Package ‘funpca’

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Type Package

Title Functional Principal Component Analysis

Version 9.0

Date 2023-06-08

Depends Brobdingnag, MASS, nlme, fda

Description Functional principal component analysis under the Linear Mixed Models representation of smoothing splines. The method utilizes the Demmler-Reinsch basis and assumes error independence. For more details see: F. Rosales (2016) <https://ediss.uni-goettingen.de/handle/11858/00-1735-0000-0028-87F9-6>.

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NeedsCompilation no

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funpca-package  

Functional Principal Component Analysis

Description

Performs functional principal component analysis using the mixed models representation of smoothing splines.

Details

Package: fpcamm  
Version: 1.0  
Date: 2023-06-08  
Depends: Brobdingnag, MASS, nlme

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summary.funpca

The function funpca() is used to fit the model. Using the resulting funpca object, fitted curves or their derivatives can be plotted with plot and summary information on the fit can be printed using summary.

Author(s)

Francisco Rosales  
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References

Rosales, F.  
For more details see <https://ediss.uni-goettingen.de/handle/11858/00-1735-0000-0028-87F9-6>

See Also

fda (package fda)
funpca

*Functional Principal Component Analysis*

**Description**

Performs functional principal component analysis using the mixed models representation of smoothing splines.

**Usage**

`funpca(mat, k)`

**Arguments**

- `mat` Is a rectangular matrix with no missing values. Each column represents a sample.
- `k` Desired number of eigen functions to construct subj spec deviations. Should be between 1 and the sample size.

**Details**

The method assumes DATA is a complete rectangular matrix and hence does not support missing values.

**Value**

A list object of class `funpca` containing the following information.

- `est` Mixed model estimation
- `f` A matrix with the fitted overall trend. All columns contain the same information
- `di` A matrix with the fitted subj spec deviations
- `fi` Fitted values for each subject, i.e. fitted overall trend + fitted subj spec deviations + subj spec seasonality.
- `error` Remainder component for each subject.
- `residuals` Remainder component for each subject.
- `y` Data used for all the computations.
- `call` Call of funpca.

**Author(s)**

Francisco Rosales <francisco.rosales-marticorena@protonmail.com>,

**References**

Rosales, F.
For more details see <https://ediss.uni-goettingen.de/handle/11858/00-1735-0000-0028-87F9-6>
plot.funpca

See Also

fda (package fda)

Examples

library(fda)
sdata <- NULL
data <- CanadianWeather$monthlyTemp
for(i in 1:ncol(data)) sdata <- cbind(sdata, spline(data[,i])$y)
x <- funpca(sdata, k=3)

plot.funpca

Plot fitted components

Description

Plots fitted signals and shows acf/pacf for the each one. Additionally a plot for all curves is added at the beginning.

Usage

## S3 method for class 'funpca'
plot(x,...)

Arguments

x funpca object.
...

Other arguments to be called by plot().

Details

Plot of the fitted results.

Value

The function returns the selected plots.

Author(s)

Francisco Rosales

References

Rosales, F.
For more details see <https://ediss.uni-goettingen.de/handle/11858/00-1735-0000-0028-87F9-6>
summary.funpca

See Also

plot.funpca (package funpca)

Examples

library(fda)
sdata <- NULL
data <- CanadianWeather$monthlyTemp
for(i in 1:ncol(data)) sdata <- cbind(sdata,spline(data[,i])$y)
x <- funpca(sdata, k=3)
plot(x)

summary.funpca  funpca Summary

Description

Takes an funpca object produced by funpca and summarizes the information of the components fi (individual fits).

Usage

## S3 method for class 'funpca'
summary(object,...)

Arguments

object    funpca object.
...

Value

The function gives basic statistics of the components resulting from applying funpca.

Author(s)

Francisco Rosales <francisco.rosales-marticorena@protonmail.com>

References

Rosales, F. and Krivobokova, T.
For more details see <https://ediss.uni-goettingen.de/handle/11858/00-1735-0000-0028-87F9-6>

See Also

plot.funpca (package funpca),
Examples

library(fda)
sdata <- NULL
data <- CanadianWeather$monthlyTemp
for(i in 1:ncol(data)) sdata <- cbind(sdata, spline(data[,i])$y)
x <- funPCA(sdata, k=3)
summary(x)
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