HomeWorkAssignment3Question3

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#Libraries

```
library(DescTools)
```

```
## Warning: package 'DescTools' was built under R version 4.0.3
```

```
library(Hmisc) #Describe Function
```

```
## Warning: package 'Hmisc' was built under R version 4.0.3
```

```
## Loading required package: lattice
```

```
## Loading required package: survival
```

```
## Warning: package 'survival' was built under R version 4.0.3
```

```
## Loading required package: Formula
```

```
## Warning: package 'Formula' was built under R version 4.0.3
```

```
## Loading required package: ggplot2
```

```
## Warning: package 'ggplot2' was built under R version 4.0.3
```

```
##
## Attaching package: 'Hmisc'
```

```
## The following objects are masked from 'package:DescTools':
##
##     %nin%, Label, Mean, Quantile
```

```
## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
library(psych) #Multiple Functions for Statistics and Multivariate Analysis
```

```
## Warning: package 'psych' was built under R version 4.0.3
```

```
##
## Attaching package: 'psych'
```

```
## The following object is masked from 'package:Hmisc':
##
##     describe
```

```
## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha

## The following objects are masked from 'package:DescTools':
##
##     AUC, ICC, SD

library(GGally) #ggpairs Function

## Warning: package 'GGally' was built under R version 4.0.3

## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2

library(ggplot2) #ggplot2 Functions
library(vioplot) #Violin Plot Function

## Warning: package 'vioplot' was built under R version 4.0.3

## Loading required package: sm

## Warning: package 'sm' was built under R version 4.0.3

## Package 'sm', version 2.2-5.6: type help(sm) for summary information

## Loading required package: zoo

## Warning: package 'zoo' was built under R version 4.0.3

##
## Attaching package: 'zoo'

## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric

library(corrplot) #Plot Correlations

## Warning: package 'corrplot' was built under R version 4.0.3

## corrplot 0.84 loaded

library(REdaS) #Bartlett's Test of Sphericity

## Warning: package 'REdaS' was built under R version 4.0.3

## Loading required package: grid

library(psych) #PCA/FA functions
library(factoextra) #PCA Visualizations

## Warning: package 'factoextra' was built under R version 4.0.3
```

```
## Welcome! Want to learn more? See two factoextra-related books at
https://goo.gl/ve3WBa

library("FactoMineR") #PCA functions

## Warning: package 'FactoMineR' was built under R version 4.0.3

library(ade4) #PCA Visualizations

## Warning: package 'ade4' was built under R version 4.0.3

##
## Attaching package: 'ade4'

## The following object is masked from 'package:FactoMineR':
##
##     reconst

library(yacca) # CCA

## Warning: package 'yacca' was built under R version 4.0.3

library(xlsx) # Excel

## Warning: package 'xlsx' was built under R version 4.0.3
```

This is a nice function for computing the Wilks lambdas for

CCA data from the CCA library's method

It computes the wilkes lambas the degrees of freedom and te

p-values

```
ccaWilks = function(set1, set2, cca)
{
  ev = ((1 - cca$cor^2))
  ev

  n = dim(set1)[1]
  p = length(set1)
  q = length(set2)
  k = min(p, q)
  m = n - 3/2 - (p + q)/2
```

```
  m

  w = rev(cumprod(rev(ev)))

  # initialize
  d1 = d2 = f = vector("numeric", k)

  for (i in 1:k)
  {
    s = sqrt((p^2 * q^2 - 4)/(p^2 + q^2 - 5))
    si = 1/s
    d1[i] = p * q
    d2[i] = m * s - p * q/2 + 1
    r = (1 - w[i]^si)/w[i]^si
    f[i] = r * d2[i]/d1[i]
    p = p - 1
    q = q - 1
  }

  pv = pf(f, d1, d2, lower.tail = FALSE)
  dmat = cbind(WilksL = w, F = f, df1 = d1, df2 = d2, p = pv)
}
```

#Set Working Directory

```
setwd("C:/Users/rejalu1/OneDrive - Henry Ford Health
System/DSC424/HomeWork3")
```

#Load the data set

```
responses <- read.csv(file="../HomeWork3/datasets/responses.csv",
header=TRUE, sep=",")
```

#Check Sample Size and Number of Variables

```
dim(responses)

## [1] 1010  150
```

#Show for first 6 rows of data

```
head(responses)

##   Music Slow.songs.or.fast.songs Dance Folk Country Classical.music
Musical Pop
## 1     5                        3     2    1       2               2
1   5
## 2     4                        4     2    1       1               1
2   3
## 3     5                        5     2    2       3               4
5   3
## 4     5                        3     2    1       1               1
```

```
1   2
## 5     5                       3     4    3       2               4
3   5
## 6     5                       3     2    3       2               3
3   2
##   Rock Metal.or.Hardrock Punk Hiphop..Rap Reggae..Ska Swing..Jazz
Rock.n.roll
## 1    5                1    1           1           1           1
3
## 2    5                4    4           1           3           1
4
## 3    5                3    4           1           4           3
5
## 4    2                1    4           2           2           1
2
## 5    3                1    2           5           3           2
1
## 6    5                5    3           4           3           4
4
##   Alternative Latino Techno..Trance Opera Movies Horror Thriller Comedy
## 1           1      1              1     1      5      4        2      5
## 2           4      2              1     1      5      2        2      4
## 3           5      5              1     3      5      3        4      4
## 4           5      1              2     1      5      4        4      3
## 5           2      4              2     2      5      4        4      5
## 6           5      3              1     3      5      5        5      5
##   Romantic Sci.fi War Fantasy.Fairy.tales Animated Documentary Western
Action
## 1        4      4   1                   5        5           3       1
2
## 2        3      4   1                   3        5           4       1
4
## 3        2      4   2                   5        5           2       2
1
## 4        3      4   3                   1        2           5       1
2
## 5        2      3   3                   4        4           3       1
4
## 6        2      3   3                   4        3           3       2
4
##   History Psychology Politics Mathematics Physics Internet PC
## 1       1          5        1           3       3        5  3
## 2       1          3        4           5       2        4  4
## 3       1          2        1           5       2        4  2
## 4       4          4        5           4       1        3  1
## 5       3          2        3           2       2        2  2
## 6       5          3        4           2       3        4  4
##   Economy.Management Biology Chemistry Reading Geography Foreign.languages
## 1                  5       3         3       3         3                 5
## 2                  5       1         1       4         4                 5
```

```
## 3                  4       1         1       5         2                  5
## 4                  2       3         3       5         4                  4
## 5                  2       3         3       5         2                  3
## 6                  1       4         4       3         3                  4
##   Medicine Law Cars Art.exhibitions Religion Countryside..outdoors Dancing
## 1        3   1    1               1        1                     5       3
## 2        1   2    2               2        1                     1       1
## 3        2   3    1               5        5                     5       5
## 4        2   5    1               5        4                     1       1
## 5        3   2    3               1        4                     4       1
## 6        4   3    5               2        2                     5       1
##   Musical.instruments Writing Passive.sport Active.sport Gardening
Celebrities
## 1                   3       2             1            5         5
1
## 2                   1       1             1            1         1
2
## 3                   5       5             5            2         1
1
## 4                   1       3             1            1         1
2
## 5                   3       1             3            1         4
3
## 6                   5       1             5            4         2
1
##   Shopping Science.and.technology Theatre Fun.with.friends
Adrenaline.sports
## 1        4                      4       2                5
4
## 2        3                      3       2                4
2
## 3        4                      2       5                5
5
## 4        4                      3       1                2
1
## 5        3                      3       2                4
2
## 6        2                      3       1                3
3
##   Pets Flying Storm Darkness Heights Spiders Snakes Rats Ageing
Dangerous.dogs
## 1    4      1     1        1       1       1      5    3      1
3
## 2    5      1     1        1       2       1      1    1      3
1
## 3    5      1     1        1       1       1      1    1      1
1
## 4    1      2     1        1       3       5      5    5      4
5
## 5    1      1     2        1       1       1      1    2      2
```

```
4
## 6    2      3     2        2       2       1      2    2      1
1
##   Fear.of.public.speaking       Smoking        Alcohol Healthy.eating
## 1                       2  never smoked    drink a lot              4
## 2                       4  never smoked    drink a lot              3
## 3                       2 tried smoking    drink a lot              3
## 4                       5 former smoker    drink a lot              3
## 5                       3 tried smoking social drinker              4
## 6                       3  never smoked          never              2
##   Daily.events Prioritising.workload Writing.notes Workaholism
Thinking.ahead
## 1            2                     2             5           4
2
## 2            3                     2             4           5
4
## 3            1                     2             5           3
5
## 4            4                     4             4           5
3
## 5            3                     1             2           3
5
## 6            2                     2             3           3
3
##   Final.judgement Reliability Keeping.promises Loss.of.interest
## 1               5           4                4                1
## 2               1           4                4                3
## 3               3           4                5                1
## 4               1           3                4                5
## 5               5           5                4                2
## 6               1           3                4                3
##   Friends.versus.money Funniness Fake Criminal.damage Decision.making
Elections
## 1                    3         5    1               1              3
4
## 2                    4         3    2               1              2
5
## 3                    5         2    4               1              3
5
## 4                    2         1    1               5              5
5
## 5                    3         3    2               1              3
5
## 6                    2         3    1               4              2
5
##   Self.criticism Judgment.calls Hypochondria Empathy Eating.to.survive
Giving
## 1              1              3            1       3                1
4
## 2              4              4            1       2                1
```

```
2
## 3              4              4            1       5                 5
5
## 4              5              4            3       3                 1
1
## 5              5              5            1       3                 1
3
## 6              4              4            1       4                 2
3
##   Compassion.to.animals Borrowed.stuff Loneliness Cheating.in.school
Health
## 1                     5              4          3                  2
1
## 2                     4              3          2                  4
4
## 3                     4              2          5                  3
2
## 4                     2              5          5                  5
1
## 5                     3              4          3                  5
3
## 6                     5              5          2                  4
3
##   Changing.the.past God Dreams Charity Number.of.friends
## 1                 1   1      4       2                 3
## 2                 4   1      3       1                 3
## 3                 5   5      1       3                 3
## 4                 5   4      3       3                 1
## 5                 4   5      3       3                 3
## 6                 3   3      3       2                 3
##               Punctuality                          Lying Waiting
New.environment
## 1     i am always on time                          never       3
4
## 2        i am often early                      sometimes       3
4
## 3 i am often running late                      sometimes       2
3
## 4        i am often early only to avoid hurting someone       1
1
## 5     i am always on time         everytime it suits me       3
4
## 6        i am often early only to avoid hurting someone       3
4
##   Mood.swings Appearence.and.gestures Socializing Achievements
## 1           3                       4           3            4
## 2           4                       4           4            2
## 3           4                       3           5            3
## 4           5                       3           1            3
## 5           2                       3           3            3
```

```
## 6           3                         3           4            2
##   Responding.to.a.serious.letter Children Assertiveness Getting.angry
## 1                              3        5             1             1
## 2                              4        2             2             5
## 3                              4        4             3             4
## 4                              3        2             5             5
## 5                              3        5             4             2
## 6                              2        3             4             3
##   Knowing.the.right.people Public.speaking Unpopularity Life.struggles
## 1                        3               5            5               1
## 2                        4               4            4               1
## 3                        3               2            4               4
## 4                        4               5            3               3
## 5                        3               5            5               2
## 6                        4               4            4               3
##   Happiness.in.life Energy.levels Small...big.dogs Personality
## 1                 4             5                1           4
## 2                 4             3                5           3
## 3                 4             4                3           3
## 4                 2             2                1           2
## 5                 3             5                3           3
## 6                 3             4                4           3
##   Finding.lost.valuables Getting.up Interests.or.hobbies Parents..advice
## 1                      3          2                    3               4
## 2                      4          5                    3               2
## 3                      3          4                    5               3
## 4                      1          1                   NA               2
## 5                      2          4                    3               3
## 6                      3          3                    5               3
##   Questionnaires.or.polls  Internet.usage Finances Shopping.centres
## 1                       3 few hours a day        3                4
## 2                       3 few hours a day        3                4
## 3                       1 few hours a day        2                4
## 4                       4 most of the day        2                4
## 5                       3 few hours a day        4                3
## 6                       4 few hours a day        2                3
##   Branded.clothing Entertainment.spending Spending.on.looks
Spending.on.gadgets
## 1                5                      3                3
1
## 2                1                      4                2
5
## 3                1                      4                3
4
## 4                3                      3                4
4
## 5                4                      3                3
2
## 6                3                      3                1
4
```

```
##   Spending.on.healthy.eating Age Height Weight Number.of.siblings Gender
## 1                          3  20    163     48                 1 female
## 2                          2  19    163     58                 2 female
## 3                          2  20    176     67                 2 female
## 4                          1  22    172     59                 1 female
## 5                          4  20    170     59                 1 female
## 6                          4  20    186     77                 1   male
##   Left...right.handed              Education Only.child Village...town
## 1        right handed college/bachelor degree         no        village
## 2        right handed college/bachelor degree         no           city
## 3        right handed        secondary school         no           city
## 4        right handed college/bachelor degree        yes           city
## 5        right handed        secondary school         no        village
## 6        right handed        secondary school         no           city
##   House...block.of.flats
## 1         block of flats
## 2         block of flats
## 3         block of flats
## 4         house/bungalow
## 5         house/bungalow
## 6         block of flats
```

```
names(responses)
```

```
##   [1] "Music"                          "Slow.songs.or.fast.songs"
##   [3] "Dance"                          "Folk"
##   [5] "Country"                        "Classical.music"
##   [7] "Musical"                        "Pop"
##   [9] "Rock"                           "Metal.or.Hardrock"
##  [11] "Punk"                           "Hiphop..Rap"
##  [13] "Reggae..Ska"                    "Swing..Jazz"
##  [15] "Rock.n.roll"                    "Alternative"
##  [17] "Latino"                         "Techno..Trance"
##  [19] "Opera"                          "Movies"
##  [21] "Horror"                         "Thriller"
##  [23] "Comedy"                         "Romantic"
##  [25] "Sci.fi"                         "War"
##  [27] "Fantasy.Fairy.tales"            "Animated"
##  [29] "Documentary"                    "Western"
##  [31] "Action"                         "History"
##  [33] "Psychology"                     "Politics"
##  [35] "Mathematics"                    "Physics"
##  [37] "Internet"                       "PC"
##  [39] "Economy.Management"             "Biology"
##  [41] "Chemistry"                      "Reading"
##  [43] "Geography"                      "Foreign.languages"
##  [45] "Medicine"                       "Law"
##  [47] "Cars"                           "Art.exhibitions"
##  [49] "Religion"                       "Countryside..outdoors"
##  [51] "Dancing"                        "Musical.instruments"
```

```
##  [53] "Writing"                      "Passive.sport"
##  [55] "Active.sport"                 "Gardening"
##  [57] "Celebrities"                  "Shopping"
##  [59] "Science.and.technology"       "Theatre"
##  [61] "Fun.with.friends"             "Adrenaline.sports"
##  [63] "Pets"                         "Flying"
##  [65] "Storm"                        "Darkness"
##  [67] "Heights"                      "Spiders"
##  [69] "Snakes"                       "Rats"
##  [71] "Ageing"                       "Dangerous.dogs"
##  [73] "Fear.of.public.speaking"      "Smoking"
##  [75] "Alcohol"                      "Healthy.eating"
##  [77] "Daily.events"                 "Prioritising.workload"
##  [79] "Writing.notes"                "Workaholism"
##  [81] "Thinking.ahead"               "Final.judgement"
##  [83] "Reliability"                  "Keeping.promises"
##  [85] "Loss.of.interest"             "Friends.versus.money"
##  [87] "Funniness"                    "Fake"
##  [89] "Criminal.damage"              "Decision.making"
##  [91] "Elections"                    "Self.criticism"
##  [93] "Judgment.calls"               "Hypochondria"
##  [95] "Empathy"                      "Eating.to.survive"
##  [97] "Giving"                       "Compassion.to.animals"
##  [99] "Borrowed.stuff"               "Loneliness"
## [101] "Cheating.in.school"           "Health"
## [103] "Changing.the.past"            "God"
## [105] "Dreams"                       "Charity"
## [107] "Number.of.friends"            "Punctuality"
## [109] "Lying"                        "Waiting"
## [111] "New.environment"              "Mood.swings"
## [113] "Appearence.and.gestures"      "Socializing"
## [115] "Achievements"                 "Responding.to.a.serious.letter"
## [117] "Children"                     "Assertiveness"
## [119] "Getting.angry"                "Knowing.the.right.people"
## [121] "Public.speaking"              "Unpopularity"
## [123] "Life.struggles"               "Happiness.in.life"
## [125] "Energy.levels"                "Small...big.dogs"
## [127] "Personality"                  "Finding.lost.valuables"
## [129] "Getting.up"                   "Interests.or.hobbies"
## [131] "Parents..advice"              "Questionnaires.or.polls"
## [133] "Internet.usage"               "Finances"
## [135] "Shopping.centres"             "Branded.clothing"
## [137] "Entertainment.spending"       "Spending.on.looks"
## [139] "Spending.on.gadgets"          "Spending.on.healthy.eating"
## [141] "Age"                          "Height"
## [143] "Weight"                       "Number.of.siblings"
## [145] "Gender"                       "Left...right.handed"
## [147] "Education"                    "Only.child"
## [149] "Village...town"               "House...block.of.flats"
```

#Check for Missing Values (i.e. NAs) #For All Variables

```
sum(is.na(responses))
```

```
## [1] 571
```

#Listwise Deletion

```
responses2 <- na.omit(responses)
```

#Check new data has no missing data

```
sum(is.na(responses2))
```

```
## [1] 0
```

#Show Structure of Dataset

```
#str(responses2, list.len=ncol(responses2))
str(responses2)
```

```
## 'data.frame':    686 obs. of  150 variables:
##  $ Music                          : int  5 4 5 5 5 5 5 5 5 5 ...
##  $ Slow.songs.or.fast.songs       : int  3 4 5 3 3 5 3 3 3 3 ...
##  $ Dance                          : int  2 2 2 4 2 5 3 2 3 1 ...
##  $ Folk                           : int  1 1 2 3 3 3 2 5 2 1 ...
##  $ Country                        : int  2 1 3 2 2 1 1 2 1 1 ...
##  $ Classical.music                : int  2 1 4 4 3 2 2 2 2 4 ...
##  $ Musical                        : int  1 2 5 3 3 2 2 5 3 1 ...
##  $ Pop                            : int  5 3 3 5 2 5 4 3 4 2 ...
##  $ Rock                           : int  5 5 5 3 5 3 5 5 3 5 ...
##  $ Metal.or.Hardrock              : int  1 4 3 1 5 1 1 2 2 1 ...
##  $ Punk                           : int  1 4 4 2 3 1 2 3 1 1 ...
##  $ Hiphop..Rap                    : int  1 1 1 5 4 3 3 2 3 1 ...
##  $ Reggae..Ska                    : int  1 3 4 3 3 1 2 4 2 1 ...
##  $ Swing..Jazz                    : int  1 1 3 2 4 1 2 4 2 2 ...
##  $ Rock.n.roll                    : int  3 4 5 1 4 2 3 4 3 2 ...
##  $ Alternative                    : int  1 4 5 2 5 3 1 4 3 5 ...
##  $ Latino                         : int  1 2 5 4 3 3 2 5 3 2 ...
##  $ Techno..Trance                 : int  1 1 1 2 1 5 3 1 4 1 ...
##  $ Opera                          : int  1 1 3 2 3 2 2 2 2 2 ...
##  $ Movies                         : int  5 5 5 5 5 4 5 5 5 5 ...
##  $ Horror                         : int  4 2 3 4 5 2 4 2 5 3 ...
##  $ Thriller                       : int  2 2 4 4 5 1 4 1 4 4 ...
##  $ Comedy                         : int  5 4 4 5 5 5 5 5 5 4 ...
##  $ Romantic                       : int  4 3 2 2 2 3 2 5 3 3 ...
##  $ Sci.fi                         : int  4 4 4 3 3 1 3 1 3 2 ...
##  $ War                            : int  1 1 2 3 3 3 3 3 2 5 ...
##  $ Fantasy.Fairy.tales            : int  5 3 5 4 4 5 4 4 5 5 ...
##  $ Animated                       : int  5 5 5 4 3 5 4 4 5 5 ...
##  $ Documentary                    : int  3 4 2 3 3 3 3 4 3 5 ...
##  $ Western                        : int  1 1 2 1 2 1 1 1 1 1 ...
```

```
##  $ Action                        : int  2 4 1 4 4 2 3 2 3 4 ...
##  $ History                       : int  1 1 1 3 5 3 5 3 3 2 ...
##  $ Psychology                    : int  5 3 2 2 3 3 2 2 3 2 ...
##  $ Politics                      : int  1 4 1 3 4 1 3 3 3 5 ...
##  $ Mathematics                   : int  3 5 5 2 2 1 1 3 2 1 ...
##  $ Physics                       : int  3 2 2 2 3 1 1 1 1 1 ...
##  $ Internet                      : int  5 4 4 2 4 2 5 5 4 5 ...
##  $ PC                            : int  3 4 2 2 4 1 4 1 5 4 ...
##  $ Economy.Management            : int  5 5 4 2 1 3 1 4 3 1 ...
##  $ Biology                       : int  3 1 1 3 4 5 2 2 2 1 ...
##  $ Chemistry                     : int  3 1 1 3 4 5 2 1 1 1 ...
##  $ Reading                       : int  3 4 5 5 3 3 2 4 3 3 ...
##  $ Geography                     : int  3 4 2 2 3 3 3 4 3 5 ...
##  $ Foreign.languages             : int  5 5 5 3 4 4 4 5 5 2 ...
##  $ Medicine                      : int  3 1 2 3 4 5 1 1 2 1 ...
##  $ Law                           : int  1 2 3 2 3 3 2 1 4 3 ...
##  $ Cars                          : int  1 2 1 3 5 4 1 1 2 1 ...
##  $ Art.exhibitions               : int  1 2 5 1 2 1 1 4 2 5 ...
##  $ Religion                      : int  1 1 5 4 2 1 2 4 2 1 ...
##  $ Countryside..outdoors         : int  5 1 5 4 5 4 2 4 4 5 ...
##  $ Dancing                       : int  3 1 5 1 1 3 1 5 1 1 ...
##  $ Musical.instruments           : int  3 1 5 3 5 2 1 3 1 1 ...
##  $ Writing                       : int  2 1 5 1 1 1 1 1 1 1 ...
##  $ Passive.sport                 : int  1 1 5 3 5 5 4 4 5 5 ...
##  $ Active.sport                  : int  5 1 2 1 4 3 5 4 1 3 ...
##  $ Gardening                     : int  5 1 1 4 2 3 1 1 3 1 ...
##  $ Celebrities                   : int  1 2 1 3 1 1 3 2 2 2 ...
##  $ Shopping                      : int  4 3 4 3 2 3 3 4 5 3 ...
##  $ Science.and.technology        : int  4 3 2 3 3 4 2 3 4 3 ...
##  $ Theatre                       : int  2 2 5 2 1 3 2 5 2 1 ...
##  $ Fun.with.friends              : int  5 4 5 4 3 5 4 5 4 3 ...
##  $ Adrenaline.sports             : int  4 2 5 2 3 1 2 2 1 1 ...
##  $ Pets                          : int  4 5 5 1 2 5 5 2 5 1 ...
##  $ Flying                        : int  1 1 1 1 3 1 3 4 1 4 ...
##  $ Storm                         : int  1 1 1 2 2 3 2 5 1 1 ...
##  $ Darkness                      : int  1 1 1 1 2 2 4 4 2 1 ...
##  $ Heights                       : int  1 2 1 1 2 1 3 5 2 3 ...
##  $ Spiders                       : int  1 1 1 1 1 1 1 3 2 5 ...
##  $ Snakes                        : int  5 1 1 1 2 5 5 4 1 5 ...
##  $ Rats                          : int  3 1 1 2 2 1 3 4 1 5 ...
##  $ Ageing                        : int  1 3 1 2 1 4 1 3 1 5 ...
##  $ Dangerous.dogs                : int  3 1 1 4 1 1 2 5 4 5 ...
##  $ Fear.of.public.speaking       : int  2 4 2 3 3 1 4 3 2 5 ...
##  $ Smoking                       : chr  "never smoked" "never smoked"
"tried smoking" "tried smoking" ...
##  $ Alcohol                       : chr  "drink a lot" "drink a lot" "drink
a lot" "social drinker" ...
##  $ Healthy.eating                : int  4 3 3 4 2 4 2 3 3 3 ...
##  $ Daily.events                  : int  2 3 1 3 2 3 3 4 3 3 ...
##  $ Prioritising.workload         : int  2 2 2 1 2 5 1 2 2 1 ...
```

```
##  $ Writing.notes                  : int  5 4 5 2 3 5 3 2 4 5 ...
##  $ Workaholism                    : int  4 5 3 3 3 5 2 3 2 3 ...
##  $ Thinking.ahead                 : int  2 4 5 5 3 3 4 3 3 1 ...
##  $ Final.judgement                : int  5 1 3 5 1 3 3 5 3 1 ...
##  $ Reliability                    : int  4 4 4 5 3 4 3 4 4 3 ...
##  $ Keeping.promises               : int  4 4 5 4 4 5 3 5 4 3 ...
##  $ Loss.of.interest               : int  1 3 1 2 3 3 1 3 1 3 ...
##  $ Friends.versus.money           : int  3 4 5 3 2 4 4 4 3 3 ...
##  $ Funniness                      : int  5 3 2 3 3 4 4 3 2 5 ...
##  $ Fake                           : int  1 2 4 2 1 1 2 1 1 3 ...
##  $ Criminal.damage                : int  1 1 1 1 4 2 1 2 1 5 ...
##  $ Decision.making                : int  3 2 3 3 2 2 3 5 5 3 ...
##  $ Elections                      : int  4 5 5 5 5 5 5 5 5 1 ...
##  $ Self.criticism                 : int  1 4 4 5 4 3 3 4 4 5 ...
##  $ Judgment.calls                 : int  3 4 4 5 4 5 5 5 5 3 ...
##  $ Hypochondria                   : int  1 1 1 1 1 1 2 1 2 5 ...
##  $ Empathy                        : int  3 2 5 3 4 4 1 4 5 5 ...
##  $ Eating.to.survive              : int  1 1 5 1 2 1 2 1 2 1 ...
##  $ Giving                         : int  4 2 5 3 3 5 3 4 3 1 ...
##  $ Compassion.to.animals          : int  5 4 4 3 5 5 5 5 5 2 ...
##  $ Borrowed.stuff                 : int  4 3 2 4 5 5 2 4 4 2 ...
##   [list output truncated]
##  - attr(*, "na.action")= 'omit' Named int [1:324] 4 9 16 18 23 28 38 46 47
48 ...
##   ..- attr(*, "names")= chr [1:324] "4" "9" "16" "18" ...
```

#Anything you do to the right of the comma, you are subsettign columns #Anything you do to the left of the comma, you are subsetting rows

```
responses3 <- responses2[,c(1:73,76,77:107,110:132,134:140,141:144)]
music <- responses2[,1:19]
movie <- responses2[,20:31]
hobbies_interests <- responses2[,32:63]
phobias <- responses2[,64:73]
health <- responses2[,76]
personality_views_opinions <- responses2[,c(77:107,110:132)]
spending <- responses2[,134:140]
demographics <- responses2[,141:144]
```

Run the CCA model

```
options(scipen = 0)
c2 = cca(hobbies_interests,spending)
summary(c2)

##
## Canonical Correlation Analysis - Summary
##
##
## Canonical Correlations:
```

```
##
##      CV 1      CV 2      CV 3      CV 4      CV 5      CV 6      CV 7
## 0.7468573 0.5264449 0.3863231 0.2928472 0.2450619 0.1913960 0.1419782
##
## Shared Variance on Each Canonical Variate:
##
##       CV 1       CV 2       CV 3       CV 4       CV 5       CV 6       CV
7
## 0.55779582 0.27714427 0.14924551 0.08575949 0.06005531 0.03663244
0.02015780
##
## Bartlett's Chi-Squared Test:
##
##           rho^2      Chisq  df    Pr(>X)
## CV 1 5.5780e-01 1.0051e+03 224 < 2.2e-16 ***
## CV 2 2.7714e-01 4.6248e+02 186 < 2.2e-16 ***
## CV 3 1.4925e-01 2.4666e+02 150 1.108e-06 ***
## CV 4 8.5759e-02 1.3917e+02 116   0.07032 .
## CV 5 6.0055e-02 7.9546e+01  84   0.61722
## CV 6 3.6632e-02 3.8360e+01  54   0.94687
## CV 7 2.0158e-02 1.3542e+01  26   0.97856
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##
## Canonical Variate Coefficients:
##
##  X Vars:
##                                CV 1        CV 2        CV 3         CV 4
## History                 0.0235865556  0.03807326  0.13350032  0.054649250
## Psychology              0.0641603007  0.08306452  0.17051910  0.108300211
## Politics               -0.0192109236 -0.10192897  0.16654654 -0.010902142
## Mathematics             0.0780103716  0.03525142 -0.20580924  0.116413847
## Physics                -0.0302431398 -0.06540821  0.03650841  0.327207132
## Internet               -0.0146390788 -0.22231253 -0.16071233  0.127481758
## PC                      0.0389617543 -0.06781427 -0.30179894 -0.090386217
## Economy.Management     -0.0893312375  0.04241668  0.09086543  0.084304485
## Biology                -0.1041948049 -0.12668813 -0.24966751 -0.054600493
## Chemistry              -0.0265395894  0.16288371  0.13160104 -0.038670125
## Reading                -0.0129533605  0.02924692 -0.05933223  0.011362209
## Geography               0.0116567958 -0.02887262 -0.03072386  0.037557624
## Foreign.languages      -0.0338577737 -0.01540055 -0.04450214  0.254967606
## Medicine                0.0582044278  0.13246544  0.13788858  0.130019961
## Law                     0.0054681503 -0.03210561 -0.10497384 -0.037592674
## Cars                   -0.0071781694 -0.18498982 -0.08563763 -0.207506173
## Art.exhibitions         0.0317094234 -0.11669120  0.29801843  0.022553231
## Religion                0.0005645171  0.05085781 -0.12287758 -0.120179081
## Countryside..outdoors   0.0807550338  0.22665139 -0.03475801  0.395029750
## Dancing                -0.0339977229 -0.09289630 -0.05003608 -0.103870310
## Musical.instruments    -0.0228164340  0.06694406  0.06796749 -0.176267448
```

```
## Writing                -0.0597940700  0.09680008 -0.08696978 -0.002116443
## Passive.sport          -0.0113513028 -0.03336914  0.02798494 -0.017255414
## Active.sport           -0.0019485158 -0.06629198  0.08461733  0.093180560
## Gardening               0.0626936396  0.13889601 -0.15613577  0.156999525
## Celebrities            -0.0659503511 -0.04415662  0.04433057 -0.038303563
## Shopping               -0.6942681618  0.04560842 -0.12723217  0.062797142
## Science.and.technology  0.0242464620 -0.29762553 -0.05769414  0.152189475
## Theatre                 0.0061919739 -0.03919509 -0.14931217  0.077100390
## Fun.with.friends        0.1203668386 -0.15904089  0.69933306  0.353418861
## Adrenaline.sports      -0.0588235022 -0.19647498  0.07526581 -0.101792555
## Pets                   -0.0028402822 -0.04924292 -0.11625468  0.027002119
##                                CV 5         CV 6        CV 7
## History                 0.233172273 -0.094412887  0.04804542
## Psychology             -0.038498557  0.146693698  0.07278235
## Politics                0.181410057 -0.027744719  0.12094450
## Mathematics            -0.003839256  0.048880247 -0.07577232
## Physics                 0.152978045  0.066761125 -0.40093018
## Internet                0.191251250  0.156152752  0.19161735
## PC                     -0.469716374 -0.143943482  0.03838185
## Economy.Management     -0.041323970  0.101514796  0.21828836
## Biology                 0.214816121 -0.093418468  0.26207886
## Chemistry              -0.057293732  0.092136308  0.12545363
## Reading                -0.150701623  0.014113128  0.26200763
## Geography               0.142589077  0.130528009  0.09556420
## Foreign.languages       0.018688659  0.025905808 -0.53707986
## Medicine               -0.061058660  0.182420571 -0.03910881
## Law                    -0.117402983 -0.052056903  0.08149578
## Cars                    0.090615115  0.127747109  0.01737110
## Art.exhibitions         0.023192301 -0.370271856 -0.25918095
## Religion                0.146312001  0.245055347 -0.13594167
## Countryside..outdoors  -0.017092023 -0.104988155  0.19910378
## Dancing                 0.002665184 -0.006384459 -0.08166116
## Musical.instruments    -0.058965984  0.100337695  0.16087183
## Writing                -0.251773021 -0.289394706  0.03536707
## Passive.sport          -0.014920482  0.154074624 -0.10250308
## Active.sport            0.155509161 -0.306028700  0.13370673
## Gardening              -0.086644950  0.128186459  0.13392154
## Celebrities            -0.156459718  0.245173311  0.15956347
## Shopping                0.128335971 -0.180943525 -0.13315965
## Science.and.technology -0.039849343 -0.194928027  0.10626657
## Theatre                 0.005518236  0.216727482  0.13208505
## Fun.with.friends       -0.746380752  0.292622215 -0.13406538
## Adrenaline.sports       0.035395046  0.133298024  0.10837216
## Pets                    0.023355376  0.003138272 -0.11949250
##
##  Y Vars:
##                                 CV 1         CV 2        CV 3       CV 4
## Finances                  0.05990981  0.053962891 -0.22756794  0.4035090
## Shopping.centres         -0.54560193  0.008739053 -0.29769656  0.2106868
## Branded.clothing          0.03966754 -0.329624012  0.06221125 -0.1950007
```

```
## Entertainment.spending      0.14431518 -0.226376617  0.51893833  0.1956531
## Spending.on.looks          -0.43290788  0.196303117  0.28925753 -0.2412341
## Spending.on.gadgets         0.10619643 -0.522889942 -0.52094108 -0.0303520
## Spending.on.healthy.eating  0.01029430 -0.075801034  0.28818479  0.7622186
##                                   CV 5        CV 6        CV 7
## Finances                    0.1078243  0.77123058  0.16688835
## Shopping.centres           -0.1697663 -0.08128295 -0.57042114
## Branded.clothing            0.8043190  0.09155112 -0.09676949
## Entertainment.spending     -0.3744696  0.50621100 -0.45917900
## Spending.on.looks          -0.0853376  0.17455602  0.84252061
## Spending.on.gadgets        -0.3690527 -0.11240732  0.20480659
## Spending.on.healthy.eating  0.1619821 -0.47041551  0.12572116
##
##
## Structural Correlations (Loadings):
##
##  X Vars:
##                                CV 1        CV 2         CV 3         CV 4
## History                 0.144616124 -0.05518525  0.247841567  0.218668304
## Psychology             -0.008500419  0.11149555  0.237163958  0.308298987
## Politics                0.082611865 -0.29114570  0.236300044  0.086339554
## Mathematics             0.247601799 -0.17220217 -0.341939514  0.362305224
## Physics                 0.256781864 -0.26848737 -0.223577482  0.456948676
## Internet               -0.027648295 -0.41892965 -0.299782279  0.112290015
## PC                      0.246784835 -0.49552524 -0.454700701  0.034988637
## Economy.Management     -0.187121670 -0.21183290  0.040526000  0.160532032
## Biology                -0.137794217  0.12315113 -0.128821498  0.308410799
## Chemistry              -0.028907505  0.17673408 -0.029419388  0.229105704
## Reading                -0.030896539  0.32030894  0.060712037  0.293527622
## Geography               0.057778631 -0.18089999  0.027973496  0.254221582
## Foreign.languages      -0.173546229  0.01029362  0.072316787  0.402784941
## Medicine               -0.055182491  0.14230353  0.031291022  0.284172702
## Law                    -0.141783551 -0.22148232  0.093964651  0.071290151
## Cars                    0.045068648 -0.64138543 -0.141120168 -0.137017666
## Art.exhibitions        -0.093648453  0.03784369  0.272966842  0.321457412
## Religion                0.072691528  0.17224871 -0.118550140  0.100025693
## Countryside..outdoors   0.058770496  0.21220049 -0.093520844  0.543986239
## Dancing                -0.300649613  0.03422281  0.100683666  0.155081892
## Musical.instruments     0.025619023  0.12423079  0.082455474 -0.019134276
## Writing                -0.061687937  0.20001346 -0.005700666  0.139129873
## Passive.sport          -0.037614249 -0.25893757  0.033994252  0.008016036
## Active.sport           -0.071569875 -0.36301118  0.166805996  0.122422756
## Gardening              -0.078674653  0.22118313 -0.216344136  0.300542754
## Celebrities            -0.546270137 -0.06562656 -0.024681201 -0.062836130
## Shopping               -0.966803839  0.02647766 -0.007693585  0.102114864
## Science.and.technology  0.153422903 -0.57579627 -0.222485110  0.352981430
## Theatre                -0.133480440  0.09214505  0.127388734  0.361241359
## Fun.with.friends       -0.148223795 -0.30330566  0.520988632  0.273428045
## Adrenaline.sports      -0.062827647 -0.52564518  0.212227422  0.092706850
## Pets                   -0.204902197 -0.05128928 -0.152953710  0.140303911
```

```
##                                CV 5        CV 6        CV 7
## History                   0.316194069 -0.15912943  0.23222067
## Psychology                0.033703702  0.06520341  0.14593783
## Politics                  0.230448977  0.05651231  0.26329030
## Mathematics               0.026604825  0.15506527 -0.13917857
## Physics                   0.140710311  0.07506586 -0.18343190
## Internet                 -0.091989766  0.18757177  0.06557995
## PC                       -0.349875469 -0.10175435  0.05967800
## Economy.Management       -0.071729582  0.16110052  0.17219946
## Biology                   0.213830735  0.12611638  0.26393205
## Chemistry                 0.143911828  0.15707371  0.18444153
## Reading                  -0.161552936 -0.05045171  0.23492361
## Geography                 0.321050621  0.07622634  0.20113168
## Foreign.languages        -0.051654462  0.07514865 -0.27810757
## Medicine                  0.155167494  0.24709421  0.18263388
## Law                       0.055558865  0.03195078  0.21384600
## Cars                      0.103720588  0.14301158  0.04474430
## Art.exhibitions          -0.057295914 -0.31236975 -0.04622991
## Religion                  0.233673733  0.22469890 -0.02299164
## Countryside..outdoors     0.062130482 -0.04818378  0.22799130
## Dancing                   0.008482124  0.02820028  0.09461994
## Musical.instruments      -0.147847201  0.02428827  0.16605003
## Writing                  -0.282476273 -0.36822052  0.15922818
## Passive.sport             0.019740741  0.28389458 -0.03051182
## Active.sport              0.215003261 -0.33036233  0.25575089
## Gardening                -0.096901631  0.03261958  0.27411592
## Celebrities              -0.211352731  0.23156025  0.16789399
## Shopping                 -0.023490365 -0.02557974 -0.04994185
## Science.and.technology    0.015176290 -0.14908202  0.15620317
## Theatre                  -0.093204500  0.03991679  0.13740517
## Fun.with.friends         -0.437309870  0.24430901 -0.05456537
## Adrenaline.sports         0.040342204  0.08245121  0.18126761
## Pets                      0.018009777  0.01404727 -0.03257234
##
##  Y Vars:
##                                    CV 1       CV 2       CV 3        CV 4
## Finances                        0.09605158  0.2266495 -0.4427479  0.51202244
## Shopping.centres               -0.90272895 -0.1377624 -0.1857764  0.14031598
## Branded.clothing               -0.30369881 -0.6751297  0.1359352 -0.16345480
## Entertainment.spending         -0.06648889 -0.5663913  0.6384528  0.01047874
## Spending.on.looks              -0.73242054 -0.2686702  0.3458221 -0.11658277
## Spending.on.gadgets            -0.03338746 -0.8670536 -0.2955952  0.01277887
## Spending.on.healthy.eating     -0.08826853 -0.2679860  0.2832005  0.79051771
##                                     CV 5        CV 6        CV 7
## Finances                        0.195612431  0.64007278  0.18235693
## Shopping.centres               -0.006480384  0.02461578 -0.33354544
## Branded.clothing                0.623874513  0.12094098 -0.05408263
## Entertainment.spending         -0.338810565  0.32257777 -0.21954338
## Spending.on.looks              -0.088273001  0.14760919  0.47813327
## Spending.on.gadgets            -0.289599038 -0.04875173  0.27077519
```

```
## Spending.on.healthy.eating  0.135520854 -0.37478449  0.23757545
##
##
## Fractional Variance Deposition on Canonical Variates:
##
##  X Vars:
##                                CV 1         CV 2         CV 3         CV 4
## History                2.091382e-02 0.0030454117 6.142544e-02 4.781583e-02
## Psychology             7.225713e-05 0.0124312569 5.624674e-02 9.504827e-02
## Politics               6.824720e-03 0.0847658185 5.583771e-02 7.454519e-03
## Mathematics            6.130665e-02 0.0296535880 1.169226e-01 1.312651e-01
## Physics                6.593693e-02 0.0720854678 4.998689e-02 2.088021e-01
## Internet               7.644282e-04 0.1755020546 8.986941e-02 1.260905e-02
## PC                     6.090275e-02 0.2455452593 2.067527e-01 1.224205e-03
## Economy.Management     3.501452e-02 0.0448731791 1.642357e-03 2.577053e-02
## Biology                1.898725e-02 0.0151662003 1.659498e-02 9.511722e-02
## Chemistry              8.356439e-04 0.0312349351 8.655004e-04 5.248942e-02
## Reading                9.545961e-04 0.1025978161 3.685951e-03 8.615846e-02
## Geography              3.338370e-03 0.0327248050 7.825165e-04 6.462861e-02
## Foreign.languages      3.011829e-02 0.0001059585 5.229718e-03 1.622357e-01
## Medicine               3.045107e-03 0.0202502945 9.791281e-04 8.075412e-02
## Law                    2.010258e-02 0.0490544194 8.829356e-03 5.082286e-03
## Cars                   2.031183e-03 0.4113752671 1.991490e-02 1.877384e-02
## Art.exhibitions        8.770033e-03 0.0014321451 7.451090e-02 1.033349e-01
## Religion               5.284058e-03 0.0296696197 1.405414e-02 1.000514e-02
## Countryside..outdoors  3.453971e-03 0.0450290473 8.746148e-03 2.959210e-01
## Dancing                9.039019e-02 0.0011712010 1.013720e-02 2.405039e-02
## Musical.instruments    6.563343e-04 0.0154332889 6.798905e-03 3.661205e-04
## Writing                3.805402e-03 0.0400053840 3.249760e-05 1.935712e-02
## Passive.sport          1.414832e-03 0.0670486661 1.155609e-03 6.425684e-05
## Active.sport           5.122247e-03 0.1317771162 2.782424e-02 1.498733e-02
## Gardening              6.189701e-03 0.0489219759 4.680479e-02 9.032595e-02
## Celebrities            2.984111e-01 0.0043068457 6.091617e-04 3.948379e-03
## Shopping               9.347097e-01 0.0007010665 5.919124e-05 1.042745e-02
## Science.and.technology 2.353859e-02 0.3315413408 4.949962e-02 1.245959e-01
## Theatre                1.781703e-02 0.0084907105 1.622789e-02 1.304953e-01
## Fun.with.friends       2.197029e-02 0.0919943218 2.714292e-01 7.476290e-02
## Adrenaline.sports      3.947313e-03 0.2763028533 4.504048e-02 8.594560e-03
## Pets                   4.198491e-02 0.0026305902 2.339484e-02 1.968519e-02
##                                CV 5         CV 6         CV 7
## History                9.997869e-02 0.0253221741 0.0539264379
## Psychology             1.135940e-03 0.0042514843 0.0212978512
## Politics               5.310673e-02 0.0031936408 0.0693217818
## Mathematics            7.078167e-04 0.0240452374 0.0193706742
## Physics                1.979939e-02 0.0056348835 0.0336472605
## Internet               8.462117e-03 0.0351831687 0.0043007302
## PC                     1.224128e-01 0.0103539472 0.0035614638
## Economy.Management     5.145133e-03 0.0259533770 0.0296526532
## Biology                4.572358e-02 0.0159053419 0.0696601245
## Chemistry              2.071061e-02 0.0246721513 0.0340186798
```

```
## Reading                 2.609935e-02 0.0025453752 0.0551891004
## Geography               1.030735e-01 0.0058104544 0.0404539540
## Foreign.languages       2.668183e-03 0.0056473197 0.0773438196
## Medicine                2.407695e-02 0.0610555463 0.0333551353
## Law                     3.086788e-03 0.0010208522 0.0457301107
## Cars                    1.075796e-02 0.0204523134 0.0020020525
## Art.exhibitions         3.282822e-03 0.0975748613 0.0021372043
## Religion                5.460341e-02 0.0504895946 0.0005286153
## Countryside..outdoors   3.860197e-03 0.0023216769 0.0519800316
## Dancing                 7.194642e-05 0.0007952560 0.0089529323
## Musical.instruments     2.185879e-02 0.0005899201 0.0275726121
## Writing                 7.979284e-02 0.1355863477 0.0253536132
## Passive.sport           3.896968e-04 0.0805961343 0.0009309711
## Active.sport            4.622640e-02 0.1091392715 0.0654085200
## Gardening               9.389926e-03 0.0010640367 0.0751395391
## Celebrities             4.466998e-02 0.0536201475 0.0281883935
## Shopping                5.517972e-04 0.0006543233 0.0024941887
## Science.and.technology  2.303198e-04 0.0222254488 0.0243994295
## Theatre                 8.687079e-03 0.0015933498 0.0188801812
## Fun.with.friends        1.912399e-01 0.0596868938 0.0029773796
## Adrenaline.sports       1.627493e-03 0.0067982016 0.0328579464
## Pets                    3.243521e-04 0.0001973259 0.0010609575
##
##  Y Vars:
##                                    CV 1       CV 2       CV 3         CV 4
## Finances                     0.009225907 0.05136998 0.19602570 0.2621669800
## Shopping.centres             0.814919563 0.01897848 0.03451288 0.0196885741
## Branded.clothing             0.092232968 0.45580011 0.01847839 0.0267174708
## Entertainment.spending       0.004420772 0.32079909 0.40762202 0.0001098041
## Spending.on.looks            0.536439848 0.07218369 0.11959290 0.0135915419
## Spending.on.gadgets          0.001114723 0.75178193 0.08737651 0.0001632996
## Spending.on.healthy.eating 0.007791333 0.07181648 0.08020252 0.6249182550
##                                      CV 5         CV 6        CV 7
## Finances                     3.826422e-02 0.4096931660 0.033254048
## Shopping.centres             4.199537e-05 0.0006059367 0.111252564
## Branded.clothing             3.892194e-01 0.0146267203 0.002924931
## Entertainment.spending       1.147926e-01 0.1040564159 0.048199297
## Spending.on.looks            7.792123e-03 0.0217884727 0.228611420
## Spending.on.gadgets          8.386760e-02 0.0023767308 0.073319204
## Spending.on.healthy.eating 1.836590e-02 0.1404634138 0.056442094
##
##
## Canonical Communalities (Fraction of Total Variance
## Explained for Each Variable, Within Sets):
##
##  X Vars:
##                History             Psychology               Politics
##             0.31242781             0.19048380             0.28050492
##            Mathematics                Physics               Internet
##             0.38327167             0.45589291             0.32669096
```

```
##                     PC     Economy.Management                Biology
##             0.65075320             0.16805175             0.27715470
##              Chemistry                Reading              Geography
##             0.16482695             0.27723066             0.25081221
##      Foreign.languages               Medicine                    Law
##             0.28334900             0.22351629             0.13290639
##                   Cars        Art.exhibitions               Religion
##             0.48530752             0.29104283             0.16463458
##  Countryside..outdoors                Dancing    Musical.instruments
##             0.41131210             0.13556912             0.07327598
##                Writing          Passive.sport           Active.sport
##             0.30393321             0.15160017             0.40048513
##              Gardening            Celebrities               Shopping
##             0.27783591             0.43375397             0.94959767
## Science.and.technology                Theatre       Fun.with.friends
##             0.57603064             0.20219156             0.71406086
##      Adrenaline.sports                   Pets
##             0.37516885             0.08927816
##
##  Y Vars:
##                   Finances           Shopping.centres
##                          1                          1
##           Branded.clothing     Entertainment.spending
##                          1                          1
##          Spending.on.looks        Spending.on.gadgets
##                          1                          1
## Spending.on.healthy.eating
##                          1
##
##
## Canonical Variate Adequacies (Fraction of Total Variance
## Explained by Each CV, Within Sets):
##
##
##  X Vars:
##       CV 1       CV 2       CV 3       CV 4       CV 5       CV 6       CV
7
## 0.05620671 0.07583962 0.04037159 0.06331722 0.03167977 0.02793688
0.03005295
##
##  Y Vars:
##       CV 1       CV 2       CV 3       CV 4       CV 5       CV 6       CV
7
## 0.20944930 0.24896140 0.13483013 0.13533656 0.09319198 0.09908727
0.07914337
##
##
## Redundancy Coefficients (Fraction of Total Variance
## Explained by Each CV, Across Sets):
##
```

```
##
##  X | Y:
##         CV 1         CV 2         CV 3         CV 4         CV 5
CV 6
## 0.0313518677 0.0210185165 0.0060252776 0.0054300528 0.0019025384
0.0010233960
##         CV 7
## 0.0006058013
##
##  Y | X:
##         CV 1         CV 2         CV 3         CV 4         CV 5         CV 6
## 0.116829944 0.068998224 0.020122791 0.011606395 0.005596673 0.003629808
##         CV 7
## 0.001595356
##
##
## Aggregate Redundancy Coefficients (Total Variance
## Explained by All CVs, Across Sets):
##
##  X | Y: 0.06735745
##  Y | X: 0.2283792
```

#FunctionNames

```
ls(c2)
```

```
##  [1] "canvarx"       "canvary"       "chisq"         "corr"
##  [5] "corrsq"        "df"            "xcancom"       "xcanvad"
##  [9] "xcoef"         "xcrosscorr"    "xcrosscorrsq"  "xlab"
## [13] "xrd"           "xstructcorr"   "xstructcorrsq" "xvrd"
## [17] "ycancom"       "ycanvad"       "ycoef"         "ycrosscorr"
## [21] "ycrosscorrsq"  "ylab"          "yrd"           "ystructcorr"
## [25] "ystructcorrsq" "yvrd"
```

#get the degrees of fredom #get the chisquare

```
c2$chisq
```

```
##       CV 1       CV 2       CV 3       CV 4       CV 5       CV 6       CV
7
## 1005.10807  462.47901  246.65617  139.17110   79.54614   38.35986
13.54189
```

```
c2$df
```

```
## CV 1 CV 2 CV 3 CV 4 CV 5 CV 6 CV 7
##  224  186  150  116   84   54   26
```

#calculate the chisquare test

```
round(pchisq(c2$chisq
             , c2$df
```

```
             , lower.tail=F
             )
      , 3
      )
```

```
##  CV 1  CV 2  CV 3  CV 4  CV 5  CV 6  CV 7
## 0.000 0.000 0.000 0.070 0.617 0.947 0.979
```

Extra credits Correspndence Analysis

set to the working directory

```
setwd("C:/Users/rejalu1/OneDrive - Henry Ford Health
System/DSC424/HomeWork3")
```

Load the data file

```
sport  <- read.xlsx(file="../HomeWork3/datasets/sport.xls"
                    , sheetIndex=1)
```

#first 6 rows

```
head(sport)
```

```
##               Scale U.K. U.S. Russia Spain France
## 1    Agree_strongly  230  400   1010   201    365
## 2             Agree  329  471    530   639    478
## 3       Neither_nor  177  237    141   208    305
## 4          Disagree   34   28     21    72     50
## 5 Disagree_strongly    6   12     11    14     97
```

#struture

```
str(sport)
```

```
## 'data.frame':    5 obs. of  6 variables:
##  $ Scale : chr  "Agree_strongly" "Agree" "Neither_nor" "Disagree" ...
##  $ U.K.  : num  230 329 177 34 6
##  $ U.S.  : num  400 471 237 28 12
##  $ Russia: num  1010 530 141 21 11
##  $ Spain : num  201 639 208 72 14
##  $ France: num  365 478 305 50 97
```

#Edit the First column as Rownames of data

```
sport.colnames.rownames = sport[,1]
sport.countries = sport[, -1]
#sport.countries
row.names_scales = sport.colnames.rownames
```

#qa

```
row.names(sport)
```

```
## [1] "1" "2" "3" "4" "5"
```

#convert the data into contigency table

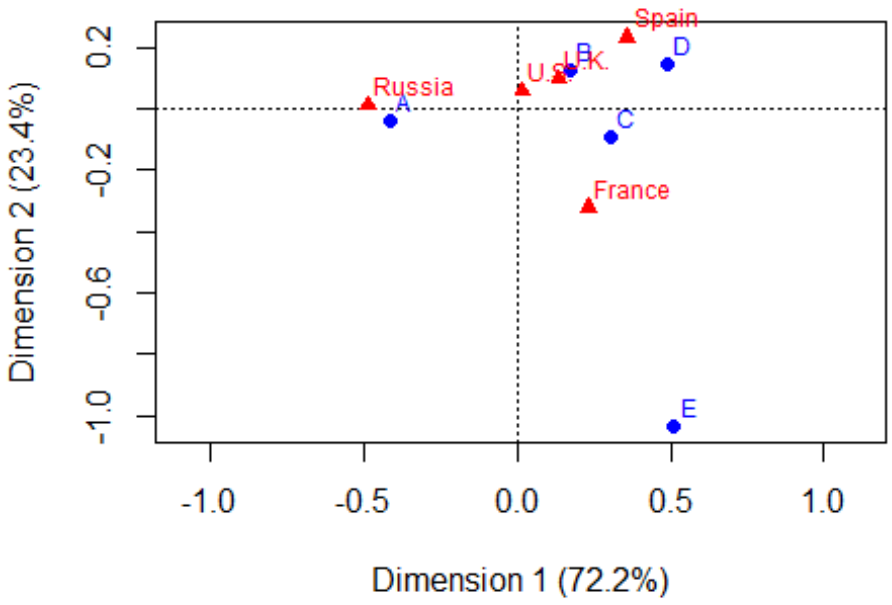
```
dtcountries = as.table(as.matrix(sport.countries))
```

#load the library ca

```
library(ca)
```

```
## Warning: package 'ca' was built under R version 4.0.3
```

```
fit = ca(dtcountries)
plot(fit)
```




```
#fits = ca(row.names_scales)
#plot(fits)
```