# Package 'SpectralMap'

October 12, 2022

**Title** Diffusion Map and Spectral Map

**Version** 1.0

**Imports** scatterplot3d, graphics, fields

**Description**
Implements the diffusion map method of dimensionality reduction and spectral method of combining multiple diffusion maps, including creation of the spectra and visualization of maps.

**Depends** R (>= 3.2.2)

**License** GNU General Public License version 2

**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 5.0.1

**NeedsCompilation** no

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**Repository** CRAN

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## R topics documented:



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`SpectralMap` *Diffusion Map and Spectral Map*

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### Description

Implements the diffusion map method of dimensionality reduction and spectral method of combining multiple diffusion maps, including creation of the spectra and visualization of maps.

## Usage

```
SpectralMap(data, epsilon=0.1, range=1, Plot2D=FALSE, Plot3D=FALSE)
```

## Arguments

| | |
|---|---|
| data | a list of datasets and each column in each dataset is a variable |
| epsilon | parameter in the Gaussian kernel |
| range | indexes of the datasets in the data list to be combined and computed. If length(range)==1, only diffusion map will be computed. Otherwise, spectral map will be computed |
| Plot2D | a logical value indicating whether a 2-D map should be plotted |
| Plot3D | a logical value indicating whether a 3-D map should be plotted |

## Value

| | |
|---|---|
| singularvector | the spectra of either diffusion map or spectral map |

## Examples

```
#generate two datasets
n <- 100
theta <- 2*pi*seq(from=0, to=1-1/n, by=1/n)
r = (1 + cos(6*theta)/4)

# X is a circle
X1 = cos(theta)
X2 = sin(theta)
X<-data.frame(X1,X2)

#Y is a hexagon
Y1 = r*cos(theta)
Y2 = r*sin(theta)
Y<-data.frame(Y1,Y2)

#create data list
Data<-list(X,Y)

#create the diffusion map of X
example1<-SpectralMap(Data, epsilon=0.1, range=1, Plot2D=TRUE, Plot3D=FALSE)
#create the spectral map from X to Y
example2<-SpectralMap(Data, epsilon=0.1, range=1:2, Plot2D=TRUE, Plot3D=FALSE)
```

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