Package 'growthfd'

December 21, 2021

Title Fitting FPCA-based growth curve model

Version 0.0.0.9000

Description
This package provides a method for fiting an FPCA-based growth curve model described in the paper stated bellow. 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, ŠKULTÉTYOVÁ 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

R topics documented:

growthfd — *Fit a FPCA Growth Curve Model to a population*

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)
```

growthfd.evaluate — *Generate a Discrete Growth Curve*

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

`growthfd.fit` *Fit a FPCA Growth Curve Model to measurements of a single individual*

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)
```

growthfd.plot *Plot a Growth Curve*

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

growthfd.residuals *Compute residuals*

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

growthfd.std *Generate a Curve Function*

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

model.bgs.f *FPCA model for girls*

Description

Model trained using 167 female individuals from Brno Growth Study (BGS).

Usage

```
model.bgs.f
```

Format

An object of class list of length 3.

model.bgs.m *FPCA model for boys*

Description

Model trained using 167 male individuals from Brno Growth Study (BGS).

Usage

```
model.bgs.m
```

Format

An object of class list of length 3.

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