CAValli Team: Report 4

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Assignment 4 – Maps

- Choropleth map [**CM**]
- Dot density map [**DM**]

1. Data Preprocessing [in Python]

This part involved activities related to rearrangement of data for the four maps we implemented. Specifically:

- [**CM**] we computed **the tree abundance for each state** and we stored it as a property in a .json file (downloaded from https://github.com/iamsamucoding/react-d3-examples/blob/4032fc34a101887cf757630fe18316baa4a7f25e/responsive-map/src/us-states.json?short_path=586ea6a) encoding the boundaries of multipolygons representing the USA and its states;

- [**CM**] we retrieved **the area of each state** from online resources and we included it in the .json file as well as the value of the **tree density** (abundance divided by area) in two variants, **amount of trees every square kilometre and amount of trees every 1000 square kilometres**;

- [**DM**] we **removed from the dataset all trees with no longitude/latitude coordinates**, which makes this

dataset different from the one used for the Choropleth map;

- [**DM**] we **rounded longitude/latitude coordinates to the first decimal digit**. In this way we **clustered distinct trees into one single location**, represented in the map as a weighted point, where the radius is proportional to the amount of occurrences that were grouped. This was done in order **to reduce the number of points to be plotted so that the computation on the website could become feasible**;

- [**DM**] for each state we collected border coordinates from online resources and **we dropped all trees that did not fall within the boundaries of the state with which they were associated**;

- [**DM**] we created two distinct .csv files for the **two dot density maps: the first one only labeling trees with states**, without separating them in tree species (so only 1 class); **the second one subdividing elements in 11 classes** (top 10 tree species + *Others*);

- [**DM**] **two extra .csv files replacing state labels with cities** were created as well, in order to display more heterogeneous information on the map. In the end we opted for these two datasets for our final visualisations.

See *Maps.ipynb* in our repository for further details.

2. Website setting [in JS, HTML, CSS]

We designed the requested data visualisations, specifically:

- two dot density maps (tree clusters and tree species clusters);
- two choropleth maps (tree abundance and tree density).

More in detail:

- **technical choices**, in particular:
    - we added two independent radio buttons to the page to switch between alternative views of the same map;
    - the choropleth map represents trees in each state **as long as they occur with some quantity**, whereas the dot density map represents trees on the map **as long as they can be localised**. As a consequence, the CM dataset includes trees that are not present in the DM dataset (e.g. Arizona is reported to have 214 trees that do not appear in the dot density map and the same for Louisiana). This approach was adopted **to preserve as much information as possible in each map**.
- **stylistic choices**, they include the most aesthetic decisions:
    - [**DM**] **an interactive legend** was added on one side of the map, with the same features that were available in plots included in Assignment 3 (highlight/hide specific classes);
    - [**DM**] we implemented **a zoom functionality that allows to better visualise occurrences** in each state by clicking on it and by sliding the map across the page or scrolling. This is possible through a change of scale;

- [**DM**] **the radius of each circle is proportional to the weight of that point (tree count) and some scaling factor is applied** to resize such circles to make them visible enough in the global view of the USA;

- [**CM**] the two distinct maps respectively adopt **a green scale and a blue scale to represent tree abundance and tree density**. Colour ranges were defined in such a way that they could improve readability of the map and better differentiate states;

- [**DM**&**CM**] we **added tooltips** with additional information for each state/city in the four maps and associated **effects based on the opacity and on colour** when we hover on them (hide other states/cities and fill the border of a state with green if any kind of tree is present in that state).