

Assignment # 5, Stat 8053, Fall 2013

Reading

Class notes on MANOVA; Härdle and Simar Chapters 9–10

Problems

Due date is Wednesday, November 20. Class on November 27 in CANCELED.

1. The data in the file

```
loc <- "http://www.stat.umn.edu/~sandy/courses/8053/Data/adopted.rda"
load(url(loc))
```

are from a classic (1949) study of adopted children. The recorded variables are the **AMED**, adopted mother's years of education; **BMIQ**, the birth mother's IQ score, and the child's IQ scores at ages 2, 4, 8, and 13. Also in the file are two additional variables, **famed** and **fbmiq** that are factors created by dividing **AMED** at the median and **BMIQ** into three nearly equal groups.

- (a) Provide a reasonable graphical view or views of the data. Does Manova appear sensible?
 - (b) Fit Manova, using the factors and their interaction as predictors. Obtain appropriate tests based the the Pillai, Wilks, Lawley-Hotelling and Roy methods. Summarize results, including any graphical summaries that you think might help.
 - (c) Fit again using the original predictors **AMED** and **BMIQ** as regressors, and summarize results.
 - (d) Obtain a test that the coefficients for **AMED** and **BMIQ** are simultaneously equal to zero, essentially a test of the "overall" regression.
 - (e) Treat age as a repeated measure, and fit the repeated measures Manova. Summarize results. Does the approximation used to get significance levels matter?
2. This problem is refers to data for the period 1999-2006 and was collected from the CDC Wonder website. It gives the reported age-adjusted mortality rates per 100,000 population in 19 categories for the 50 states and the District of Columbia.

```
> loc <- "http://tinyurl.com/ybu6w48"
> data <- read.csv(url(loc), header = TRUE, row.names = 1)
```

The row names in the data file are the state names. The other columns are given in table below.

Use only D1–D19, or some relevant subset of them and use both factor analysis and PCA to explore for similarities among the states and among the causes of death.

State.Code	State number
Population	Population
D1	Certain infectious and parasitic diseases
D2	Neoplasms
D3	Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism
D4	Endocrine, nutritional and metabolic diseases
D5	Mental and behavioural disorders
D6	Diseases of the nervous system
D7	Diseases of the eye and adnexa
D8	Diseases of the circulatory system
D9	Diseases of the respiratory system
D10	Diseases of the digestive system
D11	Diseases of the skin and subcutaneous tissue
D12	Diseases of the musculoskeletal system and connective tissue
D13	Diseases of the genitourinary system
D14	Pregnancy, childbirth and the puerperium
D15	Certain conditions originating in the perinatal period
D16	Congenital malformations, deformations and chromosomal abnormalities
D17	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified
D18	External causes of morbidity and mortality
D19	Diseases of the ear and mastoid process