Package ‘anipaths’

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Type Package
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License GPL-3
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animate_paths

Description

Animates telemetry data for the purposes of EDA using smoothing splines to interpolate the observed locations. The animations are particularly useful when examining multiple simultaneous trajectories. The output of the call to animate_paths() should bring up a browser window that shows the animation. Additionally, the images generated in images/ (or else the value set for imgdir) may be used with ffmpeg, latex, or other presentation software that can build animations directly from a sequence of images.

Usage

animate_paths(
  paths,
  times = NULL,
  delta.t = NULL,
  n.frames = NULL,
  interval = 1/12,
  paths.proj = "+proj=longlat",
  coord = c("x", "y"),
  Time.name = "time",
  ID.name = NULL,
  whole.path = FALSE,
  covariate = NULL,
  covariate.colors = c("black", "white"),
  covariate.thresh = NULL,
  covariate.legend.loc = "bottomright",
  par.opts = list(),
  dev.opts = list(),
  background = NULL,
  bg.axes = TRUE,
  bg.opts = NULL,
  bg.misc = NULL,
  method = "html",
  pt.cex = 1,
  pt.colors = NULL,
  dimmed = NULL,
  res = 1.5,
  plot.date = TRUE,
  date.col = "black",
  legend.loc = "topright",
  network = NULL,
  network.times = NULL,
  network.thresh = 0.5,
Arguments

paths     Either a data.frame with longitudes/eastings, latitudes/northings, IDs, and times (see coord, ID.name, and Time.name), a SpatialPointsDataFrame with IDs and times, or a list of data.frames containing the longitudes, latitudes, and times for each individual (with names provided). If all paths are already synchronous, another option for passing the data is to define paths as a list of matrices, all with the same number of rows, and to specify the times separately via the next argument. This situation might arise when, for example, locations the user wishes to animated correspond to realizations/sampler from a discrete-time movement model. Covariates may be provided as named columns of the matrices in paths.

times    If all paths are already synchronous, another option for passing the data is to define paths as a list of matrices, all with the same number of rows, and to specify the times separately via this argument.

delta.t    The gap in time between each frame in the animation. Specify one of delta.t or n.frames. If both are specified, delta.t is used.

n.frames    The number of frames used to animate the complete time domain of the data.

interval    Seconds per frame in animation. Default is 1/12 (or 12 frames per second).

paths.proj    PROJ.4 string corresponding to the projection of the data. Default is "+proj=longlat".

coord    A character vector of length 2 giving the names of the longitude/easting and latitude/northing columns in the paths data.frame (in that order). This is required if paths is not a SpatialPointsDataFrame.

Time.name    The name of the columns in paths giving the observation times. This column must be of class POSIXt, or numeric.

ID.name    The name of the column in paths that identifies each individual. If left as NULL (default), a single individual is assumed.
animate_paths

whole.path logical. If TRUE (default = FALSE), the complete interpolated trajectories will be plotted in the background of the animation. If whole.path = TRUE, consider also setting tail.length = 0.

covariate The name of the column in paths that identifies the covariate to be mapped to a ring of color around each point.

covariate.colors vector of colors which will be used in their given order to make a color ramp (see colorRamp())

covariate.thresh if changed from its default value of NULL, the interpolated value of the covariate will be binarized based on this numeric value.

covariate.legend.loc either the location of the covariate legend, or NA if no legend is desired

par.opts Options passed to par() before creating each frame.

dev.opts Options passed to png() before creating each frame.

background Three possibilities: (1) A single background image over which animation will be overlayed, or a list/stack of images/rasters corresponding to each frame. (2) A list with values center (long/lat), zoom, and maptype (see ggrep::get_googlemap()) which will be used to generate a background for the animation based on Google maps tiles. Additional arguments may be added which will be passed to ggrep::get_googlemap(). (3) A logical value of TRUE, which will cue the function to get the best Google Map tile combination it can come up with. Note: ggmap must be installed for (2) and (3). Note: if you are calling animate_paths() several times in a short period of time you may get an error from Google for trying to pull tiles too often (e.g., Error in download.file(url,destfile = tmp,quiet = !messaging,mode = "wb") : cannot open URL 'http://maps.googleapis...'). Waiting a minute or so usually solves this.

bg.axes logical: should animation place axis labels when using a background image (default is TRUE). If RGoogleMaps is used to produce background, labels will be "northing" and "easting". Otherwise, the strings given to coord will be used.

bg.opts Options passed to plot() function call that makes background in each frame. For example, this could be used to specify blue ocean and gray landcover if background is a SpatialPolygonsDataFrame and bg.opts = list(bg = "dodgerblue4",col = "gray",border = "gray").

bg.misc Character string which will be executed as R code after generating the background, and before adding trajectories, etc.

method either "html" (default) or "mp4". The latter requires the user has installed ffmpeg (see animation::saveVideo()).

pt.cex A numeric value giving the character expansion (size) of the points for each individual. Default is 1.

pt.colors A vector of colors to be used for each individual in the animation. Default values come from Color Brewer palettes. When a network is provided, this is ignored and individuals are all colored black. If NA, no plot colors are chosen to distinguish individuals. This can be useful when making animations involving a covariate. Consider also setting legend.loc to NA in this case.
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>dimmed</code></td>
<td>Numeric vector of individuals to &quot;dim&quot; in the animation. Order corresponds to the order of the ID.name variable, or order of paths list.</td>
</tr>
<tr>
<td><code>res</code></td>
<td>Resolution of images in animation. Increase this for higher quality (and larger) images.</td>
</tr>
<tr>
<td><code>plot.date</code></td>
<td>Logical variable toggling date text at the time center of the animation.</td>
</tr>
<tr>
<td><code>date.col</code></td>
<td>Passed to first argument of legend() function. Default is &quot;topright&quot;. NA removes legend.</td>
</tr>
<tr>
<td><code>legend.loc</code></td>
<td>Passed to first argument of legend() function. Default is &quot;topright&quot;. NA removes legend.</td>
</tr>
<tr>
<td><code>network</code></td>
<td>Array of dimensions (# individuals, # individuals, n.frames) that gives a dynamic network structure among the individuals.</td>
</tr>
<tr>
<td><code>network.times</code></td>
<td>Numeric vector. If network time grid doesn’t match n.frames, supply the times at which the network has been evaluated so it can be interpolated using smoothing splines.</td>
</tr>
<tr>
<td><code>network.thresh</code></td>
<td>Network structure is summarized in the animation in a binary way, regardless of whether or not the network is continuously weighted or not. The value of network.thresh determines the level below which no connection is shown, and above which an active connection is shown via colored rings and connecting segments.</td>
</tr>
<tr>
<td><code>network.colors</code></td>
<td>A symmetric matrix of dimension length(paths) × length(paths) giving the colors associated with each pairwise relationship.</td>
</tr>
<tr>
<td><code>network.ring.wt</code></td>
<td>Thickness of network rings (default is 3)</td>
</tr>
<tr>
<td><code>network.ring.trans</code></td>
<td>Transparency of network segments (default is 1)</td>
</tr>
<tr>
<td><code>network.segment.wt</code></td>
<td>Thickness of network segments (default is 3)</td>
</tr>
<tr>
<td><code>network.segment.trans</code></td>
<td>Transparency of network segments (default is 0.5)</td>
</tr>
<tr>
<td><code>tail.wd</code></td>
<td>Thickness of tail trailing behind each individual. Default is 1.</td>
</tr>
<tr>
<td><code>tail.length</code></td>
<td>Length of the tail trailing each individual.</td>
</tr>
<tr>
<td><code>tail.colors</code></td>
<td>Default is &quot;gray87&quot;. Can be single color or vector of colors.</td>
</tr>
<tr>
<td><code>xlim</code></td>
<td>Boundaries for plotting. If left undefined, the range of the data will be used.</td>
</tr>
<tr>
<td><code>ylim</code></td>
<td>Boundaries for plotting. If left undefined, the range of the data will be used.</td>
</tr>
<tr>
<td><code>main</code></td>
<td>Title for each frame. SOON: support for changing titles to allow for, say, dates.</td>
</tr>
<tr>
<td><code>bs</code></td>
<td>Default is &quot;tp&quot; (thin plate splines), but this can be any spline basis supported by s() in the mgcv package.</td>
</tr>
<tr>
<td><code>max.knots</code></td>
<td>Maximum number of allowed knots. This actual number of knots used in the fitting will be min(max.knots, #observations_i).</td>
</tr>
<tr>
<td><code>uncertainty.level</code></td>
<td>Value in (0, 1) corresponding to level at which to draw uncertainty ellipses. NA (default) results in no ellipses.</td>
</tr>
<tr>
<td><code>override</code></td>
<td>Logical variable toggling where or not to override warnings about how long the animation procedure will take.</td>
</tr>
</tbody>
</table>
get.network.colors

get.network.colors() Finds all maximal cliques in the network at each time point and tries to assign them a useful coloring.

Description

get.network.colors() Finds all maximal cliques in the network at each time point and tries to assign them a useful coloring.

Usage

get.network.colors(binary.network, network.color.options = NULL)
Arguments

binary.network  a 3D array giving the time-varying adjacency matrix of a dynamic network.
network.color.options
    vector of colors

Value

a list of two elements: a list of the maximal cliques at each time, and a list with colors for each clique at each time

plot.paths_animation  Plot animation path interpolation

Description

This is mainly intended as a way to check that the interpolations used in the animation are working as expected.

Usage

## S3 method for class 'paths_animation'
plot(x, ..., i = 1, level = 0.05, ylim_x = NULL, ylim_y = NULL)

Arguments

x  paths_animation object as created through a call to animate_paths().
...  additional arguments passed to plot.
i  index of individual to plot (corresponds to index in unique(paths[, 'ID.name'])).
level  confidence level for error bands. NA removes bands.
ylim_x  y-axis limits for marginal plots (x, easting, etc.)
ylim_y  y-axis limits for marginal plots (y, northing, etc.)

Examples

vultures$POSIX <- as.POSIXct(vultures$timestamp, tz = "UTC")
vultures_paths <- vultures [vultures$POSIX > as.POSIXct("2009-03-22", origin = "1970-01-01") 
    & vultures$POSIX < as.POSIXct("2009-04-05", origin = "1970-01-01")].
interpolated_paths <- animate_paths(paths = vultures_paths,
    delta.t = 3600*6,
    coord = c("location.long", "location.lat"),
    Time.name = "POSIX",
    ID.name = "individual.local.identifier",
    max.knots = 13,
    return.paths = TRUE)
interpolated_paths_gp <-
vultures

**Description**

A dataset containing a subset of the locations of turkey vultures (2003–2006), with time stamps, from:

**Usage**

vultures

**Format**

A data frame with 215719 rows and 11 variables:

- **timestamp** time of observation
- **location.long** longitude
- **location.lat** latitude
- **individual.local.identifier** identifier for each individual ...

**Details**


Bildstein K, Barber D, Bechard MJ (2014) Data from: Environmental drivers of variability in the movement ecology of turkey vultures (Cathartes aura) in North and South America. Movebank Data Repository. doi:10.5441/001/1.46ft1k05

**Source**

https://www.datarepository.movebank.org/handle/10255/move.362/ Bildstein K, Barber D, Bechard MJ (2014) Data from: Environmental drivers of variability in the movement ecology of turkey vultures (Cathartes aura) in North and South America. Movebank Data Repository. doi:10.5441/001/1.46ft1k05
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