Data Visualization - Milestone 3

1. Introduction

This process book details the journey taken to achieve the final data visualization project, highlighting the steps, challenges, and design decisions made along the way. This report also includes a peer assessment to breakdown the contributions of each team member.

2. Path to Obtain Final Result

Process

Initially, we convened as a team to discuss topics that both interested us and had feasible datasets for us to work with. As we are all exchange students, traveling specifically in Europe was an activity we were all able to connect over and were passionate about. Through comparing our travels this semester, we observed significant differences in our experiences traveling to locations at different times of the year. Especially as some of us came from overseas and weren't well traveled within Europe, we also noticed differences in popular travel locations between people from overseas vs people from Europe. Because of this, each of us had varying assumptions of what the most commonly traveled to areas would be.

Due to many of these observations, we were interested in gaining insight and delving deeper into the statistics of travel in Europe to confirm or deny our preconceptions. We also wanted to know what times of year are most popular to travel in certain countries, to either experience the peak season or try to avoid mass tourists. We searched for datasets relating to travel, flights, tourists, and more, and landed upon the European flight passengers data as our best result with the largest amount of usable data. While exploring potential visualizations we could make, we aimed to create simple but informative images that answered the curiosities we had above. After reviewing many of the options for visualizations available on moodle,

we decided a map would be best for comparing travel across all of Europe and seeing the differences between countries. We also wanted to include data across the months of the year, but also compare travel across different years. For seeing which months are best or most popular to travel to within a country, a star plot was the most compact and visually informative option we could find. We also reviewed similar projects from previous years to gather insights and refine our strategy, before finalizing our decisions.

Task Allocation and Organization

We aimed to split the workload of the visualizations and the website creation evenly between the three of us. For the website design, Noah took care of the initial scaffolding and setup, Iniya did the design for aesthetics, and Daniel did the placement, sizing and organization of the website.

For visualization 1 (the map), there were pre existing examples with a visualization similar to what we intended to do in the notes of the class, whereas for Visualization 2 (the star plot), we were starting from scratch which we assumed would require a bit more time and effort. We split the workload based on this, with Noah completing the first visualization, and Iniya and Daniel completing the second. We decided to use two separate .js files for each visualization to improve project structure and facilitate independent work, reducing merge conflicts.

For Visualization 2, we divided the workload given it had two parts, the interactive map and the star plot. Iniya handled data preparation and the plot drawing, while Daniel focused on making the map interactive and refactoring the SVG for better compatibility.

Detailed Workflow

We followed the guidelines set by each of the milestones in order to stay on track. For the first two milestones, we worked more together on the writeups and met up more. For the last milestone, we had individual tasks to split up and worked more independently. We created our own branches and completed our individual tasks in

part and slowly merged the code into our main branch to avoid merge conflicts and follow best practices.

Initially, we planned and researched by reviewing and discussing the project scope and requirements. We examined similar projects to gather inspiration and best practices. During the implementation phase, Noah adapted the researched project to fit our needs, streamlining the codebase and creating the initial map. Iniya prepared the data, created the star plot, and debugged issues. Daniel refactored the code, managed the interactive map, and edited the SVG to align with data requirements.

3. Challenges and Design Decisions

Key Challenges

One of the major challenges was the integration of code between Iniya and Daniel. We faced significant issues when merging the code, which required extensive debugging. Initially, the attempt to include JavaScript code in the `index.html` file resulted in missing DOM elements, prompting a refactor. Many sizing and formatting issues surfaced while integrating different parts of the website and visualizations at the end as well. This required inspecting the console and checking the attributes of many elements to figure out and change the specifications to what we intended. We also faced issues with naming conventions of the countries to integrate the SVG and the initial dataset, and had to manually change it to map each country code to the country name. Some parts of refactoring the SVG proved to be tedious, but we were able to make everything line up in the end.

Additionally, Noah encountered difficulties with CSS specificity, leading to further research and the use of inline styling for better control. He also encountered challenges with the enhancement where we can change between aggregate and proportional measurements. Based on the structure of the dataset and the way we transformed it into TopoJson, it was difficult to calculate the proportional info. Instead of creating a new dataset, he decided to do upfront calculations and create an easy access data structure using a hashmap that gives a country's proportional

value given the name, year and month. Additionally, he ran into problems relating to the year not changing the data which requires a lot of debugging in the console. However, these challenges just resulted in cleaner code and a better understanding of creating data visualizations.

Design Decisions

To address these challenges, we made several key design decisions. We refactored the project to load JavaScript files later and renamed variables in `StarPlot.js` and `Map.js` to avoid conflicts. We adopted a class-based structure with constructors, member variables, and functions for better code management. For CSS specificity issues, we implemented inline styling where necessary to resolve overwriting problems, ensuring a consistent visual presentation.

4. Sketches and Plans from Milestone 1

Our initial sketches provided a foundational blueprint for the visualizations. However, several adjustments were made during implementation. For the map visualization, we switched to a different map for easier country-specific CSS class assignment and enhanced the map's interactivity and visual appeal. We expanded on the initial sketches to include more detailed visual elements and improved data representation. Adjustments were made based on practical implementation challenges and feedback from early reviews.
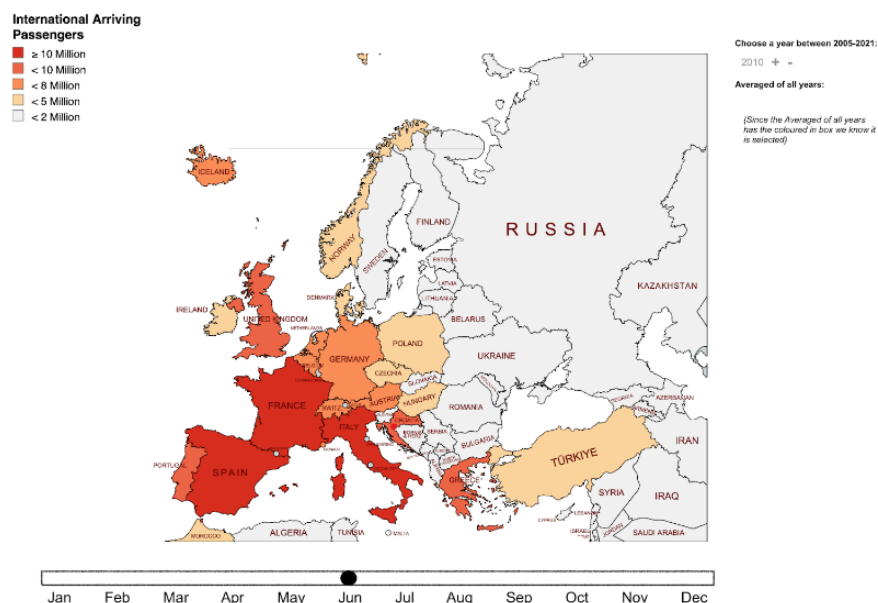
Our initial plan for Visualization 2 was more in line with our initial intentions and sketch, since we had to create it from scratch. We kept our initial design in mind the entire time we were structuring our visualization and what information we wanted to present. We ended up with the SVG, the star plot, the country name display, and everything else relatively the same as we sketched out previously. Our initial plans for the interactivity and country selection aligned with our goals and we saw no need to change our initial design.
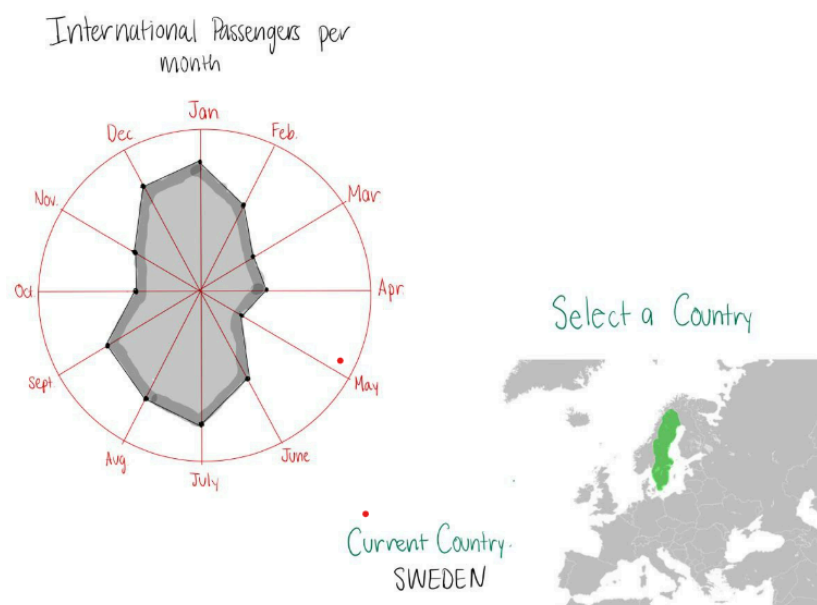

5. Peer Assessment

Contribution Breakdown

Noah contributed significantly to the planning and initial research, as well as the base website setup. He was responsible for selecting tools and preparing data, as well as editing the screencast video. He designed and created visualization 1, with the map, interactive slider, and options to alter the data displayed from changing the year to the aggregation of proportional or total data. In milestone 1, he also was responsible for the problematic and dataset exploration. He assessed the dataset's quality and outlined the needed data processing for Iniya to do, that would be used for the visualization. In the problematic, he outlined the goal of our project and our

visualizations, like what we want to show and who the target audience we are trying to cater to is.

Iniya did the exploratory data analysis and preprocessed the data for milestone 1 and created an initial graph to show what could be done with the data. She was able to aggregate to find the averages among all the years combined, as well as have all the data across all month and year combinations. She also worked side-by-side with Daniel to create the initial sketch and plan for visualization 2. Iniya prepared and aggregated the data for Visualization 2 as well, mapping country codes to country names and indices to month names to make everything clear visually. She implemented the star plot, as well as worked to integrate it with Daniels click handler for the SVG and update the star plot each time a new country is clicked. She also provided the voice-over for the screencast for our demo to display our final website and visualizations.
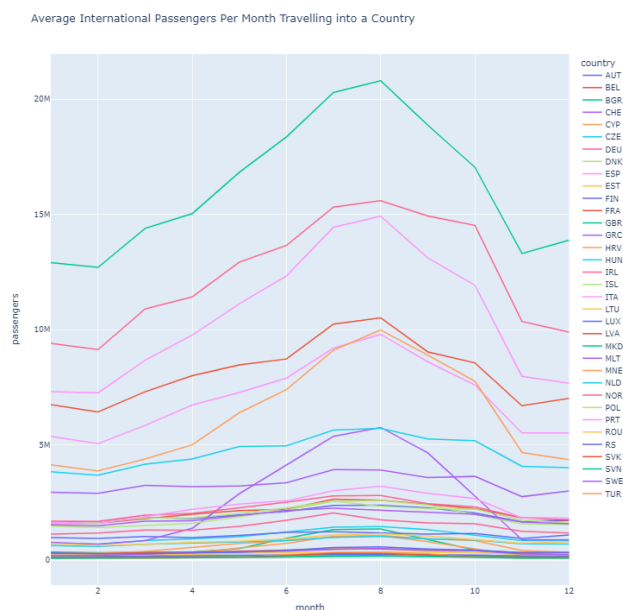
Daniel did research on suitable datasets and similar products on the market. In addition, Daniel was focusing on differentiating our solution from the competition and therefore worked on finding a USP. For milestone 2, Daniel was revising lecture material to find suitable graphs for our use-cases. He also spoke with the lecturer about the logistics for the star plot and discussed enhancements to our visualizations. Once we decided on the visualizations, he worked on the text for

milestone 2. In milestone 3, Daniel refactored the project's code to ensure proper file usage, split JavaScript files, resolved merge conflicts and branch issues, and implemented the interactive map. He also prepared the SVG for use in Visualization 2 and recorded the screencast.

6. Conclusion

This process book encapsulates the extensive effort and collaborative work put into our data visualization project. Through detailed planning, overcoming challenges, and making critical design decisions, we have achieved a robust and interactive final product. Our team has grown through this experience, enhancing our technical and collaborative skills.