

Stat 425 HW8

Fritz Scholz

For the first two problems you may/should use appropriate R functions introduced in class and posted on the class web site.

1. Problem 49 (p. 150 of Textbook). While the ordered data categories allow ranking (using midranks where appropriate) you may want to use scores of -2, -1, 0, 1, 2 for the five categories, as suggested in the next problem. Such scores will not change the rankings but they facilitate processing in R. Give your coding steps (or function) and the results (p-values and plots).

2. Problem 55 (p. 151 of Textbook). Here the scores are needed for the alignment process. Give your coding steps (or function) and the results (p-values and plots).

3. Explore the formula 3.32 of the Textbook (valid in the case of block size 2) for $N = 20$ blocks. Write a function that generates such block data pairs (x_i, y_i) from $y_i \sim \mathcal{N}(i \times .1 + \Delta, 1)$ (e.g. `y=rnorm(N, (1:N)*.1+Delta,1)`), and $x_i \sim \mathcal{N}(i \times .1, 1)$, $i = 1, \dots, N$ and which computes \hat{W}_s , V_s and S_N according to their respective definitions. For V_s you may want to use `V_s = wilcox.test(y,x,paired=T)$statistic`. Do this $N_{\text{sim}} = 10$ times and accumulate vectors of length $N_{\text{sim}} = 10$ for the three statistics \hat{W}_s , V_s and S_N . Check the formula relationship by plotting \hat{W}_s against the appropriate linear relationship of V_s and S_N and superimpose the main diagonal. Do this for $\Delta = 0$ and $\Delta = 1$. Describe any change that you perceive.

Write a separate function that simulates \hat{W}_s , V_s and S_N (with $N = 20$) $N_{\text{sim}} = 100$ times using the same types of data sets of $N = 20$ pairs $x_i \sim \mathcal{N}(i \times .1, 1)$, and $y_i \sim \mathcal{N}(i \times .1 + \Delta, 1)$ for $i = 1, \dots, N$ to calculate each of the three statistics. Plot the $N_{\text{sim}} = 100$ values of \hat{W}_s against the corresponding values of V_s . Plot a line to this data pattern via `abline(lsfite(Vs,Whats))`. What does to plot suggest or confirm?

Give your function codes and the resulting plots.