

(the last) Long Problem Set 9

The file “MetalMix.RData” contains three objects: a dataframe with the name “metals” that contains absorbance values for 27 solutions at eight wavelengths, a vector with the name “score.labels” for identifying points on a scores plot, and vector with the name “rot.labels” for identifying points on a loadings plot. The 27 solutions were prepared by diluting stock solutions of 0.10 M $\text{Cu}(\text{NO}_3)_2$, 0.10 M $\text{Ni}(\text{NO}_3)_2$, and 0.10 M $\text{Co}(\text{NO}_3)_2$ to create

- three pure solutions (one each of Cu^{2+} , Ni^{2+} , and Co^{2+})
- eighteen binary mixtures (six each of Cu^{2+} and Ni^{2+} , Cu^{2+} and Co^{2+} , and Ni^{2+} and Co^{2+})
- six ternary mixtures (each containing all three metal ions)

This is the same data used for LPS08 and you must complete that long problem set before you can begin work on this long problem set. Using this data and a separate handout that identifies the ions present in each solution (which is available to you when you turn in your answers to LPS08), answer the following questions

- (1). Complete a cluster analysis of the data in the dataframe “metals” using the clustering methods single, complete, and average. You do not need to center and scale the data. Examine the resulting dendrograms and discuss their individual success and/or lack of success in identifying meaningful clusters among the 27 samples.
- (2). Transpose the data in the dataframe “metals” and complete a cluster analysis using the clustering methods single, complete, and average. You do not need to center and scale the data. Examine the resulting dendrograms and discuss their individual success and/or lack of success in identifying meaningful clusters among the eight wavelengths.