Homework 5 Fall 23

Due in Canvas using SubmitHW5 by Monday, December 04

11/30/2023

**Total points: 35**

**Note: No R code should be provided. You may only insert relevant R outputs when answering questions. Your scores not only depend on the correctness of the problem, but also on the presentation style.**

In this homework, you will work on mtcars data from “datasets” package in R.

1. [5 points] Read the description of the data from Help page. Name the variables that are discrete, continuous and categorical.
2. [4 points] Decide how many factors you may consider for factor analysis by
3. finding number of eigenvalues that are greater than the average eigenvalue. (You should report all the eigenvalues in your answer).
4. drawing a plot of eigenvalues and checking the point beyond which eigenvalues are relatively small and the line graph connecting has a sharp drop. (You should provide your graph here.)

Now, perform a factor analysis using 3 factors with “varimax” rotation and answer the following questions.

1. [4 points] Is it sufficient to have 3 factors in this study? Justify your answer by providing the test statistic value, and p-value.
2. [4 points] Using a cutoff value of 0.6, write down the variables that constitute factors 1, 2 and 3.
3. [4 points] What are the estimated error variances associated with drat and am variables?
4. [3 points] Show the calculation how the sum of squared loadings for factor 1 is 4.38.
5. [2 points] How much variance among the observed variables is explained by factor 2?
6. [3 points] Show the calculation how the proportion of variance explained by factor 2 is found to be 0.320.
7. [2 points] Write down the variable that is highly correlated with factor 1. What is this correlation value?
8. [2 points] Write down the variable that is highly correlated with factor 2. What is this correlation value?
9. [2 points] How much variance in variable hp is explained by all the factors in the model? What do we call this variance?