Package 'DrivePlotR'

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Title Linked Plot Maps for Multivariate High-Resolution Spatio-Temporal Data

Version 0.1.0

Description Create interactive, linked plot maps for multivariate high-resolution spatio-temporal data, such as vehicle trajectories. You can explore the spatial, temporal, and multivariate aspects of the data simultaneously.

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Encoding UTF-8

RoxygenNote 7.3.3

Imports leaflet, plotly (>= 4.10.4), crosstalk, dplyr, ggplot2 (>= 3.5.2), htmltools, rlang (>= 1.1.6), viridisLite

Depends R (>= 4.1)

LazyData true

URL https://hardtme.github.io/DrivePlotR/, https://github.com/hardtme/DrivePlotR

Suggests testthat (>= 3.0.0), sf

Config/testthat/edition 3

BugReports https://github.com/hardtme/DrivePlotR/issues

NeedsCompilation no

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Contents

drive7 2
driveplot 4
driveplot_companion 6
driveplot_companions 7
driveplot_map 9
leaflet_color_palettes 10
nds_data 11

Index **13**

`drive7` *Blackbox-Driving Data for one drive*

Description

This dataset contains drive 7 from the dataset nds_data.

Usage

```
drive7
```

Format

A tibble with 321 rows and 34 columns

drive integer, identifier for a drive; a drive is defined as the time between starting the car and turning it off again.

time_utc POSIXct time stamp for each observation in UTC

time_cst POSIXct time stamp for each observation in Central time

GPS-based measurements for each observation:

gps_elevation numeric, elevation above sea-level (in m)

gps_heading numeric, continuity-corrected direction of the car (in degrees with north at 0 degrees and increasing clockwise) as measured by GPS. The continuity correction takes the initial GPS heading and adds the cumulative sum of the changes in GPS heading for the subsequent observations.

gps_fix numeric, value specifying the adequacy of the GPS fix, where 0 = no fix, 1 = time only, 2 = 2D fix, 3 = 3D fix. A gps_fix of 3 is needed for good GPS data.

gps_sats integer, the number of satellites covering a position.

gps_pdop numeric, position dilution of precision, an overall GPS data quality measure (lower is better)

gps_hdop numeric, horizontal dilution of precision, a GPS quality measure for latitude/longitude data (lower is better)

gps_vdop numeric, vertical dilution of precision, a GPS quality measure for elevation data (lower is better)

speed_mph numeric, speed of the vehicle (in miles per hour)

speed_source character, the source of the reported speed, either "gps" or "obd"

distance_miles numeric, distance traveled during a drive (in miles)

Measurements by the on-board gyroscope:

accel_x numeric, measure of vehicle acceleration along the front-back (longitudinal) axis (in g)

accel_y numeric, measure of vehicle acceleration along the right-left (lateral) axis (in g)

accel_z numeric, measure of acceleration of the vehicle in the up-down plane (normal/yaw axis) (in g)

accel_event numeric, sequential (over time) variable marking when consecutive acceleration values (absolute value of accel_x/y) exceed a threshold of 0.35g for a minimum of 1 second

accel_event_cat character, severity categorization of acceleration event into low (0.35-0.44g), medium (0.45-0.59g), and high (>0.6g)

gyro_x numeric, angular rotation rate about the right-to-left axis (in degrees/sec)

gyro_y numeric, angular rotation rate about the forward-to-backward axis (in degrees/sec)

gyro_z numeric, angular rotation rate about the up-to-down axis (in degrees/sec)

gyro_heading numeric, calculated heading utilizing compass data and gyro data (in degrees with north at 0 degrees and increasing clockwise). Note that we use non-standard congruence classes for continuity of consecutive values. Due to errors in the raw gyro heading, we use the initial GPS heading value as the initial heading value and then subtract the cumulative sum of gyro_z for the subsequent observations to calculate gyro_heading.

grav_x numeric, lateral gravity (in g)

grav_y numeric, longitudinal gravity (in g)

grav_z numeric, gravity (up-down) (in g)

roll numeric, angle about the forward-to-backward axis. 0 = level, positive = tilted to the left (in degrees)

pitch numeric, angle about the left-to-right axis where 0 = level, positive = tilted downward (i.e., vehicle going downhill) (in degrees)

engine_rpm numeric, current engine revolutions per minute value

engine_throttle numeric, engine throttle as a percentage (0-100%)

cumulative_drive_dist_mi numeric, the cumulative distance driven in miles at each observation

gps_minute factor, the minute component of the timestamp for each observation (00 to 59)

Raw heading measurements:

gps_heading_raw numeric, raw GPS heading without continuity correction (in degrees)

gyro_heading_raw numeric, raw gyro heading without continuity correction (in degrees)

GPS coordinates in a simple features column:

geometry list-column, simple features geometry column with geometry type POINT and CRS WGS84

`driveplot` *Create a vehicle trajectory plot map*

Description

Create a vehicle trajectory plot map

Usage

```
driveplot(
  shareddata,
  lng = NULL,
  lat = NULL,
  x,
  ys,
  colorvar = NULL,
  maplabel = NA,
  colorpalette = NULL,
  fillopacity = 1,
  xlabel = NULL,
  ylabels = NULL,
  showlegend = TRUE,
  legendtitle = NULL,
  plottitle = NULL,
  spacing = 0.05,
  width = "100%",
  height = "100vh"
)
```

Arguments

`shareddata`	A SharedData object containing observations to be plotted.
`lng`	The bare (unquoted) column of shareddata containing longitude (only required if shareddata does not have a geometry column).
`lat`	The bare (unquoted) column of shareddata containing latitude (only required if shareddata does not have a geometry column)
`x`	The bare (unquoted) column from shareddata to be plotted on the horizontal axis.
`ys`	A vector or list of bare (unquoted) columns from shareddata to be plotted on the vertical axes of the companion graphs.
`colorvar`	The bare (unquoted) column in shareddata to which color should be mapped.
`maplabel`	An optional label for the map points.
`colorpalette`	The color palette for the plot; either a single color (e.g., "red") or one of the viridis color palettes compatible with leaflet. Run `leaflet_color_palettes()` to see the available options for viridis color palettes. If `colorvar` and `colorpalette`

	are both not provided, `colorpalette` defaults to blue. If `colorvar` is provided but `colorpalette` is not, `colorpalette` defaults to the color palette "viridis".
`fillopacity`	The opacity of the fill of the map points (0 to 1).
`xlabel`	The label for the variable on the horizontal axis.
`ylabels`	A vector or list of labels for the vertical axes of the companion graphs. If provided, it should be the same length as ys.
`showlegend`	Show the plot legend (TRUE) or not (FALSE).
`legendtitle`	The title for the plot legend.
`plottitle`	The title for the plot map.
`spacing`	A value between 0 and 1 for the space between the companion graphs.
`width`	The width of the plot map, provided as a string with one of the following units: %, vh, vw, or px (e.g., "100%" or "400px")
`height`	The height of the plot map, provided as a string with one of the following units: %, vh, vw, or px (e.g., "100%" or "400px")

Value

A linked plot map.

Examples

```
## Only run examples in interactive R sessions
if (interactive()) {
library(crosstalk)
data(drive7)
shared_drive <- SharedData$new(drive7)

driveplot(
  shareddata = shared_drive,
  x = time_cst,
  ys = c(speed_mph, gyro_heading, gps_heading),
  colorvar = gyro_heading,
  maplabel = time_cst,
  colorpalette = "viridis",
  fillopacity = 1,
  xlabel = "Time",
  ylabels = c(
    "Speed (mph)", "Gyro Heading (degrees)",
    "GPS Heading (degrees)"
  ),
  showlegend = TRUE,
  legendtitle = "Gyro Heading",
  plottitle = "A drive with points colored by gyro heading",
  height = "500px"
)
}
```

`driveplot_companion` *Make a single plotly scatter plot from shared drive data*

Description

Make a single plotly scatter plot from shared drive data

Usage

```
driveplot_companion(
  shareddata,
  x,
  y,
  colorvar = NULL,
  colorpalette = NULL,
  xlabel = NULL,
  ylabel = NULL,
  showlegend = TRUE,
  legendtitle = NULL
)
```

Arguments

`shareddata`	A SharedData object containing observations to be plotted.
`x`	The bare (unquoted) column from shareddata to be plotted on the horizontal axis.
`y`	The bare (unquoted) column from shareddata to be plotted on the vertical axis.
`colorvar`	The bare (unquoted) column in shareddata to which color should be mapped.
`colorpalette`	The color palette for the plot; either a single color (e.g., "red") or one of the viridis color palettes compatible with leaflet. Run `leaflet_color_palettes()` to see the available options for viridis color palettes. If `colorvar` and `colorpalette` are both not provided, `colorpalette` defaults to blue. If `colorvar` is provided but `colorpalette` is not, `colorpalette` defaults to the color palette "viridis".
`xlabel`	The label for the variable on the horizontal axis.
`ylabel`	The label for the variable on the vertical axis.
`showlegend`	Show the plot legend (TRUE) or not (FALSE).
`legendtitle`	The title for the plot legend.

Value

A plotly scatterplot.

Examples

```
library(crosstalk)
data(drive7)
shared_drive <- SharedData$new(drive7)

# Time series of speed
driveplot_companion(
  shareddata = shared_drive,
  x = time_cst,
  y = speed_mph
)

# Color points by direction of car
driveplot_companion(
  shareddata = shared_drive,
  x = time_cst,
  y = speed_mph,
  colorvar = gyro_heading,
  colorpalette = "viridis",
  xlabel = "Time",
  ylabel = "Speed (MPH)",
  showlegend = TRUE,
  legendtitle = "Gyro Heading"
)
```

---

driveplot_companions *Make a stack of companion graphs from shared drive data*

Description

Make a stack of companion graphs from shared drive data

Usage

```
driveplot_companions(
  shareddata,
  x,
  ys,
  colorvar = NULL,
  xlabel = NULL,
  ylabels = NULL,
  colorpalette = NULL,
  showlegend = TRUE,
  legendtitle = NULL,
  spacing = 0.05,
  plotheight = "100vh"
)
```

Arguments

shareddata	A SharedData object containing observations to be plotted.
x	The bare (unquoted) column from shareddata to be plotted on the horizontal axis.
ys	A vector or list of bare (unquoted) columns from shareddata to be plotted on the vertical axes of the companion graphs.
colorvar	The bare (unquoted) column in shareddata to which color should be mapped.
xlabel	The label for the variable on the horizontal axis.
ylabels	A vector or list of labels for the vertical axes of the companion graphs. If provided, it should be the same length as ys.
colorpalette	The color palette for the plot; either a single color (e.g., "red") or one of the viridis color palettes compatible with leaflet. Run `leaflet_color_palettes()` to see the available options for viridis color palettes. If `colorvar` and `colorpalette` are both not provided, `colorpalette` defaults to blue. If `colorvar` is provided but `colorpalette` is not, `colorpalette` defaults to the color palette "viridis".
showlegend	Show the plot legend (TRUE) or not (FALSE).
legendtitle	The title for the plot legend.
spacing	A value between 0 and 1 for the space between the companion graphs.
plotheight	The height of the stack of companion graphs, e.g., "100vh" or "400px".

Value

A stack of plotly scatterplots.

Examples

```
library(crosstalk)
data(drive7)
shared_drive <- SharedData$new(drive7)

# Linked time series of speed, headings (in GPS and gyro), and GPS quality
driveplot_companions(
  shareddata = shared_drive,
  x = time_cst,
  ys = c(speed_mph, gyro_heading, gps_heading),
  colorvar = gps_pdop,
  xlabel = "Time",
  ylabels = c(
    "Speed (mph)", "Gyro Heading (degrees)",
    "GPS Heading (degrees)"
  ),
  colorpalette = "viridis",
  legendtitle = "GPS PDOP"
)
```

`driveplot_map` *Create a standalone map*

Description

Create a standalone map

Usage

```
driveplot_map(
  shareddata,
  lng = NULL,
  lat = NULL,
  colorvar = NULL,
  label = NA,
  colorpalette = NULL,
  fillopacity = 1,
  mapheight = "100vh"
)
```

Arguments

`shareddata`	A SharedData object containing observations to be plotted.
`lng`	The bare (unquoted) column of shareddata containing longitude (only required if shareddata does not have a geometry column).
`lat`	The bare (unquoted) column of shareddata containing latitude (only required if shareddata does not have a geometry column).
`colorvar`	The bare (unquoted) column in shareddata to which color should be mapped.
`label`	An optional label for the map points.
`colorpalette`	The color palette for the plot; either a single color (e.g., "red") or one of the viridis color palettes compatible with leaflet. Run `leaflet_color_palettes()` to see the available options for viridis color palettes. If `colorvar` and `colorpalette` are both not provided, `colorpalette` defaults to blue. If `colorvar` is provided but `colorpalette` is not, `colorpalette` defaults to the color palette "viridis".
`fillopacity`	The opacity of the fill of the map points (0 to 1).
`mapheight`	The height of the map, e.g, "100vh" or 400px".

Value

A leaflet map.

Examples

```
library(crosstalk)
data(drive7)
shared_drive <- SharedData$new(drive7)

# Basic map of one drive
driveplot_map(shareddata = shared_drive)

# Color drive points by direction of car
driveplot_map(
  shareddata = shared_drive,
  colorvar = gyro_heading,
  label = gyro_heading,
  colorpalette = "viridis"
)
```

---

leaflet_color_palettes

Vector of viridis color palettes supported by Leaflet

Description

Helper function

Usage

```
leaflet_color_palettes()
```

Details

In a DrivePlotR plot map, the map uses the same color palette as the companion graphs.

Value

Vector of viridis color palettes supported by Leaflet.

Examples

```
leaflet_color_palettes()
```

`nds_data` *Blackbox-Driving Data for a number of drives*

Description

This dataset contains 28 drives ranging in length from just over 2 hours to just 45 secs.

Usage

```
nds_data
```

Format

A tibble with 23187 rows and 35 columns

drive integer, identifier for a drive; a drive is defined as the time between starting the car and turning it off again.

time_utc POSIXct time stamp for each observation in UTC

time_cst POSIXct time stamp for each observation in Central time

GPS-based measurements for each observation:

gps_long numeric, geographic longitude in degrees with CRS WGS84

gps_lat numeric, geographic latitude in degrees with CRS WGS84

gps_elevation numeric, elevation above sea-level (in m)

gps_heading numeric, continuity-corrected direction of the car (in degrees with north at 0 degrees and increasing clockwise) as measured by GPS. The continuity correction takes the initial GPS heading and adds the cumulative sum of the changes in GPS heading for the subsequent observations.

gps_fix numeric, value specifying the adequacy of the GPS fix, where 0 = no fix, 1 = time only, 2 = 2D fix, 3 = 3D fix. A gps_fix of 3 is needed for good GPS data.

gps_sats integer, the number of satellites covering a position.

gps_pdop numeric, position dilution of precision, an overall GPS data quality measure (lower is better)

gps_hdop numeric, horizontal dilution of precision, a GPS quality measure for latitude/longitude data (lower is better)

gps_vdop numeric, vertical dilution of precision, a GPS quality measure for elevation data (lower is better)

speed_mph numeric, speed of the vehicle (in miles per hour)

speed_source character, the source of the reported speed, either "gps" or "obd"

distance_miles numeric, distance traveled during a drive (in miles)

Measurements by the on-board gyroscope:

accel_x numeric, measure of vehicle acceleration along the front-back (longitudinal) axis (in g)

accel_y numeric, measure of vehicle acceleration along the right-left (lateral) axis (in g)

accel_z numeric, measure of acceleration of the vehicle in the up-down plane (normal/yaw axis) (in g)

accel_event numeric, sequential (over time) variable marking when consecutive acceleration values (absolute value of accel_x/y) exceed a threshold of 0.35g for a minimum of 1 second

accel_event_cat character, severity categorization of acceleration event into low (0.35-0.44g), medium (0.45-0.59g), and high (>0.6g)

gyro_x numeric, angular rotation rate about the right-to-left axis (in degrees/sec)

gyro_y numeric, angular rotation rate about the forward-to-backward axis (in degrees/sec)

gyro_z numeric, angular rotation rate about the up-to-down axis (in degrees/sec)

gyro_heading numeric, calculated heading utilizing compass data and gyro data (in degrees with north at 0 degrees and increasing clockwise). Note that we use non-standard congruence classes for continuity of consecutive values. Due to errors in the raw gyro heading, we use the initial GPS heading value as the initial heading value and then subtract the cumulative sum of gyro_z for the subsequent observations to calculate gyro_heading.

grav_x numeric, lateral gravity (in g)

grav_y numeric, longitudinal gravity (in g)

grav_z numeric, gravity (up-down) (in g)

roll numeric, angle about the forward-to-backward axis. 0 = level, positive = tilted to the left (in degrees)

pitch numeric, angle about the left-to-right axis where 0 = level, positive = tilted downward (i.e., vehicle going downhill) (in degrees)

engine_rpm numeric, current engine revolutions per minute value

engine_throttle numeric, engine throttle as a percentage (0-100%)

cumulative_drive_dist_mi numeric, the cumulative distance driven in miles at each observation

gps_minute factor, the minute component of the timestamp for each observation (00 to 59)

Raw heading measurements:

gps_heading_raw numeric, raw GPS heading without continuity correction (in degrees)

gyro_heading_raw numeric, raw gyro heading without continuity correction (in degrees)

Index

∗ **datasets**
drive7, 2
nds_data, 11

drive7, 2
driveplot, 4
driveplot_companion, 6
driveplot_companions, 7
driveplot_map, 9

leaflet_color_palettes, 10

nds_data, 11