

Package ‘FPCA2D’

September 2, 2016

Type Package

Title Two Dimensional Functional Principal Component Analysis

Version 1.0

Date 2016-09-01

Author Nan Lin, Momiao Xiong

Maintainer Nan Lin <Nan.Lin@uth.tmc.edu>

Description Compute the two dimension functional principal component scores for a series of two dimension images.

License GPL-3

Depends graphics,grDevices,stats,utils,corpcor

NeedsCompilation no

Repository CRAN

Date/Publication 2016-09-02 12:21:45

R topics documented:

FPCA2D-package	1
FFT2FS_2D	2
FPCA_2D_score_fast	3

Index	5
--------------	----------

FPCA2D-package *Two Dimensional Functional Principal Component Analysis*

Description

Compute the two dimension functional principal component scores for a series of two dimension images.

Details

Package: FPCA2D
Type: Package
Version: 1.0
Date: 2016-09-01
License: GPL-3

Author(s)

Nan Lin, Momiao Xiong

Maintainer: Nan Lin <Nan.Lin@uth.tmc.edu>

References

Lin N, Jiang J, Guo S, Xiong M (2015) Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLoS ONE 10(7): e0132945. doi:10.1371/journal.pone.0132945

FFT2FS_2D

Two Dimensional Fourier Expansion

Description

Conduct the two dimensional Fourier expansion by using fast Fourier transformation.

Usage

FFT2FS_2D(A)

Arguments

A A is a two dimensional numerical matrix.

Details

Conduct the two dimensional Fourier expansion by using fast Fourier transformation. To make the results comparable, be sure to transform all the intensity values of each image pixel should be between 0 and 1.

Value

C The two dimensional Fourier expansion of the input matrix

References

Lin N, Jiang J, Guo S, Xiong M (2015) Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLoS ONE 10(7): e0132945. doi:10.1371/journal.pone.0132945

Examples

```
## Not run:
A = matrix(sample(seq(0,1,0.01),100),nrow=10)
rlt = FFT2FS_2D(A)

## End(Not run)
```

FPCA_2D_score_fast *Two Dimensional Functional Principal Component Analysis*

Description

Calculate the two dimensional functional principal component scores by using Fourier Basis

Usage

```
FPCA_2D_score_fast(X)
```

Arguments

X X is the input three dimensional array. The first two dimensions are the dimension of each input image. All the input images are organized as the third dimension of the input data array. All the image should be scaled to the range from 0 to 1 before running this function.

Details

Calculate the two dimensional functional principal component scores by using Fourier Basis

Value

eigen_value	The eigen value can be used to calculate the proportion of variance that each FPC score can explain.
FPC_score	The output FPC scores.
Eigen_vector	The eigen_vector represents the directions of the linear transformation in the functional domain.

References

Lin N, Jiang J, Guo S, Xiong M (2015) Functional Principal Component Analysis and Randomized Sparse Clustering Algorithm for Medical Image Analysis. PLoS ONE 10(7): e0132945. doi:10.1371/journal.pone.0132945

Examples

```
A = array(sample(seq(0,1,0.001),300),dim=c(10,10,3))  
r1t = FPCA_2D_score_fast(A)
```

Index

*Topic **package**

FPCA2D-package, [1](#)

FFT2FS_2D, [2](#)

FPCA2D (FPCA2D-package), [1](#)

FPCA2D-package, [1](#)

FPCA_2D_score_fast, [3](#)