Package 'prinsurf'

July 23, 2025

Title Constructs Principal Surfaces

Version 1.0

Description Construct a principal surface that are two-dimensional surfaces that pass through the middle of a p-dimensional data set. They minimise the distance from the data points, and provide a nonlinear summary of data. The surfaces are nonparametric and their shape is suggested by the data. The formation of a surface is found using an iterative procedure which starts with a linear summary, typically with a principal component plane. Each successive iteration is a local average of the p-dimensional points, where an average is based on a projection of a point onto the nonlinear surface of the previous iteration. For more information on principal surfaces, see Ganey, R. (2019, ``https://open.uct.ac.za/items/4e655d7d-d10c-481b-9ccc-801903aebfc8").

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RoxygenNote 7.3.1

Imports rgl

Suggests stats, Matrix, akima, knitr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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Contents

`principal.surface` *Principal Surface*

Description

A function to compute principal surfaces based on input data containing continuous variables.

Usage

```
principal.surface(
  X,
  max.iter = 10,
  alpha = 0.6,
  N = 50,
  print_iterations = FALSE
)
```

Arguments

`X`	A data frame or matrix containing continuous variables.
`max.iter`	Integer. Maximum number of iterations for the principal surface algorithm.
`alpha`	Numeric. The span argument passed to the `loess()` function.
`N`	Integer. The resolution for the interpolated grid surface, creating an $N^2 \times p$ matrix.
`print_iterations`	Logical. Should the iterations in the principal surface algorithm be printed? Defaults to `FALSE`.

Value

A list with the following components:

`fj.mat` A numeric $n \times p$ matrix of the final principal surface fitted values.

`lambda.j` A numeric representation of the samples in two dimensions.

Examples

```
surface <- principal.surface(iris[,1:3],max.iter = 3)
surface <- principal.surface(iris[1:50,1:3],max.iter = 3)
```

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