Package 'FPCA3D'

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Type Package

Title Three Dimensional Functional Component Analysis

Version 1.0

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Author Nan Lin, Momiao Xiong

Maintainer Nan Lin <edmondlinnan@gmail.com>

Description Run three dimensional functional principal component analysis and return the three dimensional functional principal component scores. The details of the method are explained in Lin et al.(2015) <doi:10.1371/journal.pone.0132945>.

License GPL-2 | GPL-3

Depends graphics, grDevices, stats, utils

NeedsCompilation no

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R topics documented:

FPCA3D-package *Three Dimensional Functional Component Analysis*

Description

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Details

The DESCRIPTION file:

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```

data_in = array(runif(4000,0,1),dim=c(10,10,10,4)) test = FPCA_3D_score(data_in,0.8)

Author(s)

Nan Lin, Momiao Xiong

Maintainer: Nan Lin <edmondlinnan@gmail.com>

References

Lin N, Jiang J, Guo S, Xiong M. Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLOS ONE. 2015;10(7):e0132945.

See Also

FFT2FS_3D, FPCA_3D_score

Examples

```
data_in = array(runif(4000,0,1),dim=c(10,10,10,4))
test = FPCA_3D_score(data_in,0.8)
```

FFT2FS_3D *Three dimensional Fourier Series*

Description

Calculate the three dimensional Fourier series coeffiients of the input three dimensional array.

Usage

```
FFT2FS_3D(A)
```

Arguments

A	A three dimensional numerical data array. For example, *A* can be the data array of an three dimensional image.

Details

Calcualte the three dimensional numerical data array. The input *A* array can be any three dimensional data array. For image input data, the input should be data array only without any header information.

Value

A three dimensional Fourier series coefficients array of the input *A* data array.

References

Lin N, Jiang J, Guo S, Xiong M. Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLOS ONE. 2015;10(7):e0132945.

Examples

```
test_data = array(runif(1000,0,1),dim = c(10,10,10))
rlt = FFT2FS_3D(test_data)
```

FPCA_3D_score *Three Dimensional Functional Component Analysis*

Description

Calculation of three dimensional functional principal component scores for a series of three dimensional array data.

Usage

```
FPCA_3D_score(X, prop)
```

Arguments

X	The input data array. X is a four dimensional data array. The first three dimensional data represents the three dimensional data array for each observation. The fourth dimention represents the observations.
prop	The prespecified proportion of variance the calcuatled functional principal component scores can explain in the functional domain.

Details

Calculate the three dimensional functional principal component scores for a series of three dimensional data.

Value

A two dimensional score matrix. The row of the score matrix represents each individual and the column of the score matrix represent each component score.

References

Lin N, Jiang J, Guo S, Xiong M. Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLOS ONE. 2015;10(7):e0132945.

Examples

```
data_in = array(runif(4000,0,1),dim=c(10,10,10,4))
test = FPCA_3D_score(data_in,0.8)
```

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