Package: funpca (via r-universe)

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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

Index:

`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-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)

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 colum 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>

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 *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.
...	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-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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