

CANONICAL CORRELATION

```
> #####
> #Canonical correlation of salary and background
> #####
>
> dataacc <- read.table("C:/R/rmmva/data cancorr in R.txt", header=T, quote="\")
> background <- dataacc[, 6:9]
> salary <- dataacc[, 1:2]
> #install.packages("CCA")
> library("CCA")
> output <- cc(background, salary)
> matcor(background, salary)
```

```
$Xcor
      EDUC    SENIOR    AGE    EXPER
EDUC    1.000000  0.054359 -0.294192 -0.253738
SENIOR   0.054359  1.000000  0.070081 -0.012501
AGE      -0.294192  0.070081  1.000000  0.730431
EXPER    -0.253738 -0.012501  0.730431  1.000000
```

```
$Ycor
      LCURRENT LSTART
LCURRENT  1.00000 0.88887
LSTART    0.88887 1.00000
```

```
$XYcor
      EDUC    SENIOR    AGE    EXPER LCURRENT LSTART
EDUC    1.000000  0.054359 -0.294192 -0.2537384 0.666166 0.6725345
SENIOR   0.054359  1.000000  0.070081 -0.0125012 0.050038 -0.0804069
AGE      -0.294192  0.070081  1.000000  0.7304306 -0.333049 -0.2336446
EXPER    -0.253738 -0.012501  0.730431  1.0000000 -0.098850 -0.0024397
LCURRENT 0.666166  0.050038 -0.333049 -0.0988499 1.000000 0.8888724
LSTART   0.672535 -0.080407 -0.233645 -0.0024397 0.888872 1.0000000
```

```
> summary(output)
```

```
      Length Class Mode
cor      2      -none- numeric
names    3      -none- list
xcoef    8      -none- numeric
ycoef    4      -none- numeric
scores   6      -none- list
```

```
> output$cor
```

```
[1] 0.74761 0.37739
```

```
> output$xcoef
```

```
      [,1]      [,2]
EDUC  -0.2712998  0.066260
SENIOR  0.0041533 -0.075526
AGE     0.0407656  0.048107
EXPER  -0.0529575  0.016109
```

```

> output$ycoef

      [,1]      [,2]
LCURRENT -0.9792 -4.8418
LSTART   -1.4916  5.2589

> output$scores$xscores[1:10,]

      [,1]      [,2]
[1,] -0.771896 -0.637516
[2,] -1.705623  0.261197
[3,] -0.535741 -1.188927
[4,]  0.044975 -0.712345
[5,] -0.782949 -0.379095
[6,] -1.675242 -0.093138
[7,] -0.020129  0.983884
[8,]  0.072428 -0.052931
[9,] -0.804488  0.030165
[10,] -0.783883 -0.949479

> output$scores$yscores[1:10,]

      [,1]      [,2]
[1,] -0.52834  0.32234
[2,] -2.16996  1.40664
[3,] -1.24526 -0.04632
[4,]  0.32809 -0.47518
[5,] -1.16742  0.56092
[6,] -1.67372 -0.01454
[7,]  0.39951  1.86410
[8,]  0.37713  0.29414
[9,] -0.81438  1.36153
[10,] -1.23430  0.23022

> output$scores$corr.X.xcores

NULL

> output$scores$corr.X.ycores

NULL

> output$scores$corr.Y.xcores

NULL

> output$scores$corr.Y.ycores

NULL

> #install.packages("yacca") #has test for significance of
> # canonical correlations and a brief redundancy analysis
> library("yacca")
> output <- cca(background, salary)
> output

```

Canonical Correlation Analysis

Canonical Correlations:

CV 1	CV 2
0.74761	0.37739

X Coefficients:

	CV 1	CV 2
EDUC	-0.2712998	0.066260
SENIOR	0.0041533	-0.075526
AGE	0.0407656	0.048107
EXPER	-0.0529575	0.016109

Y Coefficients:

	CV 1	CV 2
LCURRENT	-0.9792	-4.8418
LSTART	-1.4916	5.2589

Structural Correlations (Loadings) - X Vars:

	CV 1	CV 2
EDUC	-0.921299	-0.034315
SENIOR	0.035097	-0.731049
AGE	0.378877	0.587971
EXPER	0.059151	0.546785

Structural Correlations (Loadings) - Y Vars:

	CV 1	CV 2
LCURRENT	-0.96205	-0.27287
LSTART	-0.98016	0.19823

Aggregate Redundancy Coefficients (Total Variance Explained):

X Y:	0.18135
Y X:	0.53523

```
> summary(output)
```

Canonical Correlation Analysis - Summary

Canonical Correlations:

CV 1	CV 2
0.74761	0.37739

Shared Variance on Each Canonical Variate:

CV 1	CV 2
0.55892	0.14242

Bartlett's Chi-Squared Test:

	rho^2	Chisq	df	Pr(>X)
CV 1	0.559	92.842	8	<2e-16 ***
CV 2	0.142	14.673	3	0.0021 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Canonical Variate Coefficients:

	X Vars:	
	CV 1	CV 2
EDUC	-0.2712998	0.066260
SENIOR	0.0041533	-0.075526
AGE	0.0407656	0.048107
EXPER	-0.0529575	0.016109

	Y Vars:	
	CV 1	CV 2
LCURRENT	-0.9792	-4.8418
LSTART	-1.4916	5.2589

Structural Correlations (Loadings):

	X Vars:	
	CV 1	CV 2
EDUC	-0.921299	-0.034315
SENIOR	0.035097	-0.731049
AGE	0.378877	0.587971
EXPER	0.059151	0.546785

	Y Vars:	
	CV 1	CV 2
LCURRENT	-0.96205	-0.27287
LSTART	-0.98016	0.19823

Fractional Variance Deposition on Canonical Variates:

	X Vars:	
	CV 1	CV 2
EDUC	0.8487922	0.0011775
SENIOR	0.0012318	0.5344320
AGE	0.1435475	0.3457093
EXPER	0.0034988	0.2989743

	Y Vars:	
	CV 1	CV 2
LCURRENT	0.92554	0.074456
LSTART	0.96071	0.039294

Canonical Communalities (Fraction of Total Variance Explained for Each Variable, Within Sets):

X Vars:

EDUC	SENIOR	AGE	EXPER
0.84997	0.53566	0.48926	0.30247

Y Vars:

LCURRENT	LSTART
1	1

Canonical Variate Adequacies (Fraction of Total Variance Explained by Each CV, Within Sets):

X Vars:

CV 1	CV 2
0.24927	0.29507

Y Vars:

CV 1	CV 2
0.943125	0.056875

Redundancy Coefficients (Fraction of Total Variance Explained by Each CV, Across Sets):

X | Y:

CV 1	CV 2
0.139320	0.042026

Y | X:

CV 1	CV 2
0.5271274	0.0081003

Aggregate Redundancy Coefficients (Total Variance Explained by All CVs, Across Sets):

X Y:	0.18135
Y X:	0.53523

```
> #the bartlett test is given by default in the summary
> #the following line gives the Rao F-approximation
> F.test.cca(output)
```

F Test for Canonical Correlations (Rao's F Approximation)

	Corr	F	Num df	Den df	Pr(>F)
CV 1	0.748	14.709	8.000	188	<2e-16 ***
CV 2	0.377	5.259	3.000	95	0.0021 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1