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GEOG 5511 Final Project – Election Time-Enabled Web App

Link to Web App:
https://umn.maps.arcgis.com/apps/TimeAware/index.html?appid=9d5cbcaa67064bf3ab6e89e819fb71d7

General Description:

This interactive web app shows Presidential election results in the USA from 1976 – 2016 by state, displaying the party that won the state and how many total votes were cast in the state. It is time-aware, so there is a slider at the bottom of the web app allowing a user to slide through the different dates and watch the winning party and state total votes change over time.

Symbology of the map is value-by-alpha, and heavily inspired by this map: https://www.axismaps.com/blog/2008/11/a-new-kind-of-election-map/, done in 2008 by Andy Woodruff. Each state is given a red or blue color depending on the winning political party, and the color is left bright if there were a large number of votes cast in the state, or darkened if there were relatively few cast.

As the final app is interactive, each state has pop-ups giving more information about election results in that state and year than are provided by the symbology alone.

Map Purpose:

This is one in an endless stream of different election results maps, each with a different story to tell about who was elected and why. This map attempts to show which political party has won each state for the 11 most recent political elections, and how much influence that state had on the results in terms of sheer number of votes cast. No attempt is made to show overall influence on the election, such as early primaries, or by what margin the winning political party had more votes.

Design Decisions:

I chose to do an interactive map because no static format will allow a time animation. From there I decided on a web app rather than just the web map because I felt like it was a more polished display, and I wanted something that looked finished. The standard esri web map, with its white borders and options to do things like add data, change symbology, and save, doesn't seem like a final product to me.

There is a drawback to the time slider options for the web app as opposed to the web map: you have to drag the slider to get it to go step-by-step, rather than just click a forward one button. I want this map to be something that moves through time in steps, mostly because my data takes so long to load that only some of an election's data will display before the app moves to the next time step.

I chose to do a value-by-alpha map to display my data because I like how it has the ability to add magnitude of some value to a straight-forward red-and-blue standard political map without distorting shape like a cartogram would.

Specific symbology was, as I mentioned earlier, heavily influenced by a political election map done in 2008 by Andy Woodruff. Like that map, I chose to have a dark background, so that I could fade less-populous states into the background and bring forward the more-populous ones.

I used the very standard colors of red and blue to indicate Republican and Democrat, since that convention is so set that it is immediately recognizable, and to do anything else would cause confusion. For total votes cast I decided to go with an unclassed fade through different transparencies of black. I chose unclassed because it allowed for each state to look slightly different from each other in color, even when they had very similar populations.

I felt that using the standard web map projection, Mercator, would distort the message of my map. More northern states, and especially Alaska, would become much larger and dominate the view more than they should in a map that's essentially trying to say what states were most important in an election. To fix this I decided to use an equal area projection, Albers Equal Area, centered on North America. As ArcGIS Online does not allow you to change projection unless you use a basemap in that projection, I created my own basemap and uploaded it to ArcGIS Online. I created a very simplified version of Esri's Dark Grey basemap to show general position of land-masses without any distracting details such as cities.

Information that the final map is required to have, specifically the cartographer and data sources, are in the "about" dialog box/pop-up in my web app.

Issues Encountered:

I did not expect this to be a straight-forward map to make, since I was going from a spreadsheet to a shapefile to ArcGIS Online, with which I have only some familiarity, and using a time-enabled map, which I have never done before. I expected some issues. I got many, and some of them took me several frustrating days to resolve. A couple I have actually not managed to fix, so there are some errors in my final product that I don't know how to fix. Here are the most major issues:

<u>Clean data:</u>

After finding my election data, the first thing I noticed was that the spreadsheet contained entries for all political parties voted for, not just Democrats and Republicans. It also didn't indicate which party had the most votes in each state, but instead only gave the number of votes for each party, and the total votes cast in that state. After removing all parties but Democrats and Republicans, I found that the number of file entries couldn't be divided evenly by the number of enumeration units. I wasn't sure if this meant there were some areas that only had votes for one of the major political parties, if there were some areas that didn't have results listed for a particular year, or what.

I ended up writing a python script to go through my spreadsheet to find all of the entries for each state and election year, figure out which party had the highest number of votes for that place and time, and output a spreadsheet with only the winning party's data.

<u>Connect table data to geometry, and enable time:</u>

The next couple issues I ran into were how to connect each enumeration unit to its values, since each geometry had several rows of data belonging to it, and how to enable time on my layers. I started with trying to enable time, but found that time cannot be enabled on a table – you need to have

something with geometry. So the first thing that had to happen was matching each state with all its' data.

A join would have worked fine if I had only one value for each state, but I had one per election, and a many-to-one join did not allow me to use a time slider for my data. I ran through a lot of different suggestions on the web without getting any of them to work.

My actual solution was probably not the most efficient, but it did work. I uploaded my tables and shapefiles into a relational database, then connected that database back to ArcGIS Pro and created a query layer that had the geometry information attached to each entry in my spreadsheets. I then exported the query layer to a shapefile so that it would load quickly.

Fortunately, once each row had an attached geometry, and the result was exported to a shapefile, enabling time was very straightforward. There are many sets of instructions on the web, and they worked without issue.

<u>Uploading data to ArcGIS Online:</u>

I initially made my map in ArcGIS Pro, and uploaded everything to ArcOnline to make the final web map and app. Before everything was fully finalized, I uploaded several iterations of test versions to see if I could get things to work online, with the intention of going back to ArcPro, making some corrections, and uploading a new version. The problem is that at some point my uploads stopped having data attached, and I can't figure out why. I kept the same settings as the earlier versions, everything looked like it was working, but my web layers had no data. After several days of trying different things I still couldn't get it to work, so I decided to get my best test version working as well as possible.

There is one main problem with the test version that ended up as my main version. The date field, which indicates when the election was, is just a year. In ArcPro this is interpreted as January 1 of the given year. In ArcGIS Online, for reasons I have not been able to figure out, it is interpreted as December 31 of the year prior. This means that the date display on my web map and pop-ups both list the wrong year. I have tried creating new fields calculated by adding a few months to the initial date field, but couldn't get them to work. And I didn't quite dare try a calculation on the date field itself, because if I overwrote that, it didn't seem likely I would be able to get it back.

There are also a couple other fields in the ArcOnline version that I intended to change in later uploads but couldn't due to my layers repeatedly failing to upload. Specifically I wanted to include information about which Presidential candidates were being voted for and to display the percent of votes for each candidate as a percent rather than a decimal. These just affect the map pop-up, though, not the display on the map itself.

Conclusion:

For such a simple map, this was a lot of work and a lot of technical difficulties. It was definitely a learning experience, though. More so about the full process from csv to interactive web map than exploring the specific requirements of Esri's time-enabled data formats.