is the category of interest. The default is set to 1.
`spres`	is a 1*2 vector indicating the spatial resolution of the data. The default is set to c(1000,1000).
`datacrs`	is the Coordinate Reference System (CRS) of the input data.

Value

The output from `changeData`

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
data_res <- c(1000,1000)
data_prj <- "+proj=utm +zone=32 +datum=WGS84 +ellps=GRS80  +units=m +no_defs"
chdata_output <- changeData(x = example_data,nodata = no_data,
category = cat_interest,spres = data_res,datacrs = data_prj)
```

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dataStack *Creates results that serve as input for the stackbarPlot function.*

Description

Creates results that serve as input for the stackbarPlot function.

Usage

```
dataStack(
  x,
  nodata = 2,
  category = 1,
  unified = "yes",
  timePoints = c(2000, 2001, 2002, 2003, 2005),
  categoryName = "marsh",
  regionName = "Study Region"
)
```

Arguments

x	is the data, which must be a RasterStack,RasterBrick,SpatRaster or data frame.
nodata	is alphanumeric, which denotes no data in the data set.
category	is the category of interest. The default is set to 1.
unified	is a string, which can be "yes" or "no" only. If "yes," the change is a percentage of a region's unified area; else, the change is a percentage of the entire region under consideration.
timePoints	is a vector containing the time points under consideration.The default is c(2000, 2001, 2002, 2003, 2005).
categoryName	is a character representing the name of the category of interest.Default is "category"
regionName	is a string or character the name of the study region.

Value

The output from dataStack

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
unified_resp <- "yes"
time_points <- c(2000,2001,2002,2003,2005)
categ_name <- "Category"
region_name <- "Study Region"
datstk_output <- dataStack(x = example_data,nodata = no_data,category = cat_interest,
unified = unified_resp,timePoints = time_points,categoryName = categ_name,
regionName = region_name)
```

`presencePlot` *Creates two maps: a map showing how many times the category is present during the time series and a map showing how many times the category changes during the time series.*

Description

Creates two maps: a map showing how many times the category is present during the time series and a map showing how many times the category changes during the time series.

Usage

```
presencePlot(
  input,
  pltunit = "m",
  dataEpsg = 32632,
  scalePos = "bottomleft",
  narrowPos = "topright",
  narrowSize = 1,
  categoryName = "marsh",
  xAxis = "Longitude (m)",
  yAxis = "Latitude (m)",
  axisText = 1.2,
  axisLabel = 1.2,
  plotTitle = 1.5
)
```

Arguments

`input`	is the results from running the "changeData" function.
`pltunit`	is the unit which the current map is plotted in, one of cm, m, km, in, ft, mi. or lat or lon. This parameter is optional if "dataEpsg" is passed.
`dataEpsg`	is the projection of the current map. If extents are valid lat or lons, the projection is assumed to be lat and lon (EPSG:4326), or Spherical Mercator otherwise (EPSG:3857). This is done to work seamlessly with "OpenStreetMap" packages.currently it is set to 32632.

scalePos	where to align the scale bar. One of "bottomleft", "bottomright", "topleft", or "topright".
narrowPos	where to align the north arrow. One of "bottomleft", "bottomright", "topleft", or "topright".
narrowSize	is a numeric value indicating the size of the north arrow.
categoryName	is a character representing the name of the category of interest.Default is "marsh".
xAxis	is a character indicating a label for the horizontal axis. The default is "Longitude (m)".
yAxis	is a character indicating a label for the vertical axis.The default is "Latitude (m)".
axisText	is a numeric value controlling the size of the text on the horizontal and vertical ticks.
axisLabel	is a numeric value controlling the size of the horizontal and vertical labels
plotTitle	is a numeric value controlling the size of the plot title.

Value

The output from presencePlot

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
data_res <- c(1000,1000)
data_prj <- "+proj=utm +zone=32 +datum=WGS84 +ellps=GRS80  +units=m +no_defs"
chdata_output <- changeData(x = example_data,nodata = no_data,
category = cat_interest,spres = data_res,datacrs = data_prj)
ch_maps <- presencePlot(input = chdata_output,pltunit = "m",dataEpsg = 32632,
scalePos = "bottomleft",narrowPos = "topright",narrowSize = 1,
categoryName = "category",xAxis = "Horizontal (m)",yAxis = "Vertical (m)",
axisText = 1.2,axisLabel = 1.2,plotTitle = 1.5)
```

---

stackbarPlots *Create stack bar plots showing trajectories sizes and the three change components.*

Description

Create stack bar plots showing trajectories sizes and the three change components.

Usage

```
stackbarPlots(
  input,
  axisSize = 12,
  lbAxSize = 15,
  lgSize = 12,
  titleSize = 15,
  datbreaks = "no",
  upperlym = 35,
  lowerlym = -50,
  lymby = 5,
  upperlym2 = 0.5,
  lymby2 = 0.1,
  xAngle = 0
)
```

Arguments

input	is the results from running the "dataStack" function.
axisSize	is a numerical value that control the size of the labels on tick marks of the horizontal and vertical tick marks.
lbAxSize	is a numerical value to control the size of the labels on the horizontal and vertical axis.
lgSize	is a numerical value to control the size of the legend text.
titleSize	is a numerical value to control the size of the title text.
datbreaks	is a string of "yes" or "no", which controls the range and sub-division of the vertical axis of the stacked bar plots.The default is "no", which automatically generates the range and interval of the vertical axis. If "no" the user need to mannual input values for "upperlym","lowerlym", "lymby","upperlym2", and "lymby2".
upperlym	if datbreaks set to "yes," is a numerical value to control the upper limit of the trajectory stack bar plot.
lowerlym	if datbreaks set to "yes," is a numerical value to control the lower limit of the trajectory stack bar plot.
lymby	if datbreaks set to "yes," is a numerical value to control interval on the vertical axis of the components of change stack bar plot.
upperlym2	if datbreaks set to "yes," is a numerical value to control the upper limit of the components of change stacked bar plot.
lymby2	if datbreaks set to "yes," is a numerical value to control the interval on the vertical axis of the components of change stacked bar plot.
xAngle	is a numerical value to control the orientation of the text on the vertical axis of the trajectory stack bar plot

Value

The output from stackbarPlots

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
unified_resp <- "yes"
time_points <- c(2000,2001,2002,2003,2005)
categ_name <- "Category"
region_name <- "Study Region"
datstk_output <- dataStack(x = example_data,nodata = no_data,category = cat_interest,
unified = unified_resp,timePoints = time_points,categoryName = categ_name,
regionName = region_name)
stkbarplt_output <- stackbarPlots(input = datstk_output,axisSize = 12,
lbAxSize = 15,lgSize = 12,titleSize = 15,upperlym = 35,lowerlym = - 50,
lymby = 5,upperlym2 = 0.5,lymby2 = 0.1,xAngle = 0)
```

`trajData` *creates the data which serves as input for the "trajPlot" function.*

Description

creates the data which serves as input for the "trajPlot" function.

Usage

```
trajData(
  x,
  nodata = 2,
  category = 1,
  spres = c(1000, 1000),
  datacrs = NULL,
  unified = "yes"
)
```

Arguments

`x`	is the data, which must be a RasterStack,RasterBrick,SpatRaster or data frame.
`nodata`	is alphanumeric, which denotes no data in the data set.
`category`	is the category of interest. The default is set to 1.
`spres`	is a 1*2 vector indicating the spatial resolution of the data. The default is c(1000,1000).
`datacrs`	is the CRS of the input data.
`unified`	is a string, which can be "yes" or "no" only. If "yes," the change is a percentage of a region's unified area; else, the change is a percentage of the entire region under consideration.

Value

The output from trajData

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
data_res <- c(1000,1000)
data_prj <- "+proj=utm +zone=32 +datum=WGS84 +ellps=GRS80  +units=m +no_defs"
unified_resp <- "yes"
trajdt_output <- trajData(x = example_data,nodata = no_data,
category = cat_interest,spres = data_res,datacrs = data_prj,
unified = unified_resp)
```

---

trajPlot *Creates a map and pie chart of the trajectories of the category of interest.*

Description

Creates a map and pie chart of the trajectories of the category of interest.

Usage

```
trajPlot(
  input,
  pltunit = "m",
  dataEpsg = 32632,
  categoryName = "marsh's",
  scalePos = "bottomleft",
  narrowPos = "topright",
  narrowSize = 1,
  xAxis = "Longitude (m)",
  yAxis = "Latitude (m)",
  axisText = 1.2,
  axisLabel = 1.4,
  plotTitle = 1.5,
  legendTex = 0.9
)
```

Arguments

input	is the results from running the "trajData" function.
pltunit	is the unit in which the current map is plotted in, one of cm, m, km, in, ft, mi. or lat or lon.

dataEpsg	is the projection of the current map. If extents are valid lat and lons, the projection is assumed to be lat and lon (EPSG:4326), or Spherical Mercator otherwise.
categoryName	is a character representing the name of the category of interest.Default is "marsh".
scalePos	where to align the scale bar. One of "bottomleft", "bottomright", "topleft", or "topright".
narrowPos	is a numeric value indicating the size of the north arrow.
narrowSize	is a numeric value indicating the size of the north arrow.
xAxis	is a character indicating label for the horizontal axis. default is "Longitude (m)".
yAxis	is a character indicating label for the vertical axis. default is "Latitude (m)".
axisText	is a numeric value controlling the size of the text on the horizontal and vertical ticks.
axisLabel	is a numeric value controlling the size of the horizontal and vertical labels
plotTitle	is a numeric value controlling the size of the plot title.
legendTex	is a numerical value controlling the size of the legend text.

Value

The output from trajPlot

Examples

```
example_data <- terra::rast(system.file("external/Example_raster_Y.tif",package="binaryTimeSeries"))
no_data <- 2
cat_interest <- 1
data_res <- c(1000,1000)
data_prj <- "+proj=utm +zone=32 +datum=WGS84 +ellps=GRS80  +units=m +no_defs"
unified_resp <- "yes"
trajdt_output <- trajData(x = example_data,nodata = no_data,
category = cat_interest,spres = data_res,datacrs = data_prj,unified = unified_resp)
trjplt_output <- trajPlot(input = trajdt_output)
```

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