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CSPB 3112 - Professional Development in Computer Science

Final Project Report

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Introduction

This project was based around one of my hobbies and held a couple of different learning goals. First, I wanted to get more comfortable using ESRI's ArcGIS platform for mapping and displaying data upon maps. Secondly, I wanted to get better at website configuration and deployment. The data I wanted to map were my ventures into the winter backcountry of Colorado. I enjoy splitboarding away from the busyness of resort skiing, and can use a tracking software to collect data on my exact location. At the end of this project, I wanted to have a working website that housed my trip information and displayed those trips on an interactive map on the website.

Background

This is an important project to me because my future goals include working in the collection and display of mapping data. I find both maps and big data incredibly interesting and want to pursue a career path involving both of them. Being passionate about what I was mapping also helped me stay focused on this project. It was incredibly satisfying to share the project with friends who I splitboard with before it was finished and show them the trips that we had taken, mapped out and written about. I also think having a fundamental understanding of webpages and how they are typically set up is a pivotal skill to have moving forward, especially in a job market that seems to value broader skill sets more and more. Before this degree, I was also completely new to the Computer Science scene, and so had never stood up a website before. This project taught me a ton about easy and hard ways to do things, and if I could start over, I would definitely take a slightly different route, but I am glad I got this experience now to learn from.

Methodology, Materials, and Methods

Most of my knowledge for this project came from reading and following tutorials and then modifying my result to better fit my needs. I find this is a very helpful way of learning for

me because it allows me some room to fall back if I get a little too lost in the weeds, and provides a basic path to success that I can follow. When I had an issue, I found myself piecing together solutions from multiple sources, which tested my ability to find and apply an answer to a question and was great for my development.

I choose Next.js as my language of choice to build the bones of my website. I had some interaction with it in a group project in a past class but that was limited. I had enjoyed my time working with it in that class, and wanted to dive deeper to get a fuller sense of use. Using Next.js also required some proficiency in React since that is what the framework is built upon. There is an incredibly helpful tutorial on their website that helps get your feet wet and explain how the backend is set up with dynamic and static routing. I had also never used Tailwind before, and found myself on their documentation page for longer than expected trying to get divs to sit in the correct places.

The other major software that I used was ArcGIS. This came with its own set of challenges because they currently do not have a Mac version of their software. I ended up running a windows boot and downloading ArcGIS into that. It ran a bit slower than it would normally, but it still worked and I got to learn how to set up an alternating operating system which was an added bonus I did not anticipate. ArcGIS is pretty extensive and has multiple mediums for interacting with their software. I focused on ArcGIS Pro and ArcGIS Online for this project. ArcGIS Pro is downloaded software and allows much more manipulation of spatial data. This is where I imported my raw data to clean and organize into the proper format (a layer) to then export to ArcGIS Online to edit and create a web scene that could be shared on my site. The parent company for ArcGIS is ESRI, and they have a very extensive learning section for new users. I ended up taking multiple (free!!) online courses complete with videos, example projects, and quizzes. These were especially helpful to work through early in the project to build up a comfort with the ArcGIS interface and workflow.

Results

At the conclusion of this project I feel much more comfortable operating in ArcGIS. This was my main goal and I am very pleased with how my knowledge of all of their offerings has developed. As I alluded to earlier, their products work in tandem to provide a final project, and I was able to start in ArcGIS Pro to synthesize and convert my raw data into a form that ArcGIS

Online could understand. Once I moved it over to ArcGIS, I was able to create a map with all of my routes, bookmark the routes so a user could jump from one to another, and add information in a pop-up bubble regarding the statistics of each trip. Being able to go through this process multiple times for each backcountry route helped to solidify this process for me and makes me much more comfortable with the entire system. In my original project assessments I said "I want to develop hands-on skills with GIS, and specifically ArcGIS." and "I will know my project is done when I can see my backcountry trips displayed on my site.", I achieved both of these and am pleased with the integration of ArcGIS to my site.

I also developed much more skill with Next.js and by proxy, React. I had not taken on an entire project with this language before and found myself moving slowly in the beginning. What I found was that the setup of this framework required more work in the setup phase, but then was very conducive to a "copy-paste" style and creating more pages became much easier. I was pleased that I could understand and create both static and dynamic routes and link pages together with different looks. I did not achieve as much of my UX/UI goals, while I am ok with how my pages are routed together, there is much to be desired with the look and flow of each page. I will need to continue to work with Tailwind to create more dynamic and interactive interfaces that are more enjoyable to look at/scroll through.

Discussion/Reflection

I reached some of my goals, but not all of them. As mentioned above, I feel good about how the map is displayed on my site and the information that is carried there that the user can interact with. My original plan was to set up a database that housed all of the route information and that I could update using a form on my website. As I got into ArcGIS more, I realized this was a much taller task than I had anticipated. Because of this, I made the pivot to converting and mapping my routes in a more manual fashion. Linking these to a database is certainly a future goal, and while it will take more time, is something that I think will stand out even more in a portfolio, especially in this field. I still feel good about the progress that I have made, but at the start of this project, I didn't realize how much there was available to learn with this software, and it has made me even more excited to continue to use it.

I also did not make the website as user friendly or as exciting as I had hoped. I think this came down to not anticipating learning a new style language (Tailwind) and the time it would

take to integrate that knowledge. I am incredibly grateful that I did take that time, and would not change anything from the beginning of the project except maybe my expectations on what I could get done in this time. I fully intend to continue to build this project and site to get to the goal that I set, even though it will take more time than we have for this class.

Conclusion

      I am very happy with the foundation of skills his project has helped me develop. From not ever implementing ArcGIS or Next.js to being able to use both of these platforms (and more) to create something that is (mostly) functional is a big step for me. My goals now are to refine and develop these skills to create something that is more polished and user friendly. My goal would be to have multiple templates in the Next.js platform that I could utilize for various pages, and that could be easily repeated over time. I want to continue to use ArcGIS and dive more into the developer and automation tools they provide. I think this could be an area where I could stand out in this field, especially with more of a math background vs cartography or geography.

References

Next.js learning hub: https://nextjs.org/learn

ESRI training: https://www.esri.com/training/

Spatial layers tutorial: https://www.youtube.com/watch?v=XgXUFqzKZCQ

Project blog: legs21.github.io

Project site: https://backcountryroutes.vercel.app/