Package 'MazamaSpatialPlots'

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Type Package

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Title Thematic Plots for Mazama Spatial Datasets

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Description A suite of convenience functions for generating US state and county thematic maps using datasets from the MazamaSpatialUtils package.

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URL https://github.com/MazamaScience/MazamaSpatialPlots

BugReports https://github.com/MazamaScience/MazamaSpatialPlots/issues

Depends R (>= 4.0.0), MazamaSpatialUtils (>= 0.8.7)

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Repository CRAN

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Contents

`countyMap` *County level thematic map*

Description

Uses the **tmap** package to generate a thematic map at the county level. Input consists of a dataframe with `countyFIPS` identifiers.

Data to plot is specified with `parameter` argument. If `parameter` is mult-valued, mutliple plots will be generated and displayed as "facets".

The returned object is a **tmap** ggplot object which can be further modified with tmap or ggplot options.

Usage

```
countyMap(
  data = NULL,
  parameter = NULL,
  state_SFDF = "USCensusStates_02",
  county_SFDF = "USCensusCounties_02",
  breaks = NULL,
  palette = "brewer.blues",
  conusOnly = TRUE,
  stateCode = NULL,
  projection = NULL,
  stateBorderColor = "gray50",
  countyBorderColor = "white",
  title = NULL,
  showLegend = TRUE,
  legendTitle = NULL,
  legendOrientation = c("portrait", "landscape"),
  legendPosition = NULL
)
```

Arguments

`data`	Dataframe containing values to plot. This dataframe must contain a column named `countyFIPS` with the 5-digit FIPS code.
`parameter`	Name of the column in `data` to use for coloring the map.

state_SFDF	simple features data frame with US states. It's data @slot must contain a column named stateCode if either conusOnly = TRUE or the stateCode argument is specified.
county_SFDF	simple features data frame with US counties. It's data @slot must always contain a column named and countyFIPS and a column named stateCode if either conusOnly = TRUE or the stateCode argument is specified.
breaks	Numeric vector of break points.
palette	A vector of colors or palette name from the **cols4all** package (see cols4all::c4a).
conusOnly	Logical specifying Continental US state codes. Ignored when the stateCode argument is specified.
stateCode	Vector of state codes to include on the map.
projection	Named projection, *e.g.* "EPSG:4326" or "WGS84" or proj4string.
stateBorderColor	Color used for state borders.
countyBorderColor	Color used for county borders.
title	Vector of text strings to use as individual plot titles. This must be the same length as 'parameter'.
showLegend	Logical specifying whether or not to show the legend.
legendTitle	Text string to use as the legend title.
legendOrientation	Orientation of the legend. Either "portrait" or "landscape".
legendPosition	A *tm_pos* object generated with tmap::tm_pos_in() or tmap::tm_pos_out().

Value

A ggplot object.

Examples

```
library(MazamaSpatialPlots)
mazama_initialize()

countyMap(
  data = example_US_countyCovid,
  parameter = "cases",
  breaks = c(0,100,200,500,1000,2000,5000,10000,20000,50000,1e6),
  title = "COVID-19 Cases on June 01 2020"
)

countyMap(
  data = example_US_countyCovid,
  parameter = "deaths",
  state_SFDF = USCensusStates_02,
  county_SFDF = USCensusCounties_02,
  breaks = c(0, 1, 50, 100, 250, 500, 1000, 2500, 3000),
  palette = "brewer.or_rd",
```

```
  stateCode = c( "NY", "PA", "MD", "NJ", "DE"),
  stateBorderColor = "black",
  countyBorderColor = 'grey70'
) +
  tmap::tm_layout(
    attr.color = 'white',
    bg.color = "dodgerblue4"
  ) +
  tmap::tm_title(
    text = "COVID-19 Deaths* in the Mid Atlantic",
    size = 2.0,
    color = "white",
  ) +
  tmap::tm_credits("*as of June 01, 2020", col = "white", position = "left")
```

`example_US_countyCovid`

Example county Covid dataset

Description

The `example_US_countyCovid` dataset provides a small county dataset to use in code examples. The code for creating it demonstrates creation of a dataest that is compatible with `countyMap()`.

This dataset was generated on 2020-06-12 by running:

```
library(dplyr)
library(MazamaSpatialUtils)

fileUrl <- "https://raw.githubusercontent.com/nytimes/covid-19-data/master/us-counties.csv"

col_names <- c("date", "countyName", "stateName", "countyFIPS", "cases", "deaths")
col_types = "Dcccii"

outputColumns <- c("stateCode", "stateName", "countyFIPS", "countyName", "cases", "deaths")

# After a little trial and error, the following works well:

example_US_countyCovid <-
  readr::read_csv(
    file = fileUrl,
    skip = 1,                    # Skip the header line
    col_names = col_names,
    col_types = col_types
  ) %>%
  dplyr::mutate(
    stateCode = MazamaSpatialUtils::US_stateNameToCode(stateName),
```

```
  ) %>%
  dplyr::filter(.data$date == lubridate::ymd("2020-06-01")) %>%
  dplyr::select(!!outputColumns)

save(example_US_countyCovid, file = "data/example_US_countyCovid.rda")
```

Usage

```
example_US_countyCovid
```

Format

A tibble with 52 rows and 3 columns of data.

`example_US_stateObesity`

Example state obesity dataset

Description

The `example_US_stateObesity` dataset provides a small state dataset to use in code examples. The code for creating it demonstrates creation of a dataest that is compatible with `stateMap()`.

This dataset was generated on 2020-06-09 by running:

```
library(dplyr)
library(MazamaSpatialUtils)

fileUrl <- paste0("http://data-lakecountyil.opendata.arcgis.com/datasets/",
                  "3e0c1eb04e5c48b3be9040b0589d3ccf_8.csv")

col_names <- c("FID", "stateName", "obesityRate", "SHAPE_Length", "SHAPE_Area")
col_types = "icddd"

outputColumns <- c("stateCode", "stateName", "obesityRate")

# After a little trial and error, the following works well:

example_US_stateObesity <-
  readr::read_csv(
    file = fileUrl,
    skip = 1,                    # Skip the header line
    col_names = col_names,
    col_types = col_types
  ) %>%
  dplyr::mutate(
    stateCode = MazamaSpatialUtils::US_stateNameToCode(stateName)
  ) %>%
```

```
  dplyr::select(!!outputColumns)

save(example_US_stateObesity, file = "data/example_US_stateObesity.rda")
```

Usage

```
example_US_stateObesity
```

Format

A tibble with 52 rows and 3 columns of data.

`mazama_initialize` *Initialize with MazamaScience standard directories*

Description

Convenience function to initialize spatial data for US state and county maps. Wraps the following setup lines:

```
MazamaSpatialUtils::setSpatialDataDir(spatialDataDir)

MazamaSpatialUtils::loadSpatialData("USCensusCounties_02")
MazamaSpatialUtils::loadSpatialData("USCensusStates_02")
```

Usage

```
mazama_initialize(spatialDataDir = "~/Data/Spatial")
```

Arguments

`spatialDataDir` Directory where spatial datasets are found, Default: "~/Data/Spatial"

Value

No return value.

Examples

```
library(MazamaSpatialPlots)

# Set up directory for spatial data
spatialDataDir <- tempdir() # typically "~/Data/Spatial"
MazamaSpatialUtils::setSpatialDataDir(spatialDataDir)

exists("USCensusStates_02")
mazama_initialize(spatialDataDir)
exists("USCensusStates_02")
class(USCensusStates_02)
```

`stateMap` *State level thematic map*

Description

Uses the **tmap** package to generate a thematic map at the state level. Input consists of a dataframe with `stateCode` identifiers.

Data to plot is specified with `parameter` argument. If `parameter` is mult-valued, mutliple plots will be generated and displayed as "facets".

The returned object is a **tmap** ggplot object which can be further modified with tmap or ggplot options.

Usage

```
stateMap(
  data = NULL,
  parameter = NULL,
  state_SFDF = "USCensusStates_02",
  breaks = NULL,
  palette = "brewer.blues",
  conusOnly = TRUE,
  stateCode = NULL,
  projection = NULL,
  stateBorderColor = "gray50",
  title = NULL,
  showLegend = TRUE,
  legendTitle = NULL,
  legendOrientation = "portrait",
  legendPosition = NULL
)
```

Arguments

`data`	Dataframe containing values to plot. This dataframe must contain a column named `stateCode` with the 2-character state code.
`parameter`	Name of the column in `data` to use for coloring the map.
`state_SFDF`	simple features data frame with US states. It's data `@slot` must contain a column named `stateCode` with the 2-character state code.
`breaks`	Numeric vector of break points.
`palette`	A vector of colors or palette name from the **cols4all** package (see `cols4all::c4a`).
`conusOnly`	Logical specifying Continental US state codes. Ignored when the `stateCode` argument is specified.
`stateCode`	Vector of state codes to include on the map.
`projection`	Named projection, *e.g.* "EPSG:4326" or "WGS84" or proj4string.

`stateBorderColor`
: Color used for state borders.

`title`
: Vector of text strings to use as individual plot titles. This must be the same length as 'parameter'.

`showLegend`
: Logical specifying whether or not to show the legend.

`legendTitle`
: Text string to use as the legend title.

`legendOrientation`
: Orientation of the legend. Either "portrait" or "landscape".

`legendPosition`
: A *tm_pos* object generated with `tmap::tm_pos_in()` or `tmap::tm_pos_out()`.

Value

A ggplot object.

Examples

```
library(MazamaSpatialPlots)

stateMap(
  data = example_US_stateObesity,
  parameter = "obesityRate",
  stateBorderColor = "white",
  title = "2018 Obesity by State"
)

# Example of customization using tm_layout and breaks parameter
stateMap(
  data = example_US_stateObesity,
  parameter = "obesityRate",
  breaks = seq(20,38,3),
  stateBorderColor = 'black'
) +
  tmap::tm_layout(
    frame = TRUE,
    frame.double.line = TRUE,
    bg.color = "grey85",
    inner.margins  = .05
  ) +
  tmap::tm_title(
    text = 'Obesity Rate by State',
    size = 1.5,
    position = tmap::tm_pos_in("center", "top"),
    fontfamily = "serif"
  )

# Example using stateCode
stateMap(
  data = example_US_stateObesity,
  parameter = "obesityRate",
  stateCode = c('ME', 'NH', 'VT', 'MA', 'RI', 'CT'),
  stateBorderColor = 'black',
```

```
  legendPosition = tmap::tm_pos_in("right", "bottom")
) +
  tmap::tm_layout(
    frame = TRUE,
    frame.double.line = TRUE,
    bg.color = "grey85",
    inner.margins  = .08
  ) +
  tmap::tm_title(
    text = 'Obesity Rates in New England',
    size = 1.5,
    fontface = 2,
    fontfamily = "serif",
    position = tmap::tm_pos_in("center", "top")
  )
```

`USCensusCounties_02` *US Census Counties simple features data frame*

Description

The `USCensusCounties_02` dataset provides a SFDF of US counties to use in code examples. It is created from converting a US county borders shapefile to a simple features data frame with additional columns of data. The code for creating it demonstrates creation of a SFDF that is compatible with `countyMap()`. See the **MazamaSpatialUtils** package for the function `convertUSCensusCounties()` that creates this SFDF.

This dataset was generated on 2022-11-07 by running:

```
library(MazamaSpatialUtils)

setSpatialDataDir("~/Data/Spatial_0.8")

MazamaSpatialUtils::convertUSCensusCounties()

MazamaSpatialUtils::loadSpatialData("USCensusCounties_02")

save(USCensusCounties_02, file = "data/USCensusCounties_02.rda")
```

Usage

```
USCensusCounties_02
```

Format

A simple features data frame (SFDF) with 3169 observations and 9 variables.

USCensusStates_02 *US Census State simple features data frame*

Description

The USCensusStates_02 dataset provides a SFDF of US states to use in code examples. It is created by converting a US state borders shapefile to a simple features data frame with additional columns of data. The code for creating it demonstrates creation of a SFDF that is compatible with stateMap(). See the **MazamaSpatialUtils** package for the function convertUSCensusStates() that creates this SFDF.

This dataset was generated on 2022-11-007 by running:

```
library(MazamaSpatialUtils)

setSpatialDataDir("~/Data/Spatial_0.8")

MazamaSpatialUtils::convertUSCensusStates()

MazamaSpatialUtils::loadSpatialData("USCensusStates_02")

save(USCensusStates_02, file = "data/USCensusStates_02.rda")
```

Usage

```
USCensusStates_02
```

Format

A simple features data frame (SFDF) with 52 observations and 8 variables.

validateMazamaSpatialUtils *Validate proper setup of MazamaSpatialUtils*

Description

The **MazamaSpatialUtils** package mus be properly installed and initialized before using functions from the **MazamaSpatialPlots** package.

This helper function is useful when building automated plot-generation systems.

Usage

```
validateMazamaSpatialUtils()
```

Value

Invisibly returns TRUE if no error message has been generated.

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