Package 'pbs'

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Type Package

Imports graphics, stats, splines

Title Periodic B Splines

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Description Periodic B Splines Basis

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Contents

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pbs *Periodic B-Spline Basis for Polynomial Splines*

Description

Generate the periodic B-spline basis matrix for a polynomial spline.

Usage

```
pbs(x, df = NULL, knots = NULL, degree = 3, intercept = FALSE,
Boundary.knots = range(x), periodic = TRUE)
```

Arguments

x	the predictor variable. Missing values are allowed.
df	degrees of freedom; one can specify 'df' rather than 'knots'; 'pbs()' then chooses 'df - 1' knots at suitable quantiles of 'x' (which will ignore missing values).
knots	the _internal_ breakpoints that define the spline. The number of internal knots must be greater than or equal to degree polynomial regression. See also 'Boundary.knots'.
degree	degree of the piecewise polynomial-default is 3 for cubic splines.
intercept	if 'TRUE', an intercept is included in the basis; default is 'FALSE'.
Boundary.knots	boundary points at which to set the period of the perodic B-spline basis(default the range of the data). If both 'knots' and 'Boundary.knots' are supplied, the basis parameters do not depend on 'x'. Data CAN NOT be extended beyond 'Boundary.knots'. Typical Bourday knots are start and end values of period.
periodic	if "TRUE", periodic basis is generated. Default is TRUE. This is disabled. DO NOT USE.

Value

A matrix of dimension 'length(x) * (df)', where either 'df' was supplied or if 'knots' were supplied, 'df = length(knots) + intercept'. Attributes are returned that correspond to the arguments to 'pbs', and explicitly give the 'knots', 'Boundary.knots' etc for use by 'predict.pbs()'.

'pbs()' is based on the function 'spline.des()' in package splines. It generates a basis matrix for representing the family of piecewise polynomials with the specified interior knots and degree, evaluated at the values of 'x'. A primary use is in modeling formulas to directly specify a piecewise polynomial term in a model.

References

Package splines in Base R. pbs is actually modified from bs function

See Also

'bs', 'ns', 'predict.pbs'

Examples

```
require(stats); require(graphics); require(splines)
x = seq(1,628)/100
z = rep(seq(1, 314)/100, 2)


pbs(x, df = 5, Boundary.knots = c(0, 2*pi))
pbs(x, knots=c(pi/2, pi, pi*3/2), Boundary.knots = c(0, 2*pi))

#### example of one periodic functions
y= sin(x) + cos(2*x) +
   rnorm(628, 0, 0.1) ## x has a period of 2*pi
```

```
## df method, need to use large enough df to get a better fit.
## May use max loglik to choose optimal df
summary( fm1 <- lm(y ~ pbs(x, df = 10, Boundary.knots = c(0, 2*pi))) )
plot(x, y, xlab = "x", ylab = "sin(x)", pch="x", cex=.5)

lines(x, predict(fm1, data.frame(x=x, z=z)), col='blue')
lines(x, sin(x) + cos(2*x), col='red')

## knots methods, usually selected at turning points
summary( fm2 <- lm(y ~ pbs(x, knots=c(pi/2, pi, pi*3/2),
         Boundary.knots = c(0, 2*pi)))
)
plot(x, y, xlab = "x", ylab = "sin(x)", pch="x", cex=.5)

lines(x, predict(fm2, data.frame(x=x, z=z)), col='blue')
lines(x, sin(x) + cos(2*x), col='red')

#### example of two periodic functions
x0 = seq(1,628, by=4)/100
z0 = seq(1, 314, by=3)/100
x = rep(x0, each=length(z0))
z = rep(z0, length(x0))
y = sin(x) + cos(2*z) +
   rnorm(length(x), 0, 0.1) ## x has a period of 2*pi and z of pi

summary( fm3 <- lm(y ~ pbs(x, df = 5, Boundary.knots = c(0, 2*pi))+
                       pbs(z, df = 5, Boundary.knots = c(0, pi)))
)

plot(sin(x) + cos(2*3), predict(fm3, data.frame(x=x, z=3)))
summary(sin(x) + cos(2*3)- predict(fm3, data.frame(x=x, z=3)))
## End(Not run)
```

Index