

Multivariate Data Analysis. Home Assignment 3

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On the Canvas page, you can find the file Knee.xlsx with data from a medical study involving patients with knee injuries and a control group. Please choose the appropriate tests to investigate the following questions and draw your conclusions:

Task 1: Consider the four variables that measure strengths in Quadriceps and Hamstrings (both concentric and eccentric). Test simultaneously if there is a difference **between the injured and non-injured knees** for the two treatment groups, separately. If there is a significant difference, which variables are significantly different? (Paired comparisons)

Task 2: Consider the non-injured knee for all subjects¹. Test if there are a difference **between the first, second and third trials for the long jumps simultaneously**. If there is a significant difference, do pairwise comparisons among different trails. (Repeated measures)

Task 3: Consider the four variables that measure strengths in Quadriceps and Hamstrings (both concentric and eccentric) in the injured knees. Test if there is a difference **between the two treatment groups**. If there is a difference between treatment groups, find out between which variables there are differences. (Comparisons between two populations ²)

Task 4: Consider the four variables Quadriceps and Hamstrings (both concentric and eccentric) for the injured knees for all subjects. Conduct a MANOVA to **test if the Treatment group and Gender affect the responses**. If significant results are found, proceed with appropriate univariate analyses. (MANOVA)

¹For the control group, we define the injured knee is on the non-dominant leg side

²This part is not included in my slides. You can read the textbook, section 6.3, page 284-296.

Suggested contents in your report:

- Present the model, null hypothesis, test statistics, and results
- Discussion and Conclusion.
- Extra suggestion (NOT oblige): You may apply R package 'MVN' to check normality assumption and detect potential outliers.

Note: You are required to solve the tasks from 1 to 3 by your own code. For task 4, you are allowed to apply the function 'manova' in R base.