

# Package ‘DFA.CANCOR’

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**Type** Package

**Title** Linear Discriminant Function and Canonical Correlation Analysis

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**Description** Functions that produce SPSS- and SAS-like output for linear discriminant function analysis and canonical correlation analysis.

**Imports** MASS, car, irr, CCA, CCP, MVN, yacca, graphics, utils

**LazyLoad** yes

**LazyData** yes

**License** GPL (>= 2)

**NeedsCompilation** no

## R topics documented:

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## Description

This package provides SPSS- and SAS-like output for linear discriminant function analysis (via the DFA function) and for canonical correlation analysis (via the CANCOR function).

CANCOR

*Canonical correlation analysis***Description**

This function provides SPSS- and SAS-like output for canonical correlation analysis. It uses functions from the CCA, CCP, MVN, and yacca packages.

**Usage**

```
CANCOR(data, set1, set2, plot, plotCV)
```

**Arguments**

|                     |   |
|---------------------|---|
| <code>data</code>   | A dataframe where the rows are cases & the columns are the variables.   |
| <code>set1</code>   | The names of the continuous variables for the first set, e.g., <code>set1 = c('varA', 'varB', 'varC')</code> .  |
| <code>set2</code>   | The names of the continuous variables for the second set, e.g., <code>set2 = c('varD', 'varE', 'varF')</code> . |
| <code>plot</code>   | Should a helio plot of the structure coefficients be produced? The options are: 'yes' or 'no'.                  |
| <code>plotCV</code> | The canonical variate number for the helio plot, e.g., <code>plotCV = 1</code> .                                |

**Value**

The displayed output includes descriptive statistics and Pearson correlations, tests of univariate and multivariate normality, multivariate significance tests, canonical function correlations and bivariate significance tests, raw canonical coefficients, structure coefficients, standardized coefficients, and a helio plot of the structure coefficients.

The returned output is a list with elements

|                            |  |
|----------------------------|--|
| <code>cancors</code>       | canonical correlations and their significance tests                |
| <code>rawCoefSet1</code>   | raw canonical coefficients for Set 1                               |
| <code>rawCoefSet2</code>   | raw canonical coefficients for Set 2                               |
| <code>structCoef11</code>  | structure coefficients for Set 1 variables with the Set 1 variates |
| <code>structCoef21</code>  | structure coefficients for Set 2 variables with the Set 1 variates |
| <code>structCoef12</code>  | structure coefficients for Set 1 variables with the Set 2 variates |
| <code>structCoef22</code>  | structure coefficients for Set 2 variables with the Set 2 variates |
| <code>standCoefSet1</code> | standardized coefficients for Set 1 variables                      |
| <code>standCoefSet2</code> | standardized coefficients for Set 2 variables                      |
| <code>standCoefSet2</code> | standardized coefficients for Set 2 variables                      |

**Author(s)**

Brian P. O'Connor

## References

Sherry, A., & Henson, R. K. (2005). Conducting and interpreting canonical correlation analysis in personality research: A user-friendly primer. *Journal of Personality Assessment*, 84, 37-48.

Tabachnik, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). New York, NY: Pearson.

## Examples

```
# data that simulate those from De Leo & Wulfert (2013)
CANCOR(data = na.omit(data_CCA_De_Leo),
  set1 = c('Tobacco_Use', 'Alcohol_Use', 'Illicit_Drug_Use', 'Gambling_Behavior',
    'Unprotected_Sex', 'CIAS_Total'),
  set2 = c('Impulsivity', 'Social_Interaction_Anxiety', 'Depression',
    'Social_Support', 'Intolerance_of_Deviance', 'Family_Morals',
    'Family_Conflict', 'Grade_Point_Average'),
  plot = 'yes', plotCV = 1)

## Not run:
# data from Tabachnik & Fidell (2013, p. 589)
CANCOR(data = data_CCA_Tabachnik,
  set1 = c('TS', 'TC'),
  set2 = c('BS', 'BC'),
  plot = 'yes', plotCV = 1)

# UCLA dataset
UCLA_CCA_data <- read.csv("https://stats.idre.ucla.edu/stat/data/mmreg.csv")
colnames(UCLA_CCA_data) <- c("LocusControl", "SelfConcept", "Motivation",
  "read", "write", "math", "science", "female")
summary(UCLA_CCA_data)
CANCOR(data = UCLA_CCA_data,
  set1 = c("LocusControl", "SelfConcept", "Motivation"),
  set2 = c("read", "write", "math", "science", "female"),
  plot = 'yes', plotCV = 1)

## End(Not run)
```

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data\_CCA\_De\_Leo

*data\_CCA\_De\_Leo*

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## Description

A data frame with scores on 14 variables that have the same correlational structure, and which produce the same canonical correlation analysis results, as those reported in De Leo and Wulfert (2013).

## Usage

```
data(data_CCA_De_Leo)
```

**Source**

De Leo, J. A., & Wulfert, E. (2013). Problematic internet use and other risky behaviors in college students: An application of problem-behavior theory. *Psychology of Addictive Behaviors*, 27(1), 133-141.

**Examples**

```
## Not run:
head(data_CCA_De_Leo)

# data that simulate those from De Leo & Wulfert (2013)
CANCOR(data = na.omit(data_CCA_De_Leo),
        set1 = c('Tobacco_Use', 'Alcohol_Use', 'Illicit_Drug_Use', 'Gambling_Behavior',
                  'Unprotected_Sex', 'CIAS_Total'),
        set2 = c('Impulsivity', 'Social_Interaction_Anxiety', 'Depression',
                  'Social_Support', 'Intolerance_of_Deviance', 'Family_Morals',
                  'Family_Conflict', 'Grade_Point_Average'),
        plot = 'yes', plotCV = 1)

## End(Not run)
```

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|                    |                           |
|--------------------|---------------------------|
| data_CCA_Tabachnik | <i>data_CCA_Tabachnik</i> |
|--------------------|---------------------------|

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**Description**

A data frame with scores on 4 variables for 8 cases. Used by Tabachnik & Fidell (2013, p. 589) in their chapter on canonical correlation.

**Usage**

```
data(data_CCA_Tabachnik)
```

**Source**

Tabachnik, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). New York, NY: Pearson.

**Examples**

```
## Not run:
head(data_CCA_Tabachnik)

# data from Tabachnik & Fidell (2013, p. 589)
CANCOR(data = data_CCA_Tabachnik,
        set1 = c('TS', 'TC'),
        set2 = c('BS', 'BC'),
        plot = 'yes', plotCV = 1)

## End(Not run)
```

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|                |                       |
|----------------|-----------------------|
| data_DFA_Field | <i>data_DFA_Field</i> |
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**Description**

A data frame with scores on 2 variables for 10 cases in each of 3 groups. Used by Field et al. (2012) in their chapter on MANOVA and discriminant function analysis.

**Usage**

```
data(data_DFA_Field)
```

**Source**

Field, A., Miles, J., & Field, Z. (2012). Discovering statistics using R. Los Angeles, CA: Sage.

**Examples**

```
## Not run:
head(data_DFA_Field)

DFA(data = data_DFA_Field,
     groups = 'Group',
     variables = c('Actions', 'Thoughts'),
     priorprob = 'SIZES', predictive = 'yes')

## End(Not run)
```

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|                 |                        |
|-----------------|------------------------|
| data_DFA_Sherry | <i>data_DFA_Sherry</i> |
|-----------------|------------------------|

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**Description**

A data frame with scores on 5 variables for 10 cases in each of 3 groups. Used by Sherry (2006) in her article on discriminant function analysis.

**Usage**

```
data(data_DFA_Sherry)
```

**Source**

Sherry, A. (2006). Discriminant analysis in counseling research. *Counseling Psychologist*, 34, 661-683.

## Examples

```
## Not run:
head(data_DFA_Sherry)

DFA(data = data_DFA_Sherry,
     groups = 'Group',
     variables = c('Neuroticism', 'Extroversion', 'Openness',
                   'Agreeableness', 'Conscientiousness'),
     normtests = 'yes', priorprob = 'SIZES', predictive = 'yes')

## End(Not run)
```

DFA

*Discriminant function analysis*

## Description

This function provides SPSS- and SAS-like output for linear discriminant function analysis. It uses functions from the car, CPP, MASS, MVN, and irr packages.

## Usage

```
DFA(data, groups, variables, normtests, priorprob, predictive)
```

## Arguments

|            |  |
|------------|--|
| data       | A dataframe where the rows are cases & the columns are the variables.  |
| groups     | The name of the groups variable in the dataframe, e.g., groups = 'Group'.  |
| variables  | The names of the continuous variables in the dataframe that will be used in the DFA, e.g., variables = c('varA', 'varB', 'varC').  |
| normtests  | Should tests of univariate and multivariate normality be conducted? The options are: 'yes' or 'no'.  |
| priorprob  | How should the prior probabilities of the group sizes be computed? The options are: 'EQUAL' for equal group sizes; or 'SIZES' for the group sizes to be based on the sizes of the groups in the dataframe. |
| predictive | Should a predictive DFA be conducted? The options are: 'yes' or 'no'.  |

## Value

The displayed output includes descriptive statistics for the groups, tests of univariate and multivariate normality, the results of tests of the homogeneity of the group variance-covariance matrices, eigenvalues & canonical correlations, Wilks lambda & peel-down statistics, raw and standardized discriminant function coefficients, structure coefficients, functions at group centroids, one-way ANOVA tests of group differences in scores on each discriminant function, one-way ANOVA tests of group differences in scores on each original DV, significance tests for group differences on the original DVs according to Bird et al. (2014), a plot of the group means on the standardized discriminant functions, and extensive output from predictive discriminant function analyses (if requested).

The returned output is a list with elements

|               |  |
|---------------|--|
| rawCoef       | canonical discriminant function coefficients                                 |
| structCoef    | structure coefficients   |
| standCoef     | standardized coefficients  |
| standCoefSPSS | standardized coefficients from SPSS  |
| centroids     | unstandardized canonical discriminant functions evaluated at the group means |
| centroidSDs   | group standard deviations on the unstandardized functions                    |
| centroidsZ    | standardized canonical discriminant functions evaluated at the group means   |
| centroidSDsZ  | group standard deviations on the standardized functions                      |
| DFAcores      | scores on the discriminant functions   |

### Author(s)

Brian P. O'Connor

### References

Bird, K. D., & Hadzi-Pavlovic, D. (2013). Controlling the maximum familywise Type I error rate in analyses of multivariate experiments. *Psychological Methods*, 19(2), p. 265-280.

Sherry, A. (2006). Discriminant analysis in counseling research. *Counseling Psychologist*, 34, 661-683..

Tabachnik, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). New York, NY: Pearson.

### Examples

```
DFA(data = data_DFA_Field,
     groups = 'Group',
     variables = c('Actions','Thoughts'),
     normtests = 'yes', priorprob = 'SIZES', predictive = 'yes')
```

## Not run:

```
DFA(data = data_DFA_Sherry,
     groups = 'Group',
     variables = c('Neuroticism','Extroversion','Openness',
                  'Agreeableness','Conscientiousness'),
     normtests = 'yes', priorprob = 'SIZES', predictive = 'yes')
```

## End(Not run)

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