Package: acca (via r-universe)

November 7, 2026

Version 0.2

Date 2022-01-28

Title A Canonical Correlation Analysis with Inferential Guaranties

Author Livio Finos

Maintainer livio finos <livio.finos@unipd.it>

Description It performs Canonical Correlation Analysis and provides inferential guaranties on the correlation components. The p-values are computed following the resampling method developed in Winkler, A. M., Renaud, O., Smith, S. M., & Nichols, T. E. (2020). Permutation inference for canonical correlation analysis. NeuroImage, <doi:10.1016/j.neuroimage.2020.117065>. Furthermore, it provides plotting tools to visualize the results.

Encoding UTF-8

License GPL (>= 2)

RoxygenNote 7.1.2

Imports methods, stats, ggplot2, plyr

NeedsCompilation no

Repository https://livioivil.r-universe.dev

Date/Publication 2022-01-28 07:10:02 UTC

RemoteUrl https://github.com/cran/acca

RemoteRef HEAD

RemoteSha ead6266ce1bdc2568b70a6e531a897eb8d03ae88

Contents

acca-package 2
acca-method 2
cc 3
cc_inference 4
ccbiplot 5

Index 7

---

acca-package *A Canonical Correlation Analysis with Inferential Guaranties*

Description

It performs Canonical Correlation Analysis and provides inferential guaranties on the correlation components. The p-values are computed following the resampling method developed in Winkler, A. M., Renaud, O., Smith, S. M., & Nichols, T. E. (2020). Permutation inference for canonical correlation analysis. NeuroImage, <doi:10.1016/j.neuroimage.2020.117065>. Furthermore, it provides plotting tools to visualize the results.

Author(s)

Livio Finos

Examples

```
set.seed(1)
X=matrix(rnorm(500),100,5)
Y=matrix(rnorm(700),100,7)
Z=matrix(rnorm(200),100,2)
mod=cc(X,Y,Z)
mod

ccbiplot(mod)

mod=cc_inference(mod, B = 100, numb_cc = 3)
mod
```

---

acca-method *Methods for acca objects*

Description

Methods for acca objects. The following are methods to extract and manipulate relevant information from a acca object.

Usage

```
## S3 method for class 'acca'
print(x, ...)

## S3 method for class 'acca'
summary(object, ...)
```

Arguments

x	an acca object
...	additional arguments to be passed
object	an acca

---

cc *cc*

Description

Very similar cancor() of package stats, but 1) it allows for X and Y to be rank deficient, 2) it allows for categorical variables and 3) it allows for covariates, 4) more (see below).

Usage

```
cc(X, Y, Zx = NULL, Zy = Zx, numb_cc = NULL, fill.na = FALSE)
```

Arguments

X	See x in cancor for a proper documentation.
Y	See y in cancor for a proper documentation.
Zx	(=NULL by default) covariates (i.e. nuisance) of X. If different from NULL, the X are residualized by Zx before entering cc(). IMPORTANT: if Zx is not NULL, include the intercept (if appropriate!)
Zy	(=Zx by default) covariates of Y. Same use of Zx.
numb_cc	number of (pairs of) canonical correlations to be extracted
fill.na	replace NA in X and Y with column mean before enter cc().

Value

It returns an acca object. This object contains the same list as returned by cc, while it also contains prop_expl_var which is a list reporting the proportion of explained (total) variance of X and Y by each component (i.e. mode).

L=matrix(rnorm(10),10,1) X=matrix(rnorm(50),10,5) Y=matrix(rnorm(70),10,7) Z=matrix(rnorm(20),10,2)

X[,1]=X[,1]+2*L Y[,1]=Y[,1]+2*L mod=cc(X,Y,Z) mod

ccbiplot(mod)

cc_inference *cc_inference*

Description

For each pairs of components, it computes p-values to test the null hypothesis of no correlation between components. The p-values are computed following the resampling method developed in Winkler, A. M., Renaud, O., Smith, S. M., & Nichols, T. E. (2020). Permutation inference for canonical correlation analysis. NeuroImage, 220, 117065. https://doi.org/10.1016/j.neuroimage.2020.117065.

Usage

```
cc_inference(
  mod,
  B = 100,
  alpha_max = 0.5,
  numb_cc = NULL,
  resamp_type = "sign-flip",
  light = FALSE
)
```

Arguments

mod	an acca object.
B	(100 by default) number of random sampling
alpha_max	stop if p-value > alpha_max (alpha_max=0.5 by default).
numb_cc	stop after computing p-values for the first numb_cc are computed(numb_cc=NULL - the default - means compute all).
resamp_type	"sign-flip" (by default) or "permutation"
light	If TRUE the orthogonalization of the residuals of the projection on Z is not performed. For large sample size the two methods tend to overlap.

Value

It returns an acca object (see cc) with p-values for each pair of the numb_cc components.

Examples

```
set.seed(1)
X=matrix(rnorm(500),100,5)
Y=matrix(rnorm(700),100,7)
Z=matrix(rnorm(200),100,2)
mod=cc(X,Y,Z)
mod

ccbiplot(mod)
```

```
mod=cc_inference(mod, B = 100, numb_cc = 3)
mod
```

---

ccbiplot *ccbiplot*

Description

The function adapts the ggbiplot::ggbiplot() function to an acca-object.

Usage

```
ccbiplot(
  pcobj,
  choices = 1:2,
  scale = 1,
  pc.biplot = TRUE,
  obs.scale = 1 - scale,
  var.scale = scale,
  groups = NULL,
  shapes = NULL,
  ellipse = FALSE,
  ellipse.prob = 0.68,
  labels = NULL,
  labels.size = 3,
  alpha = 1,
  var.axes = TRUE,
  circle = FALSE,
  circle.prob = 0.69,
  varname.size = 3,
  varname.adjust = 1.5,
  varname.abbrev = FALSE,
  arrows.color = NULL,
  ...
)
```

Arguments

pcobj	an object returned by acca:cc()
choices	which PCs to plot
scale	covariance biplot (scale = 1), form biplot (scale = 0). When scale = 1, the inner product between the variables approximates the covariance and the distance between the points approximates the Mahalanobis distance.
pc.biplot	for compatibility with biplot.princomp()
obs.scale	scale factor to apply to observations

var.scale	scale factor to apply to variables
groups	optional factor variable indicating the groups that the observations belong to. If provided the points will be colored according to groups
shapes	which shapes to use when plotting observations
ellipse	draw a normal data ellipse for each group?
ellipse.prob	size of the ellipse in Normal probability
labels	optional vector of labels for the observations
labels.size	size of the text used for the labels
alpha	alpha transparency value for the points (0 = transparent, 1 = opaque)
var.axes	draw arrows for the variables?
circle	draw a correlation circle?
circle.prob	size of the circle in qchisq(circle.prob, df = 2)
varname.size	size of the text for variable names
varname.adjust	adjustment factor the placement of the variable names, >= 1 means farther from the arrow
varname.abbrev	whether or not to abbreviate the variable names
arrows.color	color of the arrows
...	not used yet

Value

It returns a ggplot object.

Index

acca-method, 2
acca-package, 2

cancor, *3*
cc, 3, *3*, *4*
cc_inference, 4
ccbiplot, 5

ggplot, *6*

print.acca *(*acca-method*)*, 2

summary.acca *(*acca-method*)*, 2