C2C Erin Firth

Math 378, *Applied Statistical Modeling*

Dr. Hitt

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<div align="center">Final Project Final Reflection</div>

Your reflection must be a computer-generated PDF file of no more than 6 pages and must contain the following:

1. Learning Goals of Math 378
   a. Develop an applied knowledge of traditional and computationally intensive statistical models.

Throughout this project, I learned how the statistical models that we have been learning about over the past two semesters can be used on a new data set for an applicable purpose. While most of the code comes from Alex Gold's GitHub, the application of the models onto a data set that is wrapped up and summarized on a Quarto website is a skill that is new and clearly useful. This project allowed me to see what type of modeling is useful in real studies and how that data can best be presented. I believe I earned a "B" in this learning goal because I relied on someone else's written code.

   b. Advance, use, and improve computer programming skills.

This final project greatly tested my ability to advance, use, and improve computer programming skills. While I may not have had all of the necessary skills to complete this project at the start of my work, I used all of my resources to teach myself how to accomplish what needed to be done. Alex Gold's code was useful for the statistical modeling portion of the final project but failed to teach me everything I needed to know to put together a successful website. So, I used the internet, ChatGPT, and my brother (a software engineer) to learn those skills that I lacked. The repetition of debugging and learning how to add a special function or design to the website was the result of hard work in finding the necessary resources to fully understand what I wanted RStudio and my Quarto website to do and how to make that happen. ChatGPT, the internet, and my brother were helpful in some regards but were unable to assist with every problem I had. So, I used problem solving skills to improve my computer programming skills by coming up with creative fixes for problems I was having that no one else seemed to be able to solve. Additionally, creating a full website was far more intensive programming wise than any project I have completed up to this point. So, simply working through this project allowed me to test my programming skills, identify my weaknesses, and find a way to strengthen them. One example of this is the inclusion of images. I asked ChatGPT how to include images and while the code that it provided worked for one of my three images, it did not for the other two. However, I used what I learned about inserting images in RStudio to come up with my own solution for programming the images into my website. I believe I earned an "A" in this learning goal because of the immense progress I made in my RStudio programming skills.

   c. Continue to develop the habits of mind to be an independent learner.

To me, being an independent learned does not mean that I have to complete everything on my own. Rather, it means not having to rely on someone else to do everything for me and being able

to use my resources to assist when necessary. In this project, I completed as much as I could on my own. However, like any programming assignment, I was left with error after error that I just couldn't figure out how to resolve. So, I fell back on my independent learner habits of identifying what resources I had available to me and how exactly they could help. For example, ChatGPT is useful for some coding bugs. However, it lacks the human thinking aspect. So, when Chat failed to identify the true error, I used posit threads to find others who experienced similar issues and tried to apply the solution that worked for them. If that didn't work, I could turn to my brother, a software engineer, to help me look through my code and identify the portion that was truly causing the error. Chat and internet threads cannot scroll through the code on my computer and help identify where the actual error is, but a real person can. One specific example of this is my inability to install packages. I had the majority of packages installed in RStudio and everything was running fine until ~1 week before the due date. At this point, I opened RStudio, ran my code, and magically none of the necessary packages were installed. When I attempted to install them, I could not. I went to ChatGPT for help but after doing everything it suggested, nothing worked. So, I scoured the internet for other people with similar issues and asked my brother for help. Together, we found a posit thread that discussed similar issues and possible solutions. I tried all of them until one worked. After that, I ran into more issues with installing packages. This time, without the help of my brother, I pieced together different posit threads that discussed installation issues and managed to find a combination of solutions that worked for me. In summary, while I may not have completed every single piece of this project on my own, I reinforced habits of an independent learner by finding and utilizing resources that could help me accomplish my goal. I believe I earned an "A" in this learning goal because of my ability to use resources to help me succeed as an independent learner, without relying on a Math 378 instructor to debug and complete aspects of the project for me.

2. Assess your learning and effort against the grading criteria on the next page AND answer the following ques☐ons. A paragraph for each ques☐on should be sufficient.

     a. What skills, knowledge, or experience did you gain from working on this project? If you believe you earned an "A" on the project, you should discuss how you went above and beyond the project requirements here.

I learned a lot from this project, but not much about applied statistical modeling. I learned that although computers should theoretically be predictable and redundant, there are sometimes issues that just straight up do not make sense. Such as, code does not run but when I restart RStudio and change nothing else, it runs perfectly. Or, the code that worked for one thing, even if copied and pasted in another section, does not always work properly the next time. The biggest lesson I learned through this project is how to trouble shoot. Not in the sense of scouring my code to see if I left out a "." or spelled something wrong, but rather how to trouble shoot fundamental program issues such as unsuccessful installation of packages. I learned new strategies for finding solutions to problems that I had never seen before and learned how to use ALL resources available to me. I learned how to more effectively engage with ChatGPT and what sorts of things it can and cannot actually help me with. Once I worked through all of the fundamental issues I was having, I worked to personalize my project. I changed the colors of the website and added a detailed "About" page, to include images of each penguin, a description of the study, and a description of the group that performed the study collecting data on the three

types of penguins. For this reason, I believe I earned an "A" on this project for doing more than the basic level requirements.

b. What are your strengths and weaknesses after working on this project?

After working on this project, I believe my biggest strength is my determination and perseverance. I never gave up when I ran into an error and simply searched harder for an answer. Although there were times when I wanted to just give my computer to an instructor and have them figure out my issues, I knew that I would learn more doing it myself. I worked for hours on end to fix everything I could and didn't stop until I had a functioning website. I believe my biggest weakness after working on this project is my attitude. There were times when I was so frustrated and beaten down that I was extremely inefficient at my work. I let the frustrations take over my mind and instead of staying focused and working to resolve the issue, my brain was focusing on how mad I was or how annoying the RStudio and Quarto programs were to work with.

c. What was the most interesting part of the project? This could be a particular lab or something you explored on your own.

I believe the most interesting part of the project was exploring how changes in code affected the physical website. That is, how the specific way in which I coded or typed something made it appear on the website. For example, when I was working on adding pictures to the "About" page, a slight change in the code made the difference between having a description of the image pop up when the mouse is hovered over the image versus not. Similarly, how I typed the title of each section affected how it showed up on the website. That is, some titles show up as links within the page and some do not. Messing around with and understanding how these changes happen allowed me to better understand the human factors portion of computer programming and creating user interfaces.

d. What are some of the challenges you faced working on this project? How did you persist through difficulties?

I have previously discussed many of my challenges and how I worked through them but to summarize, my biggest challenge was installing packages. No matter what I tried, I could not get RStudio to find the package I needed, despite knowing that it existed. I worked with ChatGPT to find possible solutions but when none of those worked, I scoured the web for discussion threads in which other people discussed similar issues and the solutions that worked for them. This is how I ended up fixing nearly all of my issues. Although, not every thread's recommended solution worked. So, I had to piece together different solutions from different threads until I got something to work. To say it was a frustrating process is an understatement. I contemplated whether the issues were fixable at all but knew that I could not just give up. So, through the help of my brother, I continued to search for solutions for each issue I ran into.

e. What other resources did you use to complete this project? How did you utilize these resources to learn and improve your skills?

As previously mentioned, the three main resources I used were ChatGPT, the internet (posit discussion threads, specifically), and my brother. The posit discussion threads allowed me to view other programmers' code and errors generated and the solutions that they used that worked. I utilized these by finding multiple users' errors similar to my own and piecing together a

solution that worked for me. This taught me how to use my resources to learn from others' problems. I called my brother for help because his job revolves around coding. Although he does not have experience with Quarto or RStudio, he was a vat of knowledge for how to go about troubleshooting. He may not have had the answer himself, but he taught me diagnostics to run and how to effectively search for answers online. Below I will discuss my use of ChatGPT.

Specifically, if using generative AI such as ChatGPT or another LLM, you must describe the following:

      i.   How the information or material was generated (including the prompts used)

The information I gained from ChatGPT was generated through a series of prompts describing what I was trying to do, what code I used, and what the error was. I would then ask Chat how I can fix the error or what I was doing wrong. My conversation with Chat is linked below.

      ii. What the output was (include links to your chat transcripts)

https://chat.openai.com/share/248a70d4-51c6-49bd-bcc0-f67ae9aba28e

      iii. How the output was altered by you

When Chat gave me a code output, I copied and pasted it into RStudio. However, sometimes Chat would give me a code solution for Python when I needed it in R or vice versa. In these cases, I relied on my knowledge of the program to translate the code to the other language. Additionally, when Chat gave me an entirely text response, I used it to deepen my understanding of the topic in order to determine the next steps on my own. I would go back and forth with Chat quite a bit when the solution that it offered did not work.

      f.   What is one way you could improve your DevOps skills?

One way I could improve my DevOps skills is by taking what I have learned and applying it to other uses. In this project, I learned quite a bit about Quarto websites but unfortunately did not have the opportunity to explore much more on my own. I have the basics down but know that there is so much more I could do with these programs. In the future, I can practice the skills I have learned from this project through more data analysis of varying data sets to explore information that has a practical use and can use my knowledge of Quarto to create a user friendly interactive site to showcase the analysis findings.