



What We're Trying to Solve

Ideal

Understanding the best way to display election votes on the web in an interactive way, with respect to population instead of area.

Reality

Most election maps are misleading, and render votes by riding and area rather than population. The population is what drives election results.

Consequences

These maps mislead the public about what drives elections and regularly decrease voter turnout each year.

Our Proposal

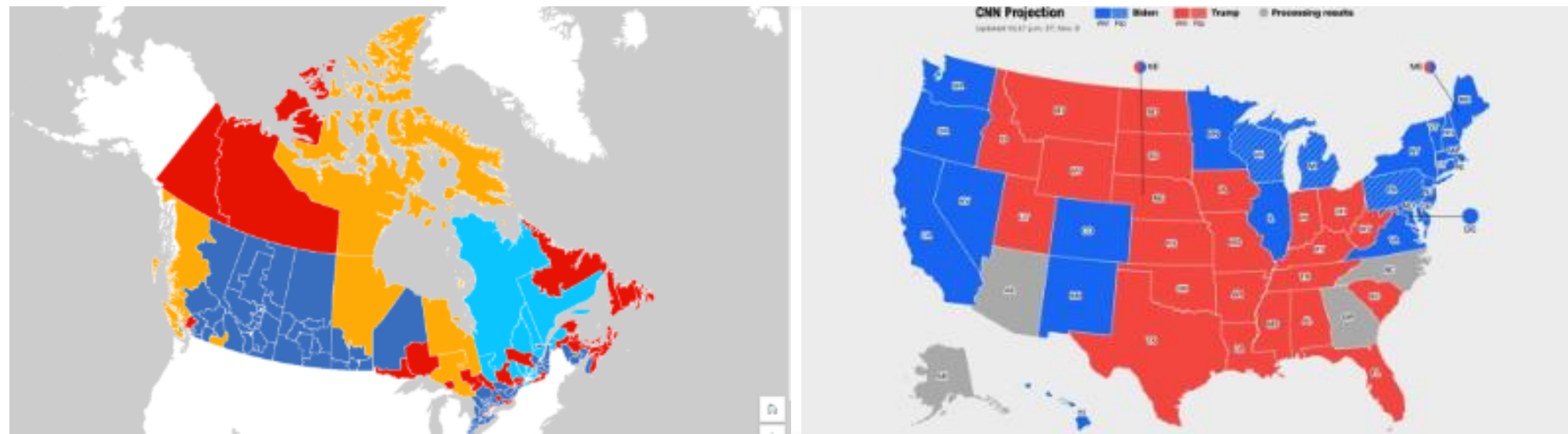
To create an interactive map that displays election data from a previous year, and updates based off of zoom, allowing for both national and local analysis.

Products We're Using

ArcGIS Online web maps, ArcGIS Story Maps, ArcGIS Dashboards and ArcGIS Experenice Builder.

The Problem

The picture below shows an average map of Canada's and the USA's political ridings during different election periods. This is how most of the public sees the voting season as.

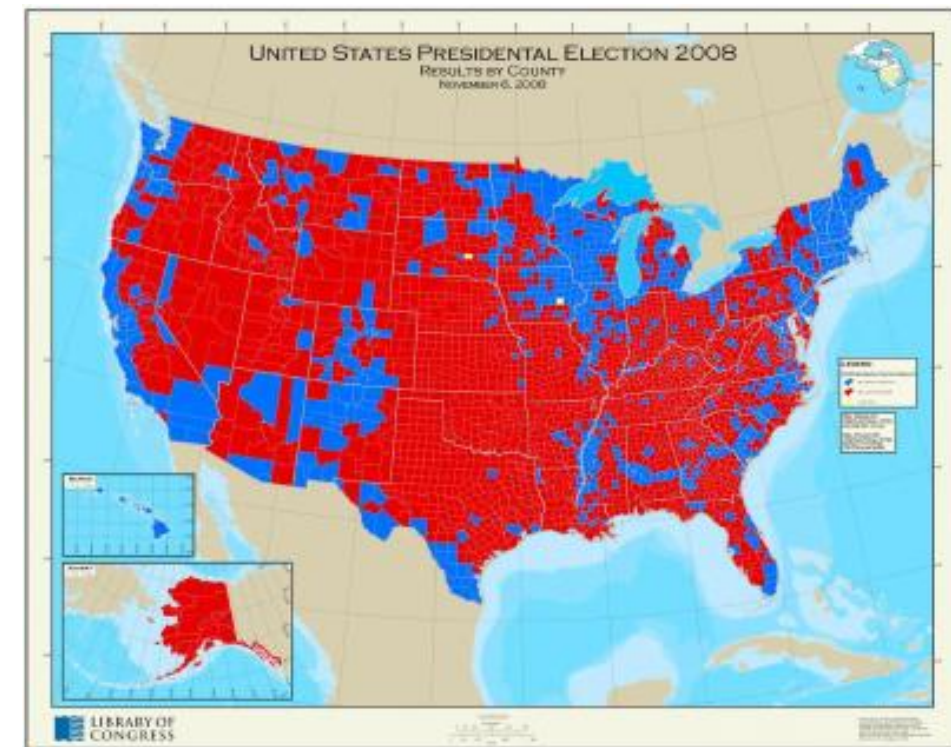


Election maps of Canada and the USA

The major problem with these maps is that they show the votes based on the winning party in each electoral district or state and not through the population. **Why is this a problem?** If we look at this map from 2008 it is often considered one of the most misleading maps in political history (Giardino, 2020). It shows the Republican Party (red) massively outweighing the Democratic

Party (blue) but in reality, blue won because the areas the Democrats won had significantly more population density.

This makes for a largely misinformed public that thinks their votes do not really matter decreasing the overall voter turnout each year. It's often considered that a vote in Wyoming is 3x more important than a vote in Florida just because of the amount of land it covers. (Durrant, 2019)



2008 election map of USA

The Solution

How we plan to solve this

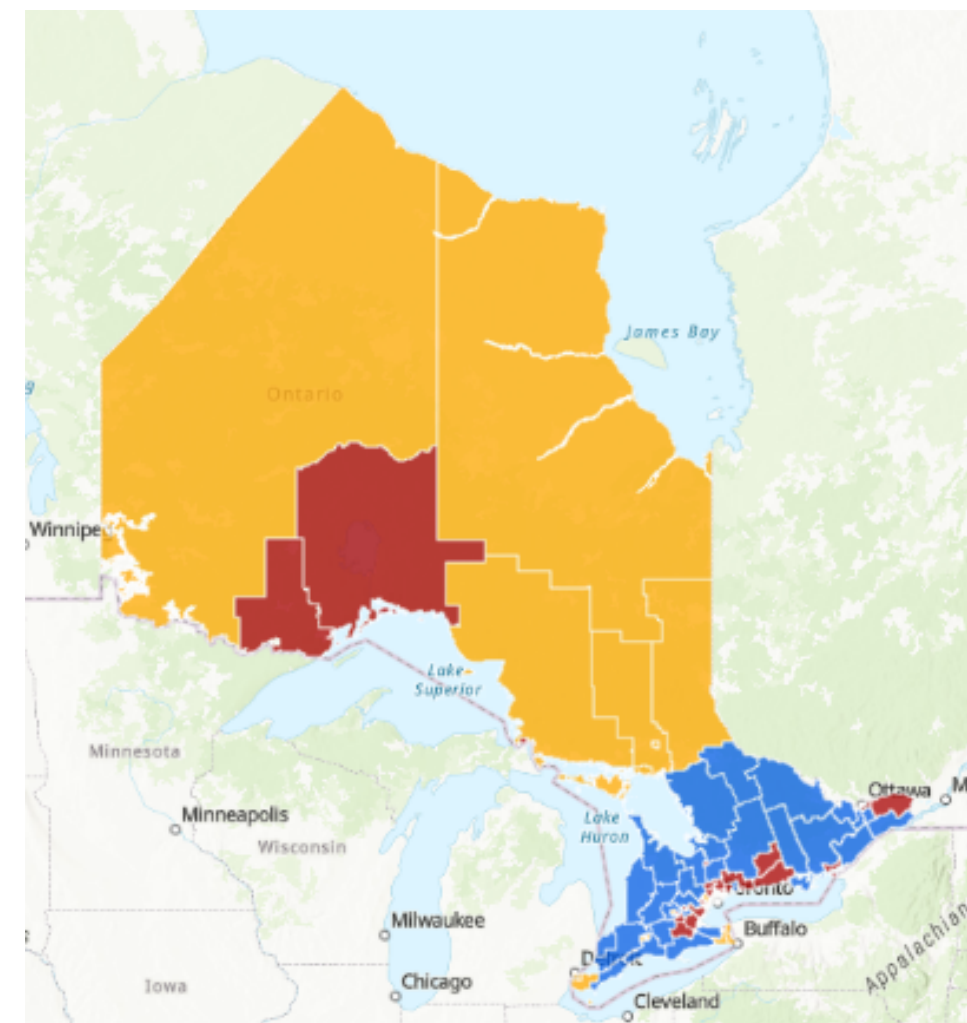
We plan on solving this problem by experimenting with different ideas that will prioritize the population instead of using the misleading attribute, area. Our first idea is through color and size where we can represent the winning party in the district with an actual number of votes it got represented by size. Second, we

wanted to show a dashboard with more information so that they aren't only presented with a map of misleading information. Lastly, we wanted to show the data through a 3D plain by making areas with more votes/population taller than the others that had a lower population/votes.

What we Created

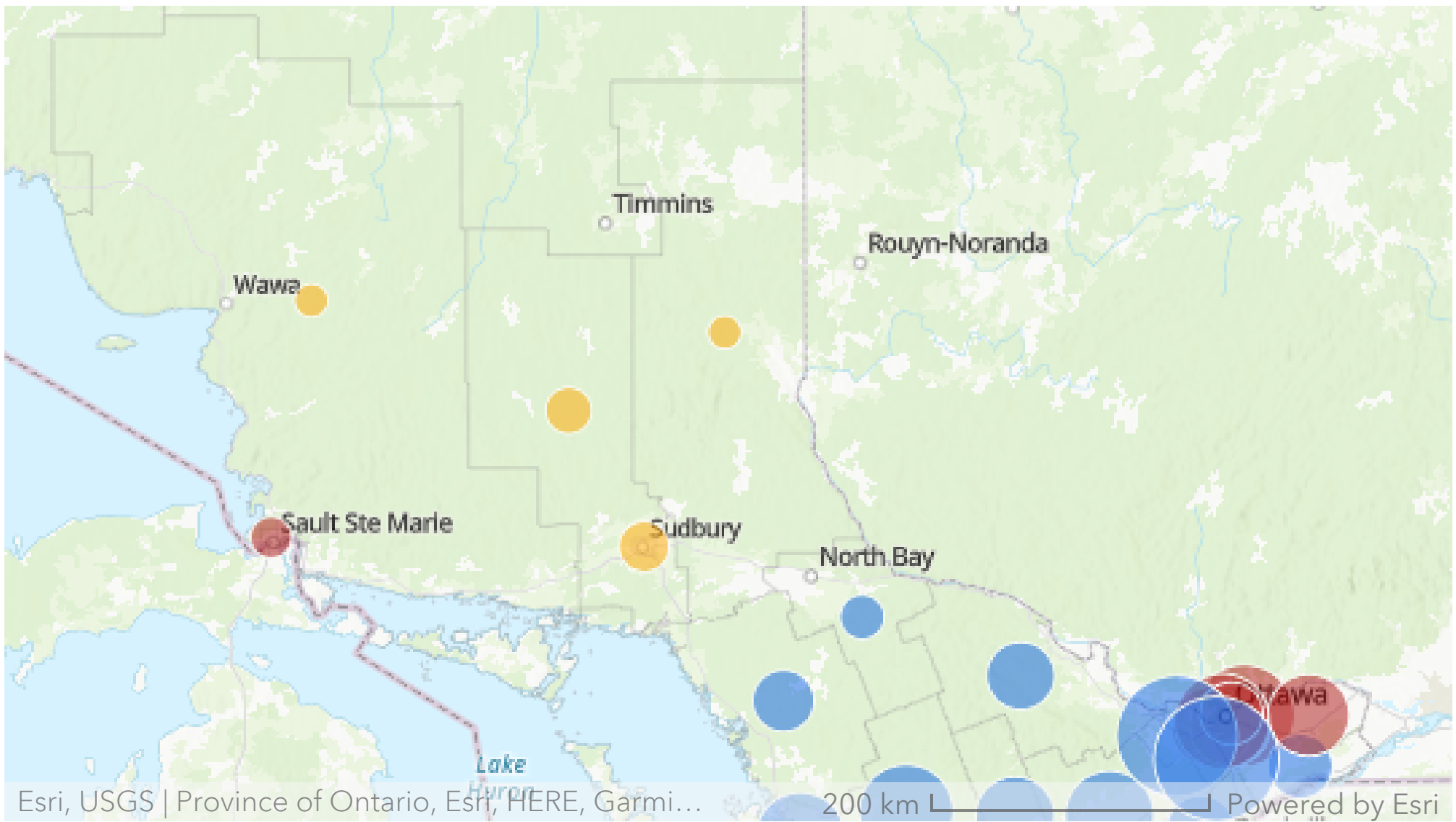
1. Through Colour and Size

We looked at a poorly represented map of Ontario's election results in 2014 and looked at it using area (Figure to the right) we then added a new attribute in size by using the total ballots cast creating the map you see below. By looking at these maps we can see that when it is area-based it looks like the NDP (orange) easily won. In reality, the Liberals won (red) and it was a lot closer race than it looked. the main votes were actually between the Liberals and the Conservatives (blue) where the NDP was



Election results of Ontario in 2014

only third. These areas that had the most population are much better represented in the map below by the areas with bigger circles.



Electoral ontario map using election results form 2014 in relation to actual ballots cast

2. Map Dashboard

We have created a dashboard that shows a map of votes through Canada in 2021. You can zoom in to see different areas and their votes. Additionally, we added two indicators to show the number of valid ballots in the area and the percentage of voter turnout in the area. we also added a list showing electoral district information, a pie graph of the number of votes each party received in each area, and a gauge representing the proportion of the electorate present in the study area. You are also able to select an electoral district and see all the data associated with it instead of using the zoom feature.



44th Canadian General Election Overview by Electoral Voting District (2021)

3. 3D Height Map

This experience builder was created to investigate the comparison between both 2D maps and 3D scenes with both electoral area and population data. This comparison aims to not only show the

differences between area and population layers on maps using color but also the differences between 2D and 3D representations using height. These differences show and compare the strengths and weaknesses of each of these maps and when directly applied to election data, shows which map is less biased. All the maps are synchronized together so that if one moves, they all will follow, and symbology was shared so that they are all visually similar. Experience builder was then used to bring these four maps together on a single page in a dashboard style.



2D and 3D Comparison Map of Election Area and Population Data

Methodology

1. Through Shape and Size

This was created by taking data from the ArcGIS Living Atlas of Ontario and then symbolizing it differently by using 2 fields instead of 1. We used the "total ballots cast" and the "party won" fields to better represent the data based on population instead of area.

2. The Dashboard

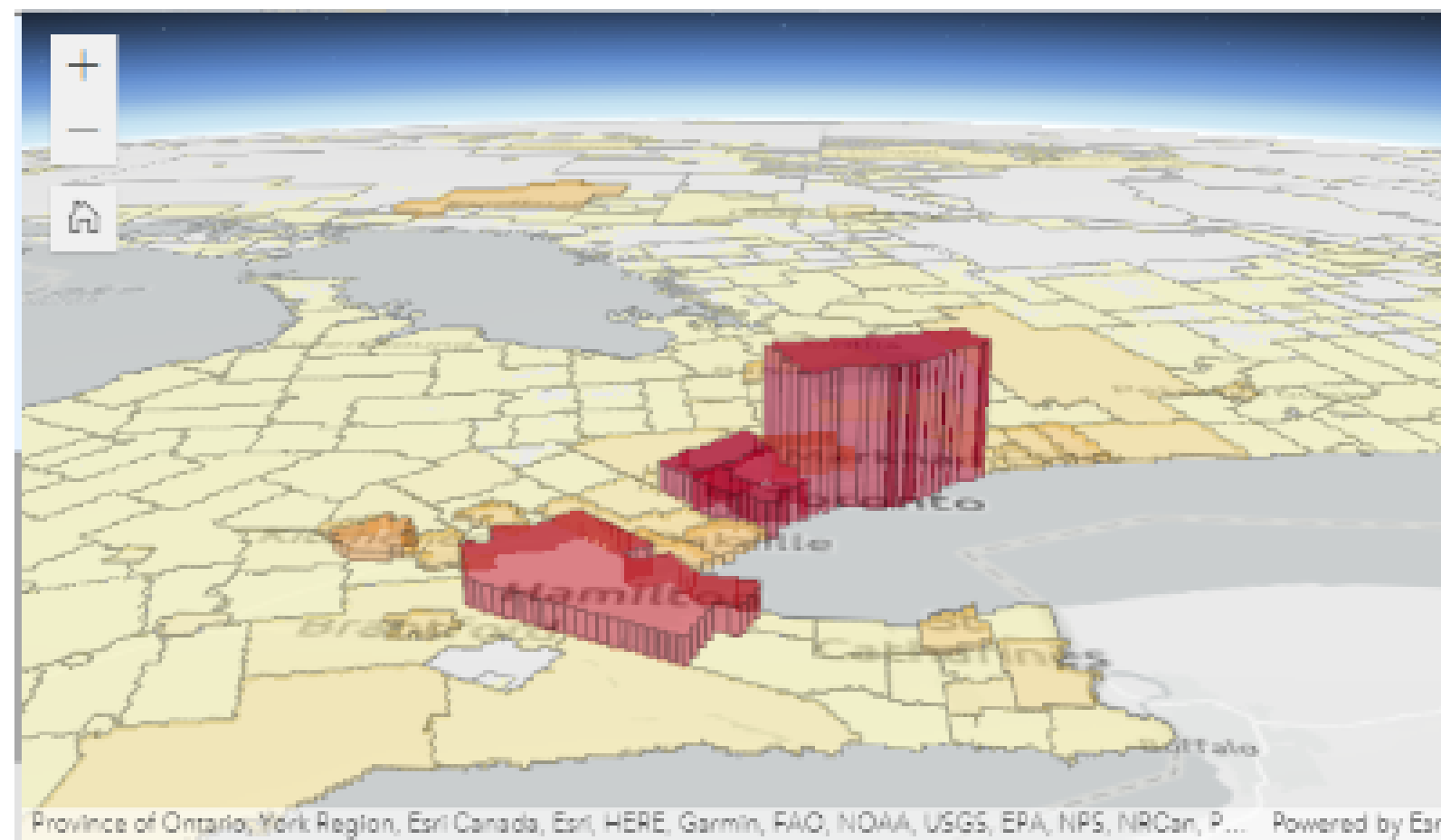
We created this by getting our data from Open Canada/Canadian government and geo-coded the data to locate it on ArcGIS Pro.

We then uploaded the data to arcgis online and created the dashboard.

Once the dashboard was created we added an indicator, a gauge, a list, and a pie graph. we then made sure it changed off of zoom and/or select. This made it easy for people to see exact information from exact electoral districts. The dashboard also helps easily identify trends with the information provided.

3. 3D Height Maps

We created this by using experience builder. We used a mix of Canadian census population data and electoral districts' total area in Canada. We then used two 2D maps which showed the difference between area and population based on color where the darker the color the higher the population/area. We then added two 3D maps to show the same data but with a visual representation of height (example below).



3D height map based population

References

Durran, D. R. (2019, July 8). *Whose votes count the least in the Electoral College?* The Conversation. <https://theconversation.com/whose-votes-count-the-least-in-the-electoral-college-74280>

Giardino, D. (2020, October 30). *The Problem With Election Maps*. The Startup. <https://medium.com/swlh/the-problem-with-election-maps-443b3a941dc7>