

# 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>"').

**License** MIT + file LICENSE

**Encoding** UTF-8

**RoxygenNote** 7.3.1

**Imports** rgl

**Suggests** stats, Matrix, akima, knitr, rmarkdown

**VignetteBuilder** knitr

**NeedsCompilation** no

**Author** Raeesa Ganey [aut, cre] (ORCID:  
<<https://orcid.org/0009-0008-6973-0999>>)

**Maintainer** Raeesa Ganey <Raeesa.ganey@wits.ac.za>

**Repository** CRAN

**Date/Publication** 2025-03-12 17:30:12 UTC

## Contents

|                             |   |
|-----------------------------|---|
| principal.surface . . . . . | 2 |
| Index                       | 3 |

---

|                   |                          |
|-------------------|--------------------------|
| principal.surface | <i>Principal Surface</i> |
|-------------------|--------------------------|

---

### 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?<br>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)
```

# Index

`principal.surface`, [2](#)