Package 'aoristic'

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Type Package

Title aoristic analysis with spatial output (kml)

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Description 'Aoristic' is one of the past tenses in Greek and represents an uncertain occurrence time. Aoristic analysis suggested by Ratcliffe (2002) is a method to analyze events that do not have exact times of occurrence but have starting times and ending times. For example, a property crime database (e.g., burglary) typically has a starting time and ending time of the crime that could have occurred. Aoristic analysis allocates the probability of a crime incident occurring at every hour over a 24-hour period. The probability is aggregated over a study area to create an aoristic graph.
Using crime incident data with lat/lon, DateTimeFrom, and DateTimeTo, functions in this package create a total of three (3) kml files and corresponding aoristic graphs: 1) density and contour; 2) grid count; and 3) shapefile boundary. (see also: https://sites.google.com/site/georgekick/software)

License GPL (>= 2)

Depends ggplot2, spatstat, GISTools

Imports lubridate, classInt, reshape2, rgdal, plotKML, MASS, sp, maptools, RColorBrewer

LazyData true

References Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43. Arlington PD (n.d.). Statistical Information. Retrieved from http://www.arlingtonpd.org/index.asp?nextpg=stats/index.asp. Accessed in June, 2013.

NeedsCompilation no

Repository CRAN

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R topics documented:

`aoristic-package` *Creating a kml file with aoristic graph: Aoristic Analysis with spatial kml data*

Description

Using crime incident data with lat/lon, DateTimeFrom, and DateTimeTo, a total of three (3) aoristic graphs can be created: 1) density and contour; 2) grid count; and 3) shapefile boundary.

Details

Google Earth needs to be installed in order to view a kml output with aoristic graphs. aoristic.grid produces a kml file of aoristic graphs based on a 5*5 grid. aoristic.shp produces a kml file of aoristic graphs based on input shapefile boundary aoristic.density produces a kml file of aoristic graphs with kernel density

Author(s)

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References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

aoristic *Sample data of crime (df) and council district (spdf)*

Description

Sample data of burglary incident data frame and spatial polygon data frame of council districts.

Usage

```
data(aoristic)
```

Author(s)

George Kikuchi, 2013-09-13

Source

City of Arlington

aoristic.all.graph *Creating a data frame for an aoristic graph using all data*

Description

Creating a data frame for an aoristic graph using all data

Usage

```
aoristic.all.graph(data)
```

Arguments

data	data.frame created by aoristic.df

Value

data data.frame with two columns (hour, freq) used to create an aoristic graph for the entire study area

Examples

```
data(aoristic)
data <- aoristic.df(data=arlington,
         DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo")
graph <- aoristic.all.graph(data=data)
ggplot(graph, aes(x=hour, y=freq)) +
   geom_bar(stat="identity") +
   ggtitle("Aoristic Graph for the Entire Study Area")

# with probability labels
graph$prob <- paste(round(graph$freq / sum(graph$freq) * 100, 1), "%", sep="")
ggplot(graph, aes(x=hour, y=freq)) +
   geom_bar(stat="identity") +
   ggtitle("Aoristic Graph for the Entire Study Area") +
   geom_text(aes(y=freq, label=prob), vjust=1.5, colour="white", size=4)
```

---

aoristic.density *aoristic graph by grid count*

Description

aoristic graph by grid count

Usage

```
aoristic.density(spdf, h = 0.01, n = 128, probs = 0.99,
  output = "output")
```

Arguments

spdf	spatial point data frame produced from aoristic.spdf
h	h parameter for the function kde2d (default=0.01); std. dev.
n	n parameter for the function kde2d (default=128); No. of cells in xy directions
probs	percentile to be identified as hot spots for the function quantile (default=0.99)
output	a character representing the name of an output folder (the folder will be generated in the current working directory; default name = output)

Value

kml file

References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

Examples

```
data(aoristic)
data.spdf <- aoristic.spdf(data=arlington,
   DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo",
   lon="lon", lat="lat")
aoristic.density(spdf=data.spdf)
```

`aoristic.df` *creating a data.frame for aoristic analysis*

Description

creating a data.frame for aoristic analysis

Usage

```
aoristic.df(data, DateTimeFrom, DateTimeTo)
```

Arguments

`data`	data.frame with a minimum of 2 columns representing FromDateTime, and ToDateTime
`DateTimeFrom`	a character vector of the column name for FromDateTime (POSIXct date-time object)
`DateTimeTo`	a character vector of the column name for ToDateTime (POSIXct date-time object). If ending date-time is missing, the duration of an event will be coded as 1 hour.

Value

data.frame

References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

Examples

```
data(aoristic)
data <- aoristic.df(data=arlington,
   DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo")
head(data)
```

`aoristic.grid` *aoristic graph by grid count*

Description

aoristic graph by grid count

Usage

```
aoristic.grid(spdf, nxy = 5, output = "output")
```

Arguments

`spdf`	spatial point data frame produced from aoristic.spdf
`nxy`	the number of grids in the x and y directions (a minimum of 2 and a default value of 5)
`output`	a character representing the name of an output folder (the folder will be generated in the current working directory; default name = output)

Value

kml file

References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

Examples

```
data(aoristic)
data.spdf <- aoristic.spdf(data=arlington,
   DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo",
   lon="lon", lat="lat")
aoristic.grid(spdf=data.spdf, nxy=5)
```

`aoristic.shp` *aoristic graph by shapefile boundary*

Description

aoristic graph by shapefile boundary

Usage

```
aoristic.shp(spdf, area.shp, output = "output")
```

Arguments

`spdf`	spatial point data frame produced from aoristic.spdf
`area.shp`	spatial polygon data frame used as a boundary in WGS84
`output`	a character representing the name of an output folder (the folder will be generated in the current working directory; default name = output)

Value

kml file

References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

Examples

```
data(aoristic)
data.spdf <- aoristic.spdf(data=arlington,
   DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo",
   lon="lon", lat="lat")
aoristic.shp(spdf=data.spdf, area.shp=CouncilDistrict)
```

`aoristic.spdf` *creating a spatial.polygon.data.frame for aoristic analysis*

Description

creating a spatial.polygon.data.frame for aoristic analysis

Usage

```
aoristic.spdf(data, DateTimeFrom, DateTimeTo, lon, lat)
```

Arguments

`data`	data.frame with a minimum of 4 columns representing FromDateTime, ToDateTime, lon, lat
`DateTimeFrom`	a character vector of the column name for FromDateTime (POSIXct date-time object)
`DateTimeTo`	a character vector of the column name for ToDateTime (POSIXct date-time object). If ending date-time is missing, the duration of an event will be coded as 1 hour.
`lon`	a character vector longitude
`lat`	a character vector of the column name for latitude

Value

spatial point data frame (SPDF)

References

Ratcliffe, J. H. (2002). Aoristic Signatures and the Spatio-Temporal Analysis of High Volume Crime Patterns. Journal of Quantitative Criminology, 18(1), 23-43.

Examples

```
data(aoristic)
data.spdf <- aoristic.spdf(data=arlington,
   DateTimeFrom="DateTimeFrom", DateTimeTo="DateTimeTo",
   lon="lon", lat="lat")
```

arlington *arlington burglary incident data (data frame)*

Description

A data frame of burglary incidents in the Arlington PD with four fields (DateTimeFrom, DateTimeTo, lon/lat).

Usage

```
data(aoristic)
```

Author(s)

George Kikuchi, 2013-09-13

Source

Arlington PD

CouncilDistrict *Council district (spatial polygon data frame)*

Description

A spatial polygon data frame of council districts in the Arlington PD jurisdiction.

Usage

```
data(aoristic)
```

Author(s)

George Kikuchi, 2013-09-13

Source

City of Arlington

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