Package 'peRiodiCS'

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Type Package

Title Functions for Generating Periodic Curves

Version 0.5.0

Date 2018-07-02

Description Functions for generating variants of curves:
restricted cubic spline, periodic restricted cubic spline,
periodic cubic spline. Periodic splines can be used to model data
that has periodic nature / seasonality.

License GPL-3

BugReports https://github.com/crtahlin/peRiodiCS/issues

Depends R (>= 2.10)

Imports graphics, Hmisc, rms

Suggests testthat

LazyData true

RoxygenNote 6.0.1

NeedsCompilation no

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Contents

b_rcs *Basis for restricted cubic splines*

Description

Function that derives the restricted cubic splines for a value/vector of values, given the knots; obtains exactly the same results as the rcs function included in the rms package.

Usage

```
b_rcs(x, knots, inclx = FALSE)
```

Arguments

x	numerical vector
knots	vector specifying the knot locations
inclx	logical, if TRUE returns also the x vector

b_rcs_prime *Derive first derivatives of RCS*

Description

function that derives the first derivative of the restricted cubic splines for a value/vector of values, given the knots

Usage

```
b_rcs_prime(x, knots)
```

Arguments

x	vector of values
knots	vector of knot locations

cs_per *Generate design matrix for periodic cubic splines*

Description

Generate design matrix for periodic cubic splines.

Usage

```
cs_per(x, knots = NULL, nk = 5, xmax = max(x, na.rm = TRUE),
  xmin = min(x, na.rm = TRUE))
```

Arguments

x	numerical x values to transform to new basis
knots	vector with locations of the knots of the spline
nk	number of knots, used only if the knots are not specified, overridden otherwise
xmax	value of the (theoretical) minimum of x
xmin	value of the (theoretical) maximum of x

Examples

```
# load example data; see help("viral_east_mediteranean")
data("viral_east_mediteranean")

# calculate location of knots to use
Knots <-
 Hmisc::rcspline.eval(x = viral_east_mediteranean$EpiWeek,
                      nk = 5, knots.only = TRUE)

# model viral infections vs weeks
model <- glm(RSV ~ cs_per(EpiWeek, knots = Knots), data = viral_east_mediteranean)

# plot model (with many points, to make it smooth)
plot_per_mod(Model = model, XvarName = "EpiWeek", Smooth = TRUE)
```

plot_per_mod *Plotting function for periodic curves model*

Description

Plots graph of periodic curves with confidence intervals. Data should be included in the model.

Usage

```
plot_per_mod(Model, XvarName, Ylab = "Response", Xlab = "Covariate",
  Ylim = NULL, Xlim = NULL, Xmin = NULL, Xmax = NULL, Knots = NULL,
  Title = NULL, Vlines = NULL, Hlines = NULL, Cex.lab = NULL,
  Cex.main = NULL, Cex.axis = NULL, Axes = TRUE, Add = FALSE,
  Col = "black", PlotCI = TRUE, Smooth = FALSE, xLocation = 2)
```

Arguments

Model	The built model
XvarName	Name of the x variable in the dataset (column name)
Ylab	Label on vertical (y) axis
Xlab	Label on horizontal (x) axis
Ylim	Limits of y axis
Xlim	Limits of x axis
Xmin	The min X of data to be predicted (if Smooth)
Xmax	The max X of data to be predicted (if Smooth)
Knots	Locations of knots of the splines
Title	Title of the plot
Vlines	Where to plot vertical lines
Hlines	Where to plot horizontal lines
Cex.lab	Character expansion (aka "size of font") for the labels
Cex.main	Character expansion for main text
Cex.axis	Character expansion for the axis text
Axes	Plot axes
Add	Add to existing plot
Col	Color of the plotted lines
PlotCI	Plot confidence intervals
Smooth	Make the Xaxis values equidistant (and the curve smoother)
xLocation	If smooth FALSE, the location of the x term in model$x[, xLocation]

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rcs_per *Generate design matrix for periodic restricted cubic spline*

Description

Generate design matrix for periodic restricted cubic spline.

Usage

```
rcs_per(x, knots = NULL, nk = 5, xmin = min(x, na.rm = TRUE),
  xmax = max(x, na.rm = TRUE))
```

Arguments

x	numerical x values to transform to new basis
knots	vector with locations of the knots of the spline
nk	number of knots, used only if the knots are not specified, overridden otherwise
xmin	value of the (theoretical) minimum of x
xmax	value of the (theoretical) maximum of x
	#' @examples # load example data; see help("viral_east_mediteranean") data("viral_east_mediteranean")
	# calculate location of knots to use Knots <- Hmisc::rcspline.eval(x = viral_east_mediteranean$EpiWeek, nk = 5, knots.only = TRUE)
	# model viral infections vs weeks model <- glm(RSV ~ rcs_per(EpiWeek, knots = Knots), data = viral_east_mediteranean)
	# plot model (with many points, to make it smooth) plot_per_mod(Model = model, XvarName = "EpiWeek", Smooth = TRUE)

---

viral_east_mediteranean

Viral etiology, seasonality and severity of hospitalized patients with severe acute respiratory infections in the Eastern Mediterranean Region, 2007-2014

Description

Data about infections with different viruses across several years.

For more information see Source and References section.

Usage

```
viral_east_mediteranean
```

Format

A data frame with variables:

UniqueID record identification number

Enrolled Did the patient consent and enroll in the study?: 1=Yes, 0=No

Country Country of enrollment: Egypt, Jordan, Oman, Qatar, Yemen

EpiYear Year of enrollment: Integers (2007-2014)

EpiMonth Month of enrollment: Integers (1-12)

EpiWeek Week of enrollment: Integers (1-53)

Interval Number of days between onset of symptoms and hospitalization: Integer

Stay Number of days between hospitalization and outcome: Integer

Sex Sex: 1=Female, 0=Male

AgeGrp Age group: 1=<1 year, 2=1-4 years, 3=5-49 years, 4=50+ years

ChronicDis Does the patient have any pre-existing chronic disease?: 1=Yes, 0=No

OxTherapy Did the patient receive oxygen therapy during hospitalization?: 1=Yes, 0=No

Ventilated Was the patient ventilated during hospitalization?: 1=Yes, 0=No

ICU Was the patient admitted to an intensive care unit during hospitalization?: 1=Yes, 0=No

Outcome What was the patient"'"s final hospitalization outcome?: 1=Discharge, 2=Transfer, 3=Death

RSV Results for respiratory syncytial virus: 1=Positive, 0=Negative

AdV Results for adenovirus: 1=Positive, 0=Negative

hMPV Results for human metapneumovirus: 1=Positive, 0=Negative

hPIV1 Results for human parainfluenzavirus type 1: 1=Positive, 0=Negative

hPIV2 Results for human parainfluenzavirus type 2: 1=Positive, 0=Negative

hPIV3 Results for human parainfluenzavirus type 3: 1=Positive, 0=Negative

Flu Results for influenza: 1=Positive, 0=Negative

Source

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0180954

References

Horton, Katherine C. AND Dueger, Erica L. AND Kandeel, Amr AND Abdallat, Mohamed AND El-Kholy, Amani AND Al-Awaidy, Salah AND Kohlani, Abdul Hakim AND Amer, Hanaa AND El-Khal, Abel Latif AND Said, Mayar AND House, Brent AND Pimentel, Guillermo AND Talaat, Maha (2017). Viral etiology, seasonality and severity of hospitalized patients with severe acute respiratory infections in the Eastern Mediterranean Region, 2007-2014. PLOS ONE, 12, 1-17.

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