

Package ‘Rpcop’

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Type Package

Title Principal Curves of Oriented Points

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Description Principal curves generalize the notion of a first principal component to the case in which it is a nonlinear smooth curve. This package provides a function `pcop(X)` to compute principal curves with the algorithm defined in Delicado (2001) <[doi:10.1006/jmva.2000.1917](https://doi.org/10.1006/jmva.2000.1917)> from a data matrix `X`.

License GPL (>= 2)

Depends R (>= 3.5.0)

Imports Rcpp (>= 1.0.7), princurve

Suggests knitr, rmarkdown, testthat (>= 3.0.0)

LinkingTo Rcpp

VignetteBuilder knitr

Encoding UTF-8

URL <https://github.com/kmfrick/Rpcop>

BugReports <https://github.com/kmfrick/Rpcop/issues>

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NeedsCompilation yes

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Contents

| | |
|------------------------|----------|
| pcop | 2 |
| pcop-methods | 3 |
| Index | 5 |

pcop *Principal Curve of Oriented Points*

Description

Computes a principal curve as defined in Delicado and Huerta (2003) [doi:10.1007/s001800300145](https://doi.org/10.1007/s001800300145).

Usage

```
pcop(x, Ch = 1.5, Cd = 0.3, plot.true = FALSE, ...)
```

Arguments

| | |
|-----------|--|
| x | A finite numeric matrix or data frame of n points in dimension p . Missing and infinite values are rejected. |
| Ch | The smoothing parameter h is C_H times the value given by the normal reference rule. Default value 1.5. Constraints $0.5 \leq C_H \leq 1.5$. |
| Cd | The distance between two consecutive principal oriented points in a PCOP is about C_D times the value of the smoothing parameter h . Default value 0.3. Constraints $0.25 \leq C_D \leq 0.5$. |
| plot.true | If TRUE, produce a two-dimensional plot of the resulting curve. Plotting requires at least two columns in x. |
| ... | Additional parameters passed to lines. |

Value

A list with two elements:

pcop.f1 Data frame storing the principal curve of oriented points in the original format, with columns param, dens, span, orth.var, pop1, pop2, ..., pr.dir1, pr.dir2, ...

pcop.f2 List conforming to the format used in **princurve**; see that package for details.

parameters List of algorithm parameters used for the fit.

input_names Input row and column names, if present. Other input attributes are not used by the algorithm and are not propagated.

call Matched function call.

Examples

```
n <- 500
p <- 3
x <- matrix(rnorm(n * p), ncol = p) %**% diag(p:1)
pcop(x, plot.true = FALSE)

x <- runif(100, -1, 1)
x <- cbind(x, x ^ 2 + rnorm(100, sd = 0.1))
pcop(x, plot.true = FALSE)
if (interactive()) {
  pcop(x, plot.true = TRUE, lwd = 4, col = 2)
}
```

pcop-methods

Methods for pcp objects

Description

Print, summary, and plot methods for objects returned by `pcop()`.

Usage

```
## S3 method for class 'pcop'
print(x, ...)
## S3 method for class 'pcop'
summary(object, ...)
## S3 method for class 'summary.pcop'
print(x, ...)
## S3 method for class 'pcop'
plot(x, ...)
```

Arguments

| | |
|---------------------|--|
| <code>x</code> | A <code>pcop</code> or <code>summary.pcop</code> object. |
| <code>object</code> | A <code>pcop</code> object. |
| <code>...</code> | Additional arguments passed to methods. For <code>plot.pcop()</code> , arguments are passed to <code>graphics::plot</code> . |

Value

`print.pcop()`, `print.summary.pcop()`, and `plot.pcop()` return their input invisibly. `summary.pcop()` returns a compact summary object.

Examples

```
set.seed(1)
x <- runif(100, -1, 1)
x <- cbind(x, x ^ 2 + rnorm(100, sd = 0.1))
fit <- pcop(x, plot.true = FALSE)

print(fit)
summary(fit)
if (interactive()) {
  plot(fit)
}
```

Index

`pcop`, [2](#)
`pcop-methods`, [3](#)
`plot.pcop (pcop-methods)`, [3](#)
`print.pcop (pcop-methods)`, [3](#)
`print.summary.pcop (pcop-methods)`, [3](#)
`summary.pcop (pcop-methods)`, [3](#)