Package ‘ggvoronoi’

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Title Voronoi Diagrams and Heatmaps with 'ggplot2'
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Description Easy creation and manipulation of Voronoi diagrams using 'deldir' with visualization in 'ggplot2'. Convenient functions are provided to create nearest neighbor diagrams and heatmaps. Diagrams are computed with 'deldir' and processed to work with the 'sp' framework. Results are provided in a convenient spatial data structure and displayed with 'ggplot2'. An outline can be provided by the user to specify the spatial domain of interest.
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fortify_voronoi

Create Data Frame from voronoi_polygons output

Description

Allows output of `voronoi_polygon` to be plotted using `geom_polygon`.

Usage

```r
fortify_voronoi(vor_spdf)
```

Arguments

- `vor_spdf`: Output from `voronoi_polygon` (`SpatialPolygonsDataFrame`)

Value

A `data.frame` containing coordinates to trace the paths of the provided voronoi diagram.

Examples

```r
set.seed(45056)
x <- sample(1:200, 100)
y <- sample(1:200, 100)
points <- data.frame(x, y,
  distance = sqrt((x-100)^2 + (y-100)^2))
circle <- data.frame(x = 100*(1+cos(seq(0, 2*pi, length.out = 2500))),
  y = 100*(1+sin(seq(0, 2*pi, length.out = 2500))),
  group = rep(1,2500))

vor_spdf <- voronoi_polygon(data=points, x="x", y="y", outline=circle)
vor_df <- fortify_voronoi(vor_spdf)

ggplot(vor_df) +
geom_polygon(aes(x=x, y=y, fill=distance, group=group))
```
Description

Convenience function for use with `stat_voronoi`. Uses `geom_polygon` as the default geom and `stat_voronoi` as the default stat. To plot region borders instead of a choropleth map, use `stat_voronoi` with `geom="path"`, or use `fill=NA` with `color="black"`.

Usage

```r
geom_voronoi(mapping = NULL, data = NULL, stat = StatVoronoi,
position = "identity", ..., na.rm = FALSE, show.legend = NA,
inherit.aes = TRUE, outline = NULL)
```

Arguments

- **mapping**: Set of aesthetic mappings created by `aes()` or `aes()`. If specified and `inherit.aes` = TRUE (the default), it is combined with the default mapping at the top level of the plot. You must supply `mapping` if there is no plot mapping.
- **data**: The data to be displayed in this layer. There are three options:
  - If NULL, the default, the data is inherited from the plot data as specified in the call to `ggplot()`.
  - A data.frame, or other object, will override the plot data. All objects will be fortified to produce a data frame. See `fortify()` for which variables will be created.
  - A function will be called with a single argument, the plot data. The return value must be a data.frame, and will be used as the layer data.
- **stat**: The statistical transformation to use on the data for this layer, as a string.
- **position**: Position adjustment, either as a string, or the result of a call to a position adjustment function.
- **...**: Other arguments passed on to `layer()`. These are often aesthetics, used to set an aesthetic to a fixed value, like `colour = "red"` or `size = 3`. They may also be parameters to the paired geom/stat.
- **na.rm**: If FALSE, the default, missing values are removed with a warning. If TRUE, missing values are silently removed.
- **show.legend**: logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.
- **inherit.aes**: If FALSE, overrides the default aesthetics, rather than combining with them. This is most useful for helper functions that define both data and aesthetics and shouldn’t inherit behaviour from the default plot specification, e.g. `borders()`.
- **outline**: data.frame with first column x/longitude, second column y/latitude, and a group column denoting islands or pieces.
**Value**

Adds a path or polygon layer depicting a nearest neighbor diagram to a 'ggplot' figure.

**Examples**

```r
set.seed(45056)
x <- sample(1:200,100)
y <- sample(1:200,100)
points <- data.frame(x, y,
  distance = sqrt((x-100)^2 + (y-100)^2))
circle <- data.frame(x = 100*(1+cos(seq(0, 2*pi, length.out = 2500))),
  y = 100*(1+sin(seq(0, 2*pi, length.out = 2500))),
  group = rep(1,2500))

ggplot(points) +
  geom_voronoi(aes(x=x,y=y,fill=distance))

ggplot(points) +
  geom_voronoi(aes(x=x,y=y,fill=distance),outline=circle)

ggplot(points) +
  geom_voronoi(aes(x=x,y=y,fill=distance),fill=NA,color="black")
```

---

**ncdc_locations**

*Locations and Elevation of NCDC Weather Stations*

**Description**

A dataset containing identifying information as well as coordinates and elevation for each unique North American land-based weather station in the National Climatic Data Center. Note that sites with a missing elevation in the raw data (recorded as -999.9) have been removed. Some sites have a potentially erroneous recorded elevation of zero meters.

**Usage**

`ncdc_locations`

**Format**

A data frame with 65804 rows and 6 variables:

- **ID** ID number to connect the data back to other NCDC data
- **country** country that the site is in. USA, Canada or Mexico
- **state** two character state/province abbreviation that the site is in
- **lat** latitude coordinate
- **long** longitude coordinate
- **elev** site elevation in meters
oxford_bikes

Source

National Climatic Data Center

---

oxford_bikes  Bike Rack Locations in Oxford, Ohio.

Description

A dataset with the location of bike racks in Oxford, Ohio. Includes Miami University’s campus and Uptown Oxford. GPS coordinates were measured for each bike rack via handheld GPS receivers. Off-campus data were gathered for a Miami University GIS class project and On-campus data were gathered for a Miami University Kinesiology research project.

Usage

oxford_bikes

Format

A data frame with 205 rows and 3 variables:

- x longitude coordinate
- y latitude coordinate
- name location name, if recorded

Source

Madeline Maurer (Miami University Department of Geography); Justin Hopkins, Dr. Helaine Alessio and Amanda Meiering (Miami University Department of Kinesiology)

---

oxford_map  Google Map of Oxford, Ohio.

Description

A ggmap object containing a static google map image of Oxford, Ohio. Zoomed in to show the Uptown Oxford and Miami University campus areas.

Usage

oxford_map

Format

Large ggmap object
stat_voronoi

Source

Google Maps static map api (accessed from 'ggmap' package)

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stat_voronoi Voronoi Diagrams with ggplot2

Description

See geom_voronoi for general use. Use geom="polygon" for choropleth heatmap or geom="path" for region borders.

Usage

stat_voronoi(mapping = NULL, data = NULL, geom = "polygon", position = "identity", na.rm = FALSE, show.legend = NA, inherit.aes = TRUE, outline = NULL, ...)

Arguments

mapping Set of aesthetic mappings created by aes() or aes_(). If specified and inherit.aes = TRUE (the default), it is combined with the default mapping at the top level of the plot. You must supply mapping if there is no plot mapping.

data The data to be displayed in this layer. There are three options: If NULL, the default, the data is inherited from the plot data as specified in the call to ggplot(). A data.frame, or other object, will override the plot data. All objects will be fortified to produce a data frame. See fortify() for which variables will be created. A function will be called with a single argument, the plot data. The return value must be a data.frame, and will be used as the layer data.

geom The geometric object to use display the data

position Position adjustment, either as a string, or the result of a call to a position adjustment function.

na.rm If FALSE, the default, missing values are removed with a warning. If TRUE, missing values are silently removed.

show.legend logical. Should this layer be included in the legends? NA, the default, includes if any aesthetics are mapped. FALSE never includes, and TRUE always includes. It can also be a named logical vector to finely select the aesthetics to display.

inherit.aes If FALSE, overrides the default aesthetics, rather than combining with them. This is most useful for helper functions that define both data and aesthetics and shouldn’t inherit behaviour from the default plot specification, e.g. borders().

outline data.frame with first column x/longitude, second column y/latitude, and a group column denoting islands or pieces.

... Other arguments passed on to layer(). These are often aesthetics, used to set an aesthetic to a fixed value, like colour = "red" or size = 3. They may also be parameters to the paired geom/stat.
Examples

```r
set.seed(45056)
x <- sample(1:200, 100)
y <- sample(1:200, 100)
points <- data.frame(x, y,
  distance = sqrt((x-100)^2 + (y-100)^2))
circle <- data.frame(x = 100*(1+cos(seq(0, 2*pi, length.out = 2500)))/,
  y = 100*(1+sin(seq(0, 2*pi, length.out = 2500)))/,
  group = rep(1, 2500))

ggplot(points) +
  stat_voronoi(aes(x=x, y=y, fill=distance))

ggplot(points) +
  stat_voronoi(aes(x=x, y=y), geom="path")

ggplot(points) +
  stat_voronoi(aes(x=x, y=y, fill=distance), outline=circle)
```

---

### voronoi_polygon

**Voronoi Diagram from Data Frame**

Create a Voronoi diagram for analysis or plotting with `geom_polygon`.

#### Usage

```r
voronoi_polygon(data, x = "x", y = "y", outline = NULL,
data.frame = FALSE)
```

#### Arguments

- **data**: data.frame containing a set of points to make voronoi regions and any additional desired columns.
- **x**: numeric vector (for example longitude).
- **y**: numeric vector (for example latitude).
- **outline**: data.frame with first column x/longitude, second column y/latitude, and a group column denoting islands or pieces.
- **data.frame**: output as data.frame? You will lose information if you do this. For use in `StatVoronoi`.

#### Value

Returns a `SpatialPolygonsDataFrame` containing the polygon tiles of the nearest neighbor diagram generated by the provided (x,y) coordinates.
Examples

```r
set.seed(45056)
x <- sample(1:200,100)
y <- sample(1:200,100)
points <- data.frame(x, y,
                     distance = sqrt((x-100)^2 + (y-100)^2))
circle <- data.frame(x = 100*(1+cos(seq(0, 2*pi, length.out = 2500))),
                     y = 100*(1+sin(seq(0, 2*pi, length.out = 2500))),
                     group = rep(1,2500))

vor_spdf <- voronoi_polygon(data=points,x="x",y="y",outline=circle)
vor_df <- fortify_voronoi(vor_spdf)

ggplot(vor_df) +
       geom_polygon(aes(x=x,y=y,fill=distance,group=group))
```
Index

* choropleth
  fortify_voronoi, 2
  geom_voronoi, 3
  stat_voronoi, 6
  voronoi_polygon, 7

* datasets
  ncdc_locations, 4
  oxford_bikes, 5
  oxford_map, 5
  stat_voronoi, 6

* voronoi
  fortify_voronoi, 2
  geom_voronoi, 3
  stat_voronoi, 6
  voronoi_polygon, 7

aes(), 3, 6
aes(), 3, 6

borders(), 3, 6

fortify(), 3, 6
fortify_voronoi, 2

geom_polygon, 2, 3, 7
geom_voronoi, 3, 6

ggplot(), 3, 6

layer(), 3, 6

ncdc_locations, 4

oxford_bikes, 5
oxford_map, 5

SpatialPolygonsDataFrame, 2, 7
stat_voronoi, 3, 6

StatVoronoi, 7
StatVoronoi (stat_voronoi), 6

voronoi_polygon, 2, 7