GEOGRAPHY 426
LAB 4: Choropleth Maps

The purpose of this exercise is to explore several different classification methods that can be used to display geographic data sets, and also to cover how to make your own ArcMap Document, and how to join in data from other data sources.

With making a choropleth map, your goal should be to choose a classification that produces the best representation of the underlying data. As you will see in this exercise, maps can look very different depending on which classification method you use. Selecting a classification method requires a careful examination of the data distribution. Other important decisions include deciding upon an appropriate number of classes, and selecting and displaying an appropriate legend. It is also important to think about how easy it is for the reader to understand the classification method.

To help you decide what classification method is appropriate, how many classes you should use, and how to create an appropriate legend, see your text for the class.

The data for this exercise is on the labs portion of the course website. The map project consists of a single layer, whose attribute table contains the variables you will use in this exercise. You are asked to produce several maps with different classification methods. When you turn in the lab, each map that you produce should be accompanied by a histogram displaying relevant information about your classification methods, and a description of why the color and classification choices you made were appropriate for that map. Information about classification methods can be found in the Slocum et al. text for the class.

Step 1. Copy the data and open the exercise map document.

- Save the data from the website to another directory that you can work from.
- Open ArcMap – add two layers: USSEA.shp and “cancer data”
- Open the data table for the “USSEA” layer. You can do this by selecting the map layer in the Table of Contents frame, then right-clicking to bring up the context menu, and choosing “Open Attribute Table” there. Note that there is an “ID_” column
- Open the “cancer_data” data table as well. Look for a field that has similar values to the “ID_” one in the USSEA table.
- Join the two fields. You can do this by using the “Joins and Relates -> Joins” button from the context menu for the USSEA layer (right click on USSEA in the Table of Contents). This should bring up a form with three steps. Set these appropriately – 1. ID_, 2. cancer_data, 3. SEA. If these options aren’t available to you, make sure that you right clicked on the USSEA layer for the join and that you have added the cancer_data file to the ArcMap project.
Step 2. Design a layout.

Before you start to classify your data set, you will need to create a layout. This layout will be used for all the maps you create. Use your knowledge of layout design to arrange the different map elements in your layout (e.g., title, legend, scale bar, text). Remember that you can change your layout page orientation if needed. Once you have the layout designed, make sure to keep it the same for ALL the maps. You might have to change text (i.e. the title and the name of the classification method used), but locations and sizes of the elements should remain the same. Also, remember to select an appropriate map projection!

Important: Make sure to add a text block in your layout to name the classification method you used for each map. A subtitle would be a good place to add this information.

- From the View Menu, Choose Layout View.
- Add the different map elements to your layout.
- Choose a better map projection. Do this by first selecting the data frame in the TOC, then click on the “Coordinate System” tab. Then select an appropriate projection under the Predefined -> Projected -> Continental choices.
- Save your work. This means saving your ArcMap document into your working directory. This will help keep all of your data together.

Step 3. Decide on a variable.

In this exercise you will be working with data representing rates of different types of cancer for the United States between 1970 and 1994. The data are based on State Economic Areas (SEA) throughout the country. These data have already been normalized by a value that was derived by a complex equation, which takes into account the population and ages in each SEA unit. Three
different data values are available for this exercise. You will explore the data values and select a data set to work with. The three data sets are:

- cancer_data.RATEBRWF: breast cancer in white females
- cancer_data.RATECOLBF: colon cancer in black females
- cancer_data.RATEPROSWM: prostate cancer in white males

If you would like to look at other available data, or maps that have been produced, the on-line version of the Atlas of Cancer Mortality in the Unites States (1950-1994) can be accessed on line at [http://www3.cancer.gov/atlasplus/type.html](http://www3.cancer.gov/atlasplus/type.html)

You will select one of the three variables (RATEBRWF, RATECOLBF, and RATEPROSWM) for your maps. You will use this variable in steps 4 and 5.

**Step 4. Experiment with different classification methods.**

The classification method can be changed in the Symbology tab of the Layer Properties dialog. Select “Quantities” from the Show box on the left. Choose the variable you are working in the Value field, and choose a color ramp.

An example of the Layer Properties window is shown below.

Open the Classification dialog box by clicking on the classify button. The Classification dialogue box provides information about the classification of the data. One view it provides is a detailed histogram, by clicking the “classify” button. A histogram shows the values of the data along the x-axis and the frequency of each data value on the y-axis. For example, if 7 SEA units had the value of 5, a bar would be present at the location of 5 on the x-axis and it would rise to 7 on the y-axis.

You can change the classification method and the number of classes in the Classification dialog. Experiment with changing the number of classes and classification method, paying attention to how the blue lines (class break values) change in the histogram. You can also change the class breaks by dragging the blue lines or by typing new values in the “break values” box manually. Experiment with these things.

An example of the Classification window is shown below.
The Classification dialog also provides additional information about your data set. You can click on the Show Std. Dev and Show Mean checkboxes to display these quantities on the histogram. You can also view the Classification statistics in a box in the upper right corner of the dialog.

You can change the labels of the classification values in the legend by typing in the actual values you want displayed in the Label section of the Layer Properties window. This doesn’t change the actual class values – it only changes the labels. To change the class values, use the Range section or return to the Classification Dialog box.

**Step 5. Classify your data**

For a single cancer data set (the one you chose to work with), produce three different maps based on three different classification methods. You can, for example, select one that you think best represents the data set and one that does not provide a good representation. When placing your three classified maps in a Word document, you should order them from best to worst classified map. In the Word document, explain why the classification methods selected are, or are not, most suitable for the data.

Use ColorBrewer color schemes for your maps. These can be found at colorbrewer.org. Ask your TA for help in implementing these colors in your map.

**Note:** For this part of the exercise make sure to use a manually derived break value for at least one of the classifications. With manual classifications you select all of the class breaks, but you should be able to well justify your choices of class breaks. “The map looked good with these classes” is not a good justification.

- Use the layout you designed in step 2 to map the data using your first classification method. Remember to add a text block that names the classification you used on the map.
- Make a screen capture of the histogram for the classification you used for this map. This screen capture should inserted in the Word document along with your map. To create a screen capture, use Alt + Print Screen (the print screen button is on the upper right side of the keyboard) when the Classification dialog is open on your screen. Then paste the image directly into Word (Ctrl + V, or Edit -> Paste). Alternatively, you can use an image editing program such as Photoshop as an intermediate step, but this is optional and the process will not be described in the lab. You must paste the image before capturing another screen or the first will be replaced by the second.
- Export your map as a JPEG and save your work. Save the word document with your screen captures.
- To place your exported maps into the Word document click on Insert -> Picture -> From File in the main menu.
At the end of this step you should have made three maps, exported all three as JPEGs, and pasted screen captures of the histogram for each classification method into a word document. Label each of the histograms in Word so that it is easy to tell which classification method each represents (Example shown below).

**Natural Breaks (Jenks)**

This is a good/bad classification scheme for this data because...

---

**Grading Criteria (10 points):**

1. 3 page print out of each of the three maps with histograms and explanations
2. Document is placed on website AS A PDF
3. Maps are projected in Albers Equal Area Conic
4. Used ColorBrewer color schemes *appropriately*
5. Layout is well designed.
6. Legend is clear and well designed, does not use ArcMap abbreviations
7. Well written explanations (look in your textbook)
8. Overall good map design