# Package: funpca (via r-universe)

September 6, 2024

**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>.

**License** GPL-2

**NeedsCompilation** no

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**Repository** https://lfrm.r-universe.dev

**RemoteUrl** https://github.com/cran/funpca

**RemoteRef** HEAD

**RemoteSha** 92ab27c7faadc1fa00178c57fbf40547e0ed463b

## Contents

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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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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