Video: "MATLAB Instructions for Lab 3" (5:56)

Video (00:00)

Let's talk about Lab 3. In Lab 2, you used some basic statistics to analyze your sleep diary. Now, let's look at the relationships within your diary. What might cause what? What has more effect on how much sleep you get; your bed time or your wake time? Does napping affect your SSI? How about caffeine? Just like in Lab 2, you'll be using your sleep diary data for the analysis. The data is in the same format as before, so you'll need to pre-process it so that it reflects values you'll understand, with "0" being midnight (12:00 AM), 11:00 PM is a "-1" and 1:00 AM is a "+1." Make a directory called Lab 3, make a copy of your data, and create a Lab 3 script.

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In the first part of the analysis, you'll be performing correlations, which we covered in Lesson 8. Correlation works on columns, but your data is already in columns so you don't need to worry about this. You'll need to perform and output these six correlations.

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I did my correlations and here are the outputs. Since a "+1" means a strong positive correlation and a "-1" means a strong inverse correlation, we would expect to have a strong positive correlation between bed times and wake times, wake times and amount of sleep, since when one goes up, so do the others. As expected, I do have a positive correlation between bed time and wake time, and a very strong positive correlation between wake up and total sleep, but a surprisingly inverse correlation between bed time and total sleep. This is interesting - I need to remember this for graphing.

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In the week 1 versus week 2 comparison, we had a holiday on the second Monday, so you would think the main difference between those two weeks is that Monday, and you can see a slight positive correlation in bed time, but my wake up times are definitley not the same with a strong inverse correlation. Also, my SSI had almost no correlation to my total sleep. Remember, a good SSI is a low number, and a good amount of sleep is higher, so you would expect an inverse relationship, which is a "-1" correlation. These are not particularly interesting and will probably not be graphed later.

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You will be generating ten graphs for Lab 3. The first four are histograms, showing distributions of your wake up, your bed time, your hours of sleep, and total daily sleep. Here are mine. Mine are going to look slightly different because I've added white bars in between them to make them easier to see. Only one of mine has anything close to a bell shape - the hours of sleep. But, like you, I have different activities on different days of the week, so I don't wake up at the same time every day, so it doesn't make sense that I would have a bell shape.

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The next graph where you plot four different items shows how these are related. I add the SSI to see how that might be affected. Mine is pretty boring. Notice on mine you cannot tell when the weekend is. Remember, we started collecting bed times on a Wednesday, so Friday bed time would be day 3, and Saturday wake time would also be day 3. My Fridays are pretty consistent, but Saturdays and Sundays are not based on my activities, as can be seen for days 11 through 13 which was the holiday weekend, and days 18 and 19.

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On the next two, you get some freedom to explore what is unique or interesting about your data. I tell you to construct two line graphs, but I don't tell you which ones to plot. I chose bed times and total hours of sleep and wake up and hours of sleep because of that odd correlation I noticed earlier.

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Here is my bed time and total hours of sleep and it look like it's all over the place. No weekends. No obvious pattern.

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But now I compare my wake up times and my total hours of sleep and there's a fairly tight match. But remember, this was the one where I had a correlation of "+0.7."

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Lastly, you need to generate three scatter plots with interesting correlation. Earlier you generated and outputted six correlations, which might not be enough to generate three interesting values. Any of the choices where you only had a choice of yes or no, such as caffeine consumption or alarm use, are not conducive to these graphs and so should not be used. If you are not a heavy or a frequent napper, it also should not be used. Use variables where there is a variety of values. I only generated two as examples.

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In this one, I'm looking at the bed time and wake time with a medium positve correlation of "+0.3." The best fit line is on there and so is the equation.

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In the second one that I've given you as a demonstration, I'm showing you the wake up time and the total hours of sleep. That's got that "+0.7" correlation. Notice my low numbers down in the lower left are low and early and up in the right are high with a best-fit line. That's a really nice strong positive correlation.

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After you generate these, publish the entire script and check to make sure there are no errors. You might want to copy your graphs into a Word document so you can reference specific ones for your bullet point analysis. Write three bullet points on the correlations and scatter plots, and three on the other graphs, making sure to note which graph you are referring to. Save that document, put it in your Lab 3 directory, zip it up, and submit it on BlackBoard. Make sure to check your zip file contains your published product, your Lab 3 script, your data file, and your Word document.