Package 'FPCA2D'

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Type Package

Title Two Dimensional Functional Principal Component Analysis

Version 1.0

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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

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R topics documented:

`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

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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 Dimenstional 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

Calcualte 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 inputs images are organized as the third dimension of the input data array. All the image should be scaled to the rage from 0 to 1 before running this function.

Details

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

Value

eigen_value	The eigen value can be used to calcualte 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 lienar 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))
rlt = FPCA_2D_score_fast(A)
```

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