Team Research Project --- Lab Guide

1 Overview

For the remainder of the semester, you will work on your team project. Project management (the process of planning, organizing, and overseeing a project from start to finish) is an important aspect of research. From Week 12 to the end of the semester, you will manage your time to complete your analysis and communicate the results of your project.

2 Getting Started

To begin your analysis, download the Research Project Colab Notebook and the HDF5 data file from Canvas. The data file contains all of the class's measurement data from the entire semester. **You will use this one Colab notebook for the rest of the semester.** It includes helper functions for querying the data and performing common analyses. You may need to write some of your own code, but these functions will get you started.

We suggest the following approach:

1. **Identify your data.** Determine which cells, pixels, dates, and measurement types you need for your analysis. These should be outlined in your Team Research Proposal. Use the Query code blocks in the Colab notebook to find and select your data.
2. **Inspect the raw data.** Plot some of the raw data to make sure it looks as you expect before doing further analysis.
3. **Build your analysis.** Work on the analysis and visualizations you proposed. Make sure your analysis and visualizations support your research claims.

3 Tips for Staying on Track

You have already developed a clear question, analysis plan, and timeline in your project proposal. The next step is to carry that plan through to completion, adapting as you learn from your data. Research rarely goes exactly as expected, and that is part of the process.

- **Revisit your proposal.** Use your research question, analysis plan, and timeline as a guide. If your data reveals new insights or challenges, adjust your plan and document what changed and why.
- **Record your progress.** Keep notes on your data selection, analysis choices, and interpretation of results. Documenting your reasoning now will make writing your Research Memo much smoother.
- **Focus on your main figure(s).** Your figures and tables should communicate your results clearly and effectively.
- **Communicate.** Keep your team updated on progress and obstacles. Collaborate on both coding and writing so everyone understands the full project.
- **Check for consistency.** Make sure your summary slide, memo, and figures all tell the same story.
- **Reflect as you go.** Think about the skills you are developing (analyzing data, troubleshooting, writing, collaborating) and how they connect to doing research beyond this course.
- **All results are valuable.** Whether significant, null, or inconclusive, each outcome helps build understanding and contributes information to our collaborators at NLR. Your goal is not just to

produce a result, but to demonstrate how your team proposed a question, worked collaboratively to answer it, and effectively presented your findings.

4 Remaining Activities

- Attend your lab section each week through the end of the semester. For additional help with your analysis, attend TA help hours.
- Read the Research Memo Guide and the Summary Slide Guide. Each guide describes the required elements and the rubric used for evaluation.
- Read the Report to Future Researchers Guide.
- The final research meeting will be **Thursday, December 10th**. Robert Tirawat and Dr. Joe Berry will review your summary slides and discuss your findings, the semester overall, and next steps.
- Submit all remaining assignments (see below).

5 Assignments

All assignment due dates can be found on the Canvas calendar. **Please check the calendar regularly to stay up to date on deadlines and availability.**

5.1 Team Assignments

- **Team Project Summary Slide** — Your team will create one slide (in Google Slides format only) to share the main takeaways from your research question. The slides will be shared with Robert Tirawat and Dr. Joe Berry prior to the final research meeting. To submit to Canvas, download your slide as a PDF and then upload it to the 'Team Project Summary Slide' assignment.
- **Research Memo** — Your team will write a Research Memo summarizing your analysis and results for your research question.
- **Research Project Colab Notebook** — As with all other Colab notebooks this semester, you will submit .ipynb and PDF files of your Research Project Colab Notebook.

5.2 Individual Assignments

5.2.a Reflections

- Week 12 — Becomes available before your Week 12 lab session
- Week 13 — Becomes available before your Week 13 lab session
- Week 14 — Becomes available before your Week 14 lab session

5.2.b Assessments

- Post-Assessment Survey 1 — Becomes available before your Week 14 lab session
- Post-Assessment Survey 2 — Becomes available before your Week 16 lab session
- Post-course survey — Becomes available before your Week 16 lab session

5.2.c Report to Future Researchers

These reports are written for next semester's incoming researchers. You will summarize the project for new students in the course, including its goals, methods, findings, personal learning reflections, advice for future students, and suggestions for continuing the research. Becomes available before your Week 16 lab session.