Package ‘cpca’

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Type Package

Title Methods to perform Common Principal Component Analysis (CPCA)

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Description This package contains methods to perform Common Principal Component Analysis (CPCA). The stepwise method by Trendafilov is published in the current version. Please see Trendafilov (2010). Stepwise estimation of common principal components. Computational Statistics & Data Analysis, 54(12), 3446-3457. doi:10.1016/j.csda.2010.03.010

License GPL (>= 3)

URL https://github.com/variani/cpca

LazyData yes

LazyLoad yes

Depends R (>= 3.0.1)

Suggests abind, plyr

Collate 'cpc.lib.R' 'package.R'

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NeedsCompilation no

Repository CRAN

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R topics documented:

cpc *Function cpc.*

Description

This function computes the CPCA from a given set of covariance matrices (of different groups).

Usage

```
cpc(X, method = "stepwise", k = 0, iter = 30,
  threshold = 0, ...)
```

Arguments

`X`	An array of three dimensions: the 3rd dimension encodes the groups and the first two dimension contain the covariance matrices.
`method`	The name of the method for computing the CPCA. The default value is `"stepwise"`, which is the stepwise algorithm by Trendafilov.
`k`	The number of components to be computed (all if it is `0`). This paramter is valid if the given method supports built-in ordering of the eigvenvectors. The default value is `0`, that means computing of all the components.
`iter`	The maximum number of iterations. The parameter is valid for the stepwise algorithm by Trendafilov, that is applied in the power algorithm for estimation a single component. The default value is 30.
`threshold`	The threshold value of the captured variance, which is reserved for further extensions.
`...`	Other parameters.

Details

Currently, the only the stepwise algorithm by Trendafilov is supported.

Value

A list several slots: `CPC` rotation matrix with eigenvectors in columns; `ncomp` the number of components evaluated (equal to the number of columns in `CPC`).

Note

This function adpats the original code in matlab written by Dr N. T. Trendafilov.

References

Trendafilov (2010). Stepwise estimation of common principal components. Computational Statistics & Data Analysis, 54(12), 3446-3457. doi:10.1016/j.csda.2010.03.010

Examples

```
require(plyr)
require(abind)

data(iris)

C <- daply(iris, "Species", function(x) cov(x[, -ncol(x)]))
C <- aperm(C, c(2, 3, 1)) # put the 1st dimension to the end

# default call
mod1 <- cpc(C)
round(mod1$CPC, 2)

# compute only first two CPCs
mod2 <- cpc(C, k = 2)
round(mod2$CPC, 2)
```

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cpca *Package cpc.*

Description

Methods to perform Common Principal Component Analysis (CPCA).

Examples

```
require("plyr")
require("abind")

data(iris)

C <- daply(iris, "Species", function(x) cov(x[, -ncol(x)]))

C <- aperm(C, c(2, 3, 1)) # put the 1st dimension to the end
dim(C)
dimnames(C)

mod <- cpc(C)
str(mod)

round(mod$CPC, 2)
# See Trendafilov (2010). Stepwise estimation of common principal components.
# Computational Statistics & Data Analysis, 54(12), 3446-3457.
# doi:10.1016/j.csda.2010.03.010
# p. 10, Example 2
#
#     [,1]  [,2]  [,3]  [,4]
#[1,] 0.75 -0.09  0.63  0.20
#[2,] 0.44  0.79 -0.33 -0.26
```

```
#[3,] 0.47 -0.60 -0.54 -0.34
#[4,] 0.15  0.02 -0.45  0.88
#
# The eigenvectors must be the same, as the default method in `cpc` function
# is the power algorithm proposed by Trendafilov.
```

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