da410\_project07\_grahn

Jason Grahn

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# Use R to solve Chapter 13 Page 476, #13.7(a).

Make sure you include the commands and outputs, as well as the interpretations of the outputs.

## Problem 13.7(a)

### 13.7 Use the words data of Table 5.9.

#### (a) Obtain principal component loadings for two factors.

data <- read.table(here::here("assignment08/T5\_9\_ESSAY.DAT")) %>%   
 rename(student = V1,  
 y1 = V2, # informal\_words  
 y2 = V3, # informal\_verbs  
 x1 = V4, # formal\_words  
 x2 = V5) %>% # formal\_verbs  
 select(y1:x2)  
  
head(data,3)

## y1 y2 x1 x2  
## 1 148 20 137 15  
## 2 159 24 164 25  
## 3 144 19 224 27

# Using Principal Components Analysis method with correclation matrix  
fit <- principal(data,   
 nfactors = 2,   
 rotate = 'none',   
 covar = FALSE)  
fit

## Principal Components Analysis  
## Call: principal(r = data, nfactors = 2, rotate = "none", covar = FALSE)  
## Standardized loadings (pattern matrix) based upon correlation matrix  
## PC1 PC2 h2 u2 com  
## y1 0.80 -0.54 0.93 0.070 1.7  
## y2 0.86 -0.33 0.84 0.161 1.3  
## x1 0.88 0.27 0.85 0.147 1.2  
## x2 0.71 0.66 0.94 0.057 2.0  
##   
## PC1 PC2  
## SS loadings 2.67 0.90  
## Proportion Var 0.67 0.22  
## Cumulative Var 0.67 0.89  
## Proportion Explained 0.75 0.25  
## Cumulative Proportion 0.75 1.00  
##   
## Mean item complexity = 1.6  
## Test of the hypothesis that 2 components are sufficient.  
##   
## The root mean square of the residuals (RMSR) is 0.07   
## with the empirical chi square 0.95 with prob < NA   
##   
## Fit based upon off diagonal values = 0.98

Factor loadings are correlations between the factors and each of the variables. Reviewing the factor loadings for the dataset shows that Factor 1 has a strong relationships with ALL variables and can be considered practically significant across the board. When we review factor 2, we see some practical significance, however, we also see much weaker correlation for the and variables informal\_verbs and formal\_words.