

# Package ‘growthfd’

December 21, 2021

**Title** Fitting FPCA-based growth curve model

**Version** 0.0.0.9000

## Description

This package provides a method for fitting an FPCA-based growth curve model described in the paper stated below. This research was funded by Technology Agency of the Czech Republic (Technologická agentura České republiky), grant number TL01000394.

**Citation** KRÁLÍK Miroslav, KLÍMA Ondřej, ČUTA Martin, MALINA Robert M., KOZIEL Slawomir, POLCEROVÁ Lenka, ŠKULTÉTY-  
OVÁ Anna, ŠPANĚL Michal, KUKLA Lubomír a ZEMČÍK Pavel. Estimating Growth in Height from Limited Longitudinal Growth Data Using Full-Curves Training Dataset: A Comparison of Two Procedures of Curve Optimization-Functional Principal Component Analysis and SITAR. Children, roc. 8, c. 10, 2021, s. 934-955. ISSN 2227-9067

**License** use\_gpl\_license()

**Encoding** UTF-8

**RoxygenNote** 7.1.2

**Imports** minpack.lm,  
sitar (>= 1.2.0),  
fda

**Depends** R (>= 2.10)

**LazyData** true

**Suggests** rmarkdown,  
knitr

**VignetteBuilder** knitr

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growthfd	<i>Fit a FPCA Growth Curve Model to a population</i>
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### Description

This function fits a model to the given measured data of a population.

### Usage

```
growthfd(data, x, y, id, model, verbose = 1)
```

### Arguments

data	Data frame containing age, height and id of individuals
x	Age at measured data points
y	Height at measured data points
id	Corresponding individual's id at measured data points
model	FPCA growth model to be fitted
verbose	Verbosity

### Value

List containing individuals id and model

### Examples

```
filename <- system.file("extdata", "data.csv", package="growthfd", mustWork=TRUE)
csv <- read.csv(filename)
d <- data.frame('id'=as.factor(csv[, 'id']), 'x'=csv[, 'age'], 'y'=csv[, 'height'])
growthfd(data=d, x=x, y=y, id=id, model=model.bgs.m)
```

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growthfd.evaluate	<i>Generate a Discrete Growth Curve</i>
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### Description

This function evaluates a curve function for given ages. Depending on a degree of derivation, the function produces stature, velocity or acceleration curve.

### Usage

```
growthfd.evaluate(x, par, model, deriv = 0)
```

### Arguments

x	Ages to be evaluated
par	Parameters of the model
model	FPCA growth model
deriv	Path to the input file

**Value**

Y-values of the evaluated curve

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growthfd.fit	<i>Fit a FPCA Growth Curve Model to measurements of a single individual</i>
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**Description**

This function fits a model to the given measured data of a single individual.

**Usage**

```
growthfd.fit(model, age, height, nprint = 1)
```

**Arguments**

model	FPCA growth model to be fitted
age	Age at measured data points
height	Height at at measured data points
nprint	Verbosity

**Value**

An optimization result object

**Examples**

```
age <- c(6.9, 8.2, 10, 12.1)
height <- c(114, 122, 130, 141)
fit <- growthfd.fit(model.bgs.m, age=c(6.9, 8.2, 10, 12.1), height=c(114, 122, 130, 141))
x11()
growthfd.plot(model.bgs.m, fit$par)
points(age, height)
x11()
growthfd.plot(model.bgs.m, fit$par, from=0.5, deriv = 1)
x11()
growthfd.plot(model.bgs.m, fit$par, from=0.5, deriv = 2)
```

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growthfd.plot	<i>Plot a Growth Curve</i>
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**Description**

This function plots a stature, velocity or acceleration curve.

**Usage**

```
growthfd.plot(model, par, deriv = 0, from = 0, to = 18)
```

**Arguments**

model	FPCA growth model
par	Parameters of the model
deriv	Path to the input file
from	The lower age limit
to	The upper age limit

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growthfd.residuals	<i>Compute residuals</i>
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**Description**

This function computes residuals between measured stature data and data generated from the growth model.

**Usage**

```
growthfd.residuals(x, y, par, model)
```

**Arguments**

x	Vector with input ages
y	Vector with target height measurements
par	Parameters of the model
model	FPCA growth model

**Value**

A vector of residuals

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growthfd.std	<i>Generate a Curve Function</i>
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**Description**

This function generates a growth curve function based on given model and parameters, describing the growth phase and amplitude.

**Usage**

```
growthfd.std(par, model)
```

**Arguments**

par	Phase and amplitude parameters
model	FPCA growth model

**Value**

FDA function object

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