

Package ‘funpca’

July 22, 2025

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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Repository CRAN

Date/Publication 2023-06-15 17:20:05 UTC

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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: Brodningnag, MASS, nlme

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funpca	Performs FPCA using the MM representation of penalized splines.
plot.funpca	Plots fitted curves: overall trend, subj spec deviations and derivative of the mean curve.
summary.funpca	Summary of individual fits.

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 Maintainer: Francisco Rosales <francisco.rosales-marticoarena@protonmail.com>

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

<code>mat</code>	Is a rectangular matrix with no missing values. Each column represents a sample.
<code>k</code>	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.

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

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>>

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>>

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	<i>funpca Summary</i>
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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.
...	further arguments to be passed to summary().

Value

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

Author(s)

Francisco Rosales <francisco.rosales-martcorena@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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