eBird Observations Map

GPHY 504 Project Part 1

For this project, I wanted to be able to create an interactive web map that would allow a user to easily search for sightings of any particular bird. My first step for this was to acquire the necessary data. Luckily, the Cornell Lab of Ornithology has a huge collection of observation data collected by its eBird users. Through their website I was able to submit a request for observation data for Gallatin County. Once I had the data, I had to utilize eBird’s R package *AUK* to extract relevant data from the massive dataset. First, I had to shrink down the dataset, since the provided text file was too large to upload to GitHub (where I have stored my project). To do so I filtered it down to just observations from Jan. 1st, 2021 to Jan 1st, 2023.

Now that the data was processed, I could begin developing the web application. I chose to use Shiny, a framework/package that is designed for websites running R code. There is also Leaflet support through R and Shiny, so I was able to use Leaflet for my web map. For this map I used the standard CRS WGS 84, since a.) it is the standard for general Leaflet web maps, b.) there is no precise distance calculations or anything with this project, just simply displaying observations for the end-user, and c.) ideally, this project could later to expand to map observations around the world, in which case having too specific a CRS for Gallatin County would not be good for most anywhere else. From there I used *AUK* to extract all the unique species in the dataset and use those to populate the species dropdown menu.

The Shiny app allows you to set up reactive variables, so this way the filters used to extract observations from the dataset get updated any time a user changes one of the inputs. There also is an observation event that triggers when these inputs change which converts the filtered dataset to a dataframe. After this, it then loads that dataframe as a heatmap layer on the Leaflet map. If the option is selected, it will also dynamically cluster the observation markers and add that layer to the map. This way you can see the heatmap of where a species is very commonly found, and with the clusters, locate the individual site for those observations. I also added a small script that displays observation data as a popup when you click on one of those markers.

Finally, I added a histogram that displays the distribution of hours for observations. This updates whenever the inputs on the side panel are changed. This allows a user to see what times of day are most likely for a sighting of a particular bird. In the future, I would like to add a second histogram that displays the monthly distribution of observations as well.

Data Source:

eBird Basic Dataset. Version: EBD\_relJun-2023. Cornell Lab of Ornithology, Ithaca, New York. Jun 2023.

GitHub Repo:

<https://github.com/jdmau72/GPHY-504-Project---eBird-Map>

Website Link (Hosted on Shinyio):

<https://justindmau.shinyapps.io/eBird_Observation_Map/>