CS/INFO 3300; INFO 5100
Homework 6
Due 11:59pm **Friday, April 2**

Goals: Practice using d3 to create paths based on TopoJSON files. Get more experience building choropleth maps.

Your work should be in the form of an HTML file called index.html with one <p> element per (sub)problem. Wrap any SVG code for each problem in a <svg> element following the <p> element(s). For this homework we will be using d3.js and topoJSON. **In the <head> section of your file, please import d3 and TopoJSON using these tags:**

```
<script src="https://d3js.org/d3.v6.min.js"></script>
<script src="https://d3js.org/topojson.v3.min.js"></script>
```

Create a zip archive containing your HTML file plus **ALL associated data files** and upload it to CMS before the deadline. You will be penalized for missing data files or non-functional code.
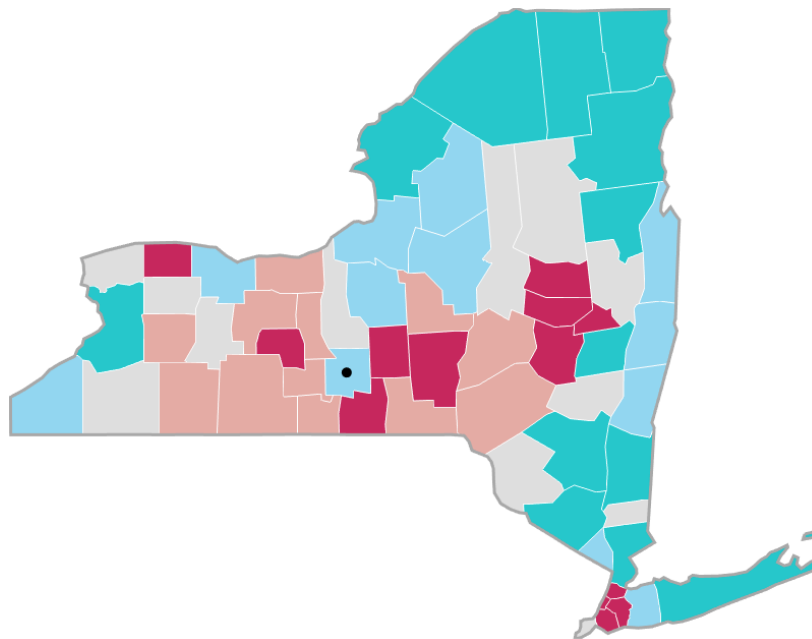
1. In this problem we will make a choropleth map of biodiversity in different New York counties. We have provided a topoJSON file of different counties in NY. This shapefile also contains **bonus properties showing the total biodiversity of each county**. To obtain these data, we counted the number of species identified in a county in the [NYS DEC dataset](#). You can find the biodiversity data within the properties dictionary attached to every county geometry entry (e.g. `dataset.objects.counties.geometries[0].properties`). We'll be making use of the `Total_Biodiversity` property for this assignment. We'll use a divergent color scale that bins values into quintiles to color each county based on its biodiversity.

       (quartiles = 4 bins :: quintiles = 5 bins)

A. In the HTML portion of your submission, create the following SVG canvas:

```
<svg id="choropleth" height="620" width="800" style="margin:20px" />
```

In a <script> tag, use `.then()` or `await` to load the **ny_state_biodiversity.json** dataset into a variable called "**nyb**". Afterwards, please:

- Create a variable, "**counties**", that contains the **topojson.feature** for the **nyb.objects.counties** GeometryCollection.

- Create a second variable, "**countiesMesh**", that contains a **topojson.mesh** for the **nyb.objects.counties** GeometryCollection.

- Create third variable, "**stateMesh**", that contains a **topojson.mesh** for the **nyb.objects.state** GeometryCollection.

- Finally, create a **d3.geoMercator** projection fit to the size of your canvas, and make a **d3.geoPath()** **path generator** that uses this projection.

B. Now, build a quintile divergent color scale for the **Total_Biodiversity** variable:

- First, design a divergent scale. Create an array that has 5 elements, where each element is a color string (e.g. **"#ef21ac"**). Your divergent color scale should have a **neutral middle** (position 2). The left side of the array (position **1** and **0**) should get **increasingly red**, while the right side of the array (position **3** and **4**) should get **increasingly blue**. The ends of the scale (position **0** and **4**) should be the most saturated and intense.

- Then, make a **d3.scaleQuantile()** scale. We have helpfully included the **domain** of possible **Total_Biodiversity** values right in **nyb.Total_Biodiversity_allvalues**.

- Having made a 5 color array, set it as the **range** of your **scaleQuantile()**. This will give you a scale that divides the data into colored quintiles.

C. Now, construct your visualization. You should, in order:

- Use a data join to create **<path>** elements for each county in **counties.features**. Use your quantile scale to set the fill of each path. You can find the **Total_Biodiversity** value within the **bonus properties dictionary** for each feature. Do not give these county paths a stroke.

- Use **.append().datum()** to create a **<path>** element for countiesMesh. Give it a **1px white stroke** so it sits on top of your counties and visually separates them.

- Finally, use **.append().datum()** to create a **<path>** element for stateMesh. It should sit on top of all of your other elements. Give it a **3px dark grey stroke** to make the edges of the state stand out.

D. Finally, **add a black circle of radius 5 to mark the location of the Cornell belltower in Ithaca.** The belltower is located at **latitude 42.4476** and **longitude -76.4850**. (hint: you can use your **projection** to determine the x and y pixel locations for the circle, see **d3.geo documentation** and be careful of your latitude/longitude parameter order).