GEOG 4140/6140 – Winter 2021
Lab 4: Map Types and Data Classification
Due Thursday, Feb 25th by 11:59 PM

<u>**Overview**</u>
Language preferences represent an important cultural aspect of a population. While English is predominant throughout much of the United States, local usage of other languages are common in a variety of states, and more locally within municipalities. This lab focuses on different methods with which to display information pertaining towards the distribution of the French language within Louisiana by census tract. Utilizing different map types and methods of data classifications, the spatial and numerical attributes of the French speaking population can be displayed in a variety of methods. When creating a map, it is important to take into account both the audience that will view your map, as well as any spatial variability in the data composing your visual representation.

The following resource may be of use in completing this assignment:
Layouts in ArcGIS Pro
Overview of joins and relates
Create a map series
Video – Creating Map Books using Map Series in ArcGIS Pro
Heat map symbology
Fundamentals of field calculations
Proportional symbols
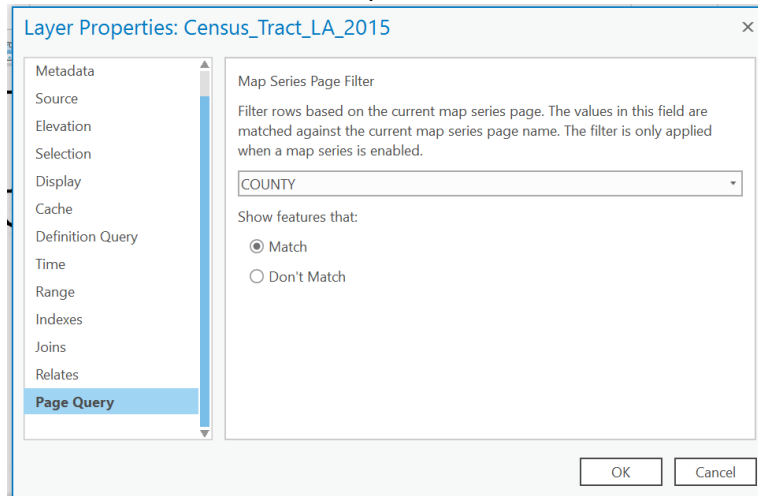Dot density

<u>**Required Data (*Sources*)**</u>
1. Census_Tract_LA feature class (*Lab data on Canvas*)
2. ACS_2010_5YR_B16001 (*Lab data on Canvas*)
3. ACS_2015_5YR_B16001 (*Lab data on Canvas*)

<u>**Workflow**</u>
1. Open ArcGIS Pro and create a new project titled *Lab04YourLastName* in your working directory for this lab.
    a. Load the provided Census_Tract_LA feature class, the 2010 American Community Survey (ACS) attribute table, and the 2015 ACS attribute table.

2. **Change your basemap** to Light Gray Canvas.

3. Create a **join** between the Census_Tract_LA feature class and the 2015 American Community Survey table.
    a. **Export** this as a new feature class after the join.

4. The first three maps will be simple choropleth maps showing the number of French speakers for each census tract. (Deliverable 1) There are a variety of ways in which to apply graduated colors to display the groupings of your dataset. Each method offers its own advantages and disadvantages to display the data, so it is important to take into account both the message you wish to communicate about the data and the audience of the map itself.
    a. Within your map, create a **graduated colors** symbology based off the newly joined French Speaking population value for 2015. For your first choropleth map, examine the breaks created in the default Natural Breaks (Jenks) method.
    b. Create a **layout** map, adding your map frame. Add the required map elements, including a title that reflects the data classification method selected.
    c. When satisfied with your layout map, export a tiff version of the Jenks map.
    d. Export 2 more versions of this map using two more classification methods (quantile, equal interval, defined interval, etc.). Be sure to update the title to reflect the classification method used for each map.

5. A Map Series allows for the creation of a sequence of layout pages from a single layout (in ArcMap this was known as Data Driven Pages). (Deliverable 2) A map book will provide a more in-depth view of the tracts within each parish (county).
    a. Open the attribute table for the tract feature and notice that the same county name is repeated over several records (or rows). **Dissolve** these records based on the county name so that only one record remains for each county. (When running this tool, the statistics field should be the French-speaking population count and the statistics type is Sum.)
        i. This new feature class will now show the parish (county) boundaries. Change the **symbology** so that only a border shows (no fill).
    b. Create a new **layout** titled "MapBook" and copy the elements from your previous layout into this one. Utilize the choropleth classification method of your choice for this map series.
    c. Via the Layout tab, **Enable a Map Series** utilizing your newly created parish boundary feature as the index layer (select the Map Series option under the Layout tab).
        i. Your layer for the map series will be the newly created parish (county) boundary. The name and sort field should be the county name field.
        ii. Your map extent will need to be Best Fit with a margin size of approximately 10%.
    d. Now that the map series is created, each page in your layout now features a different parish boundary; however, all of the tracts are still visible. We want to change this so that only the tracts associated with the parish of interest are shown. We will create a page query to accomplish this.
        i. In Data view, open the **layer properties** for the tract feature.
        ii. Select the **Page Query** section near the bottom of the list.

iii. Make sure the name of the parish matches the name of the map series page.

Layer Properties: Census_Tract_LA_2015   ×

Metadata	**Map Series Page Filter**
Source	
Elevation	Filter rows based on the current map series page. The values in this field are matched against the current map series page name. The filter is only applied when a map series is enabled.
Selection	
Display	COUNTY ▾
Cache	
Definition Query	Show features that:
Time	● Match
Range	○ Don't Match
Indexes	
Joins	
Relates	
Page Query	

OK   Cancel

    iv. Now only the tracts that are within the parish of interest are displayed. This will update as you change the page in the layout view.

  e. Finally, add a **dynamic title** so that it updates to the parish of interest on each page.

    i. Insert -> Dynamic Text, scroll down to Map Series options. Select Page Name and modify it as desired.

    ii. Example: French Speakers by Census Tract, <dyn type="page" property="name"/> Parish

  f. Export the map book as a multi-page PDF so that each parish has its own page. Share -> Export -> set file type to PDF. Make sure in your Export Option that you select the All (# pages) option on the map series tab. Save this in your working folder.

6. A heat map is a consolidated smoothed version of the data that does not correspond to geographic boundaries. Create a heat map of the data utilizing the counts of French speakers for each tract. (Deliverable 3)

  a. A heat map requires point inputs rather than polygons so you will need to convert the census tract polygons to point type. (Use the **Feature to Point** geoprocessing tool.)

  b. Insert a new layout and create a heat map displayed at a statewide scale with only parishes as a background and the basemap as Light Gray Canvas.

7. A change over time choropleth map will represent the decline or increase in native French speakers. For this map, we will compare the percent change from the 2010 ACS estimates to the 2015 ACS estimates. (Deliverable 4)

  a. Within your exported Census_Tract_LA feature class created above, **create a new long field** titled "French_Speaker_Change_2010_2015"

  b. We will now add an additional join to this layer. We will follow the same process as we did for the 2015 ACS dataset, but this time we will join the 2010 ACS dataset to this feature.

  c. **Calculate** the numerical change from the 2015 number of French speakers from the 2010 value. This new field will be either a negative or a positive whole number

representing the difference in population between these two years. (See Fundamentals of field calculations for additional information.)

    d. Add a double field titled "French_Speaker_Change_Percentage" and calculate the percent change by comparing the 2010 values to the numerical change value. The join for 2010 data can be removed after this step. You will have to address the issue of dividing by zero by using the following rules:

        If a county has 0 French speaker in 2010 and any number > 0 in 2015, calculate this as a 100% increase.

        If a county has 0 French speakers in 2010 and 0 French speakers in 2015, calculate this as a 0% increase.

    e. This can be accomplished using a definition query to select the parcels, then using a field calculator to set them to a specific value.

    f. For this map, you will want to utilize a manual interval method. Utilize a bi-color progression symbology to visualize the percent change as a large decline, small decline, no change (or NA), small increase, and large increase. Choose a value that would stay constant and be a logical break point for each of these categories.

8. A proportional symbol map displays a proportionally sized circle to represent the number of speakers in each Parish. (Deliverable 5)
   a. Utilize your dissolved Parish feature created earlier for the map book series. It will have the sum of French speakers for each parish if you correctly utilized the Statistics field during the dissolve.
   b. Create a proportional symbology containing a symbol for each parish overlaying the actual parish boundaries. Scale your symbol size and properties for maximum clarity.
   c. Using an SQL query, label only the three largest French speaking populations by parish with the total population of French speaking residents.

9. Finally, create a dot density map to show a different method of displaying the number of French speakers for each parish (the same dataset as the proportional symbol map). This map type is similar in scope to a proportional symbol, but takes a different approach towards the visualization of the data. Create a new map with the Parish boundaries and customize a dot density symbology. Set the sizes and values as desired. (Deliverable 6)

Deliverables

1. 3 Choropleth maps of the French speaking population by tract showing the different classifications explored in Step 4. (6 points: 2 points per map)

2. Map book containing a detailed breakdown of each parish showing the chosen choropleth style of your choice. (8 points)

3. A heat map of the number of French speakers throughout Louisiana. (3 points)

4. An advanced choropleth map showing the percent change over time of French speakers by tract. (6 points)

5. A proportion symbol map showing the population count of French speakers by parish. (4 points)

6. A dot density map showing the population count of French speakers by parish. (3 points)