Statistics for Psychologists - PSYC122

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Chapter 1

Intro

This is a collection of tuition material written for Psychology undergraduates at Lancaster University. At the moment the content represents the "lab materials" for the PSYC122 module in first year. As was the case for PSYC121, they feature tuition of programming with R, building on the skills you developed last term.

1.1 Analysis labs and 'pre-lab work'

Some parts should be completed before you attend the lab session (watching lectures, reading chapters, pre-lab activities). All the links to the different materials and activities are also in the 'to-do list' for the relevant week on Moodle.

Chapter 2

Week 11: Correlation

Written by Margriet Groen (partly adapted from materials developed by the PsyTeachR team a the University of Glasgow)

Today we will take a look at correlation as a measure of association between two numerical variables. We will create scatterplots to visualise correlations, we will run a correlation analysis and we will practise interpreting and reporting the results.

2.1 Lectures

The lecture material for this week is presented in two parts:

1. **Theory**
2. **How to**

2.2 Reading

The reading that accompanies the lectures this week and next week is from **the free textbook by Miller and Haden**.

Chapter 10 gives you a brief overview of what correlation and regression are. Chapter 11 introduces correlation in more detail. Both chapters are really short but provide a good basis to understanding correlational analysis. Please note, in Chapter 10 you might encounter some terminology that is unfamiliar to you. It talks about ANOVA, which means Analysis of Variance and about GLM, which means General Linear Model. Having a quick look at Chapter 1 of Miller and Haden also helps with that.

2.3 Pre-lab activities

After having watched the lectures on correlation and read the textbook chapters you'll be in a good position to try these activities. Completing them before you attend your lab session will help you to consolidate your learning and help move through the lab activities more smoothly.

2.3.1 Pre-lab activity 1: Visualing correlations

Have a look at **this visualisation of correlations** by Kristoffer Magnusson.

After having read Miller and Haden Chapter 11, use this visualisation page to visually replicate the scatterplots in Figures 11.3 and 11.4 - use a sample of 100. After that, visually replicate the scatterplots in Figure 11.5.

Each time you change the correlation, pay attention to the shared variance (the overlap between the two variables) and see how this changes with the changing level of relationship between the two variables. The greater the shared variance, the stronger the relationship. Also, try setting the correlation to r = .5 and then moving a single dot to see how one data point, a potential outlier, can change the stated correlation value between two variables.

2.3.2 Pre-lab activity 2: Guess the correlation

Now that you are well versed in interpreting scatterplots (scattergrams) have a go at **this online app on guessing the correlation**.

This is a very basic app that allows you to see how good you are at recognising different correlation strengths from the scatterplots. We would recommend you click the "Track Performance" tab so you can keep an overview of your overall bias to underestimate or overestimate a correlation.

Is this all just a bit of fun? Well, yes, because stats is actually fun, and no, because it serves a purpose of helping you determine if the correlations you see in your own data are real, and to help you see if correlations in published research match with what you are being told. As you will have seen from the above examples, one data point can lead to a misleading relationship and even what might be considered a medium to strong relationship may actually have only limited relevance in the real world. One only needs to mention Anscombe's Quartet to be reminded of the importance of visualising your data, which leads us to the final pre-lab activity for this week.

2.3.3 Pre-lab activity 3: Anscombe's quartet

Anscombe (1973) showed that four sets of bivariate data (X, Y) that have the exact same means, medians, and relationships can look very different when plotted. You can read more about this **here**.

All in this is a clear example of why you should visualise your data and not to rely on just the numbers.

2.3.4 Pre-lab activity 4: Getting ready for the lab class

2.3.4.1 Remind yourself of the basics of how to work with RStudio.

You might want to re-watch some of the videos John and Tom provided in PSYC121:

- Video on how to upload a zip file and import data (3.5 mins)
- Video on basic operations in RStudio (8 mins)
- Video on using scripts and using the console (3 mins)

2.3.4.2 Create a folder and a Project for Week 11.

Click here for the instructions from Week 6 of PSYC121 if you are unsure.

2.3.4.3 Get your files ready

Files to download for the lab activities as well as the lab activities themselves will be added later this week.