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GEOG 592 - Web Mapping

Link to Site: https://abiesafdie171.github.io/EugeneGreenery/

Final Project Report

Introduction

I developed an interactive, choropleth web map that depicts urban tree coverage in the City of Eugene. Some key features include: tree coverage scores for each square kilometer block, information of tree coverage and species quantities within each grid, and a searchable list of tree species that, when clicked, displays the clusters of where those trees are located in Eugene. Further, when the user zooms in on these clusters, they break down into individual tree points that display a pop-up when clicked with specific information on that tree, including height, spread, and species. I believe this project can provide citizens of Eugene with an interactive web map that can be used to learn about what trees live in Eugene, where they live, and what specific areas might make for exciting urban adventures. Further, I believe this map can be used by public policy officials to come to conclusions on what areas in Eugene can benefit from investments in more greenery and green spaces. All together, I believe these use cases make this project an extremely interesting and exciting tool for anyone who calls Eugene home.

When developing this project an interactive map was necessary to present this story due to the nature of the data that I attempted to visualize. For instance, my choropleth grid layer is a static map that I imported from my work in ArcGIS, however, I found that just presenting this choropleth layer hid a lot of necessary information regarding the trees that lived in each specific grid. Therefore, I decided that it was necessary to make the grid interactive, so when a user clicks on a grid, they get information on the number of trees in that grid, the total height and canopy

spread, the number of unique tree species, and the most common species. I found that making this data display in an interactive way was very beneficial for the user experience. Lastly, I found it necessary to provide some way for the user to display and interact with the individual tree points, so I created a search bar of all the species where the user can toggle which trees they want to be displayed. These choices seemed like the best way for users to visualize and learn from the data.

Data collection and processing

My project geographically covers the city of Eugene (its exact city boundaries). The data that I used was from the City of Eugene's government's website (https://mapping.eugene-or.gov/datasets/public-trees-view-1/explore) and was processed by Eric Cariaga. This dataset provided data points on every tree on public land in the City of Eugene. However, this dataset had some notable shortcomings: many trees were labeled "unknown" for its species, nature parks were not mapped as robustly as they should be, some trees are not mapped (I know this anecdotally – a tree I see everyday outside my apartment is not mapped), and trees on the U of O campus are not mapped at all (UO has a separate tree map dataset, however).

To create my choropleth map, I did some extensive data manipulation in ArcGIS. First, I created a square kilometer grid of the city of Eugene's boundaries and did various spatial joins to get the tree data linked to the grid. I then performed multiple mathematical manipulations in ArcGIS to get the total spread/height, number of species, etc per grid. Lastly, exported this gridded map data as a geojson that I could use in my web map. On a similar note, I also imported the raw tree points as a geojson. This data layer is used for when the user displays the individual tree points.

Design

For my web map I made several interaction choices. As previously mentioned, I decided that the user should be able to click on each grid and receive a pop-up giving information on that specific grid. Second, I decided to have individual tree points generate pop-ups as well. However, having each individual tree point on the map at once would have displayed too much data. To fix this, I made the choice of creating tree point clusters. Each cluster states how many points are in it, and when clicked on, the map zooms in and breaks down into smaller clusters, or individual points if zoomed in far enough. Third, I decided to have a search menu for the user to decide what specific tree species they want displayed at the current moment. I believe this gives the user greater control over what they want displayed at a given time. Fourth, given my map is focused on the Eugene-area, I created map bounds so the user cannot zoom too far away. Further, I created a max-zoom level so the user can not zoom out past the local level. Fifth, I created a "Reset Zoom" button, so when the user is zoomed all the way in on a specific tree they can quickly reset the map to its starting parameters. Lastly, I created an information panel that states general information on the map, the scoring formula, and where the data was retrieved from. This information panel is collapsable, so experienced users can choose to hide the panel and have more screen space dedicated to the map.

For my base map I chose mapbox's "outdoors-v12" style. I experimented with different basemaps, such as dark-mode and satellite, but found that the outdoor style was the base map that contrasted best with the tree points, the street grid, and the overlaid choropleth map layer.

For my overall aesthetic, I made various design choices. First, I decided to have a general green theme, as this web map displays information on tree greenery. So, the selection panel, information panel, and associated buttons all have green backgrounds. For my font, I chose

sans-serif. I experimented with different fonts, but I ended up choosing sans-serif for simplicity and readability. There is one instance where I used a different font – my scoring formula. I chose a monospaced font for it because I was attempting to display mathematical, code-like text and decided that having a font where all the characters take up the same amount of space would be visually appealing and also because most coding fonts exhibit this behavior. For my choropleth map, I chose a classification color scheme with 11 distinct color bins. Originally, the colors scaled from red to green, but after realizing this might cause issues for those who are red-green color-blind, I changed the color scale to be red to blue, with blue denoting highest levels of greenery. Lastly, I kept my symbols fairly simple. Each tree is a circular green point. I believe this provides clean, direct communication to the user. I was worried about the green point contrasting negatively in the red grids for those that are color-blind, but decided that due the points being discrete and of a different shape, color-blind individuals would still be able to locate them. Note, attached separately is a UI diagram of my web map.

AI Disclosure

For this project, I used AI for general debugging and certain javascript interactions, such as getting my search bar functioning and figuring out how to update my clusters on a new species being added to the set. All the design choices and ArcGIS data manipulation I did without the use of AI. However, for the CSS on certain elements, I would describe to AI how I wanted it formatted and it would generate some of the CSS for me. I would then have to edit the CSS to fit what I imagined, but it did a good job providing the skeleton. Lastly, this report was written without any AI (despite google now integrating their platform straight into docs and begging me to use it by making the button flash!).

Concluding statement

I had a lot of fun building this map and hope that it will be used by people who live in Eugene. I also hope that the city of Eugene continues to update their tree map with newly planted trees and update the height/spread of trees that currently exist. All together, I am proud of the work I was able to do in 3-4 weeks, and plan to include this project in my resume and show it to future employers if I choose to work in this field!