

**Lab IV ENVR 4305 Fall 2019 (18 pts)**      **Name** \_\_\_\_\_

### **Displaying Data**

Part I: From the “Getting to Know ArcGIS” book provided in lab, work through the Chapter 7 **Exercises 7a, 7b.**

Part II: Go through the attached exercise “Symbolize GIS data.”

The data files for part I should be in the C drive under folder EsriPress/GTKarcGIS/

The data files for part II should be in the C drive under folder EsriTraining/ARC2/

Ask the TA or Instructor for help if you are confused at any time.

Each student should sign their own lab and turn it in at the end of lab.

25 minutes



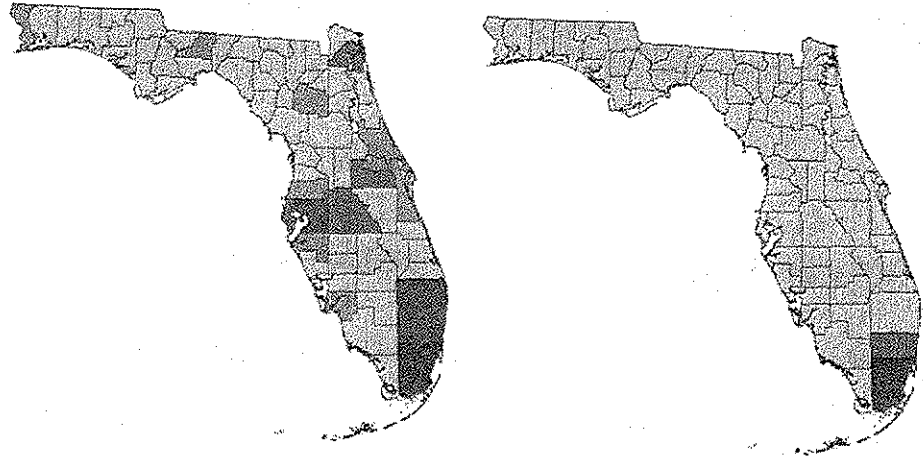
## Exercise 2 Symbolize GIS Data

Create maps of the state of Florida using crime data. From these different maps, choose the map that best symbolizes the crime distribution.

In this exercise, you will:

- Apply quantitative symbology to GIS data.
- Evaluate quantitative classification methods.

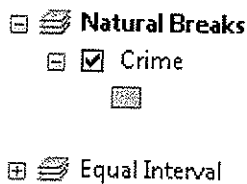
**Figure**  
Florida vehicle thefts  
displayed using two  
different quantitative  
methods.




## Step 1: Evaluate attributes for symbology

Data attributes serve as the foundation for your map symbols. In this step, you will explore attributes and identify which could be used for quantitative display.

- a Start ArcMap.
- b From the File menu, click Open.
- c Browse to your ..\ARC2\Symbology folder and open Quantitative\_Symbols.mxd.



Your map opens with two data frames in the table of contents. The Natural Breaks data frame is active and is shown in a bold font.

- d Click the Full Extent button .

The Natural Breaks data frame has one layer named Crime. Crime is the layer shown on your map. You can think of each data frame as a separate map, each with its own layers and symbols.

To illustrate how each data frame represents a map, you will change your view in ArcMap to layout view, which displays all your maps together on a virtual page.

- e From the View menu, choose Layout View.



The Layout toolbar appears when you switch to layout view.

- f If necessary, move the toolbar so you can see the maps. (Click the top of the toolbar to move it. You can also dock it to one of the edges of the ArcMap window.)

Each of the data frames in your table of contents is shown as a separate map. These maps, along with their titles, have been positioned for you in the map document. You will change each of these maps and then use layout view at the end of this exercise to compare the maps.

- g From the View menu, choose Data View.



You can also change views by clicking the Data View  and Layout View  buttons at the bottom-left of your map display.



Before symbolizing your data, examine the type of data stored in each attribute field. Identifying the level of measurement for each attribute can help you determine how the attribute should be symbolized.

h Open the attribute table for the Crime layer.

i If necessary, resize your table window so that you can see all the attribute columns.

Several attributes are shown in the table. Many attributes are automatically created and maintained by ArcGIS, such as:

- OBJECTID
- Shape
- Shape\_Length
- Shape\_Area

The remaining attributes have been added to this feature class and are specific to the data:

- STATE
- COUNTY
- POPULATION
- VEHICLE\_THEFT

j Right-click the COUNTY attribute field heading and choose Properties.

The Field Properties dialog box shows the structure of this attribute.

1. What type of field is the COUNTY attribute?

---

k Click Cancel to close the field properties.

2. Is the COUNTY attribute a nominal, ordinal, interval, or ratio measurement?

---

1. Examine the attribute types for the POPULATION and VEHICLE\_THEFT attributes.

3. What type of attributes are POPULATION and VEHICLE\_THEFT?

---

4. Are POPULATION and VEHICLE\_THEFT qualitative or quantitative?

---

5. What level of measurement are the POPULATION and VEHICLE\_THEFT attributes?

---

2. Close the Table window.

## Step 2: Apply the Natural Breaks classification method

Now that you have examined your attributes, you are ready to begin classifying the data. When you classify data, you group the features into different classes based on map symbols. Classifying data allows you to visualize patterns, trends, and categories of features on your map. You can choose from several classification methods provided in ArcMap or you can manually define your own custom class ranges.

In the remaining steps of this exercise, you will work with Florida crime data and compare different quantitative classification methods to symbolize your maps. You will compare the results of the different methods and examine why one classification method may be preferred over another.

When displaying quantitative attributes, you need to choose a classification method. You also need to decide how many classes you will use to represent the data. The number of classes you choose will depend on how many symbols are necessary to effectively show spatial patterns.

- Too few classes will result in an overly-simplified map.
- Too many classes will result in a map in which major patterns are difficult to recognize.

Having too many classes can also make it difficult to match the map symbols to their correct values in the legend. This could cause map readers to make incorrect decisions when reading the map.

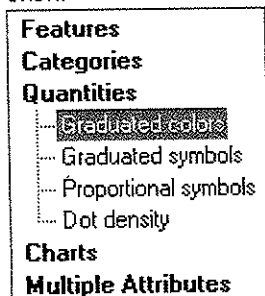
a. In the Natural Breaks data frame, double-click the Crime layer to open the Layer Properties dialog box.

- b Click the Symbology tab.

Methods that you can use to symbolize your data are listed on the left. These are known as *renderers*.

- c Click Quantities and confirm that the Graduated Colors renderer is selected.

Show:

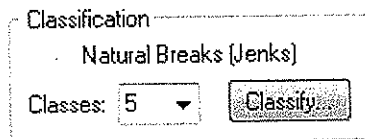


Next, you will choose which attribute field will be symbolized with graduated colors.

- d Under Fields, for Value, choose VEHICLE\_THEFT.

These are the number of vehicle thefts by county.

Under Classification, notice that the method is set to Natural Breaks (Jenks) and the number of classes is set to 5.

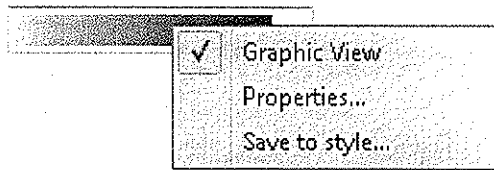


Natural Breaks is the default method and number of classes when classifying quantitative attributes. This method is named after George Jenks, a professor of geography at the University of Kansas, who developed this method of showing spatial data distributions.



The Jenks method is often regarded as the best method for showing clusters of attribute values by using the breaks, or gaps, between symbols in the map legend.

- e Right-click the Color Ramp.



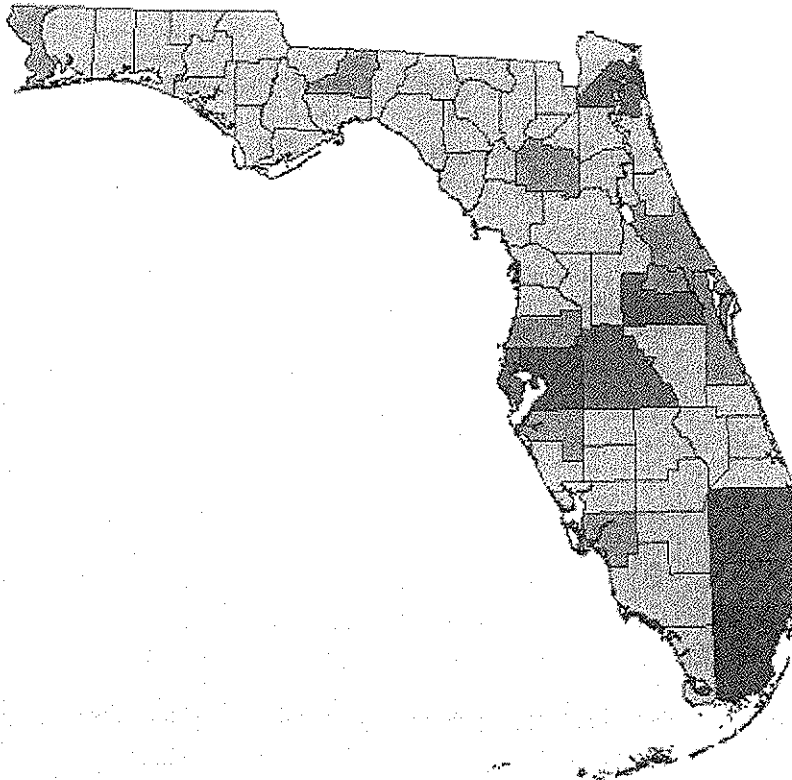
- f Click Graphic View to remove the check mark.



Turning off the graphic view allows you to view the color ramps by name. Viewing color ramps by name is helpful when you want to use a specific color ramp or communicate which color ramp is used to symbolize your data.

- g Click the down arrow to the right of Color Ramp and choose the Purple Bright color ramp.

- h Click OK.



Your map is now symbolized using a graduated colors renderer based on the VEHICLE\_THEFT data. The number of thefts is represented by a range of colors that indicates a progression of numeric values. Values are grouped into classes according to the Natural Breaks classification method, and each class is displayed in the map as a different shade of the Purple Bright color ramp.

Next, you will look at the population values of some of the polygons and compare them to the Crime attributes that you symbolized.

- i. Open the layer properties for the Crime layer.
- j. Click the Display tab.
- k. Under Display Expression, for Field, choose POPULATION.
- l. Select the check box next to Show MapTips Using The Display Expression.
- m. Click OK.
- n. Verify that you are in data view.
- o. Pause your pointer over some of the polygons in your map.


As you pause over each county, the POPULATION value appears in a MapTip.

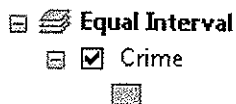
### Step 3: Apply the Equal Interval classification method

In this step, you will work with a classification method named Equal Interval.

- a. In the table of contents, collapse the Natural Breaks data frame.
- b. Right-click the Equal Interval data frame and choose Activate.

Activating the data frame displays its layers in the map.

- c. Click the Full Extent button .
- d. Expand the Equal Interval data frame to see the Crime layer.



- e. Open the Layer Properties dialog box for the Crime layer.



f On the Symbology tab, click Quantities and confirm that the Graduated Colors renderer is selected.

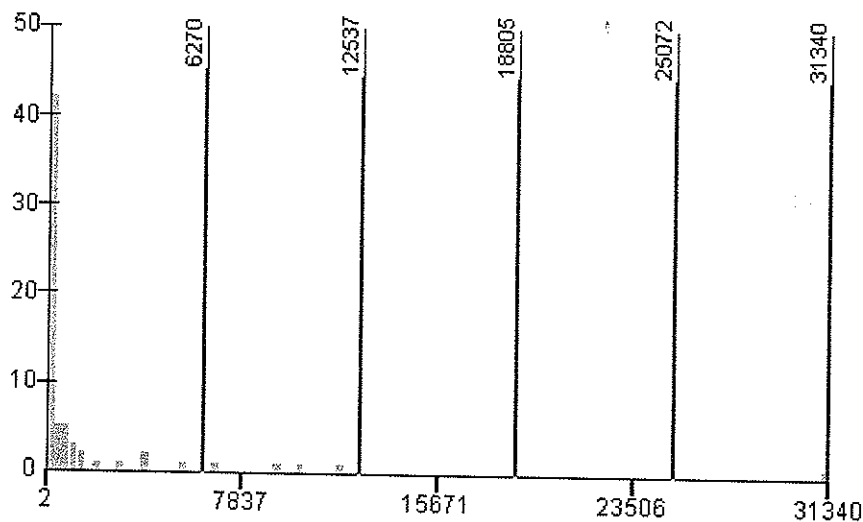
g For Value, choose VEHICLE\_THEFT.

Notice that the default classification is set to Natural Breaks (Jenks), with five classes.

h Click Classify.

i At the top of the Classification dialog box, for Method, from the list of options choose Equal Interval.

j Review the histogram at the bottom of the dialog box.



The histogram shows the distribution of the VEHICLE\_THEFT attribute values along the x-axis and the number of features along the y-axis.



Viewing the histogram is one way to examine your data for trends in the distribution and to identify possible outlier values, which you may choose to show or exclude from your map. Use the histogram when using the Equal Interval method to ensure that all your legend categories have values. Empty categories are confusing and misleading to your map reader.

6. Based on the class breaks currently shown in the histogram, what potential problems might you encounter when you create a map legend?

---

---

As you can see from the histogram, the Equal Interval classification method does not consider how your data values are distributed. This can result in empty classes, which will create legend categories that have no corresponding features on the map.

Ⓚ Change the number of classes to something other than five and review the histogram until you do not have any empty classes.

7. For Equal Interval to have at least one feature in each class, how many classes should you use?

---

Using the Equal Interval method with four or more classes will result in some classes with no features. Three classes is the maximum number that can be used with this attribute. Other attributes may allow for more classes to be shown. Always check the histogram to make sure.

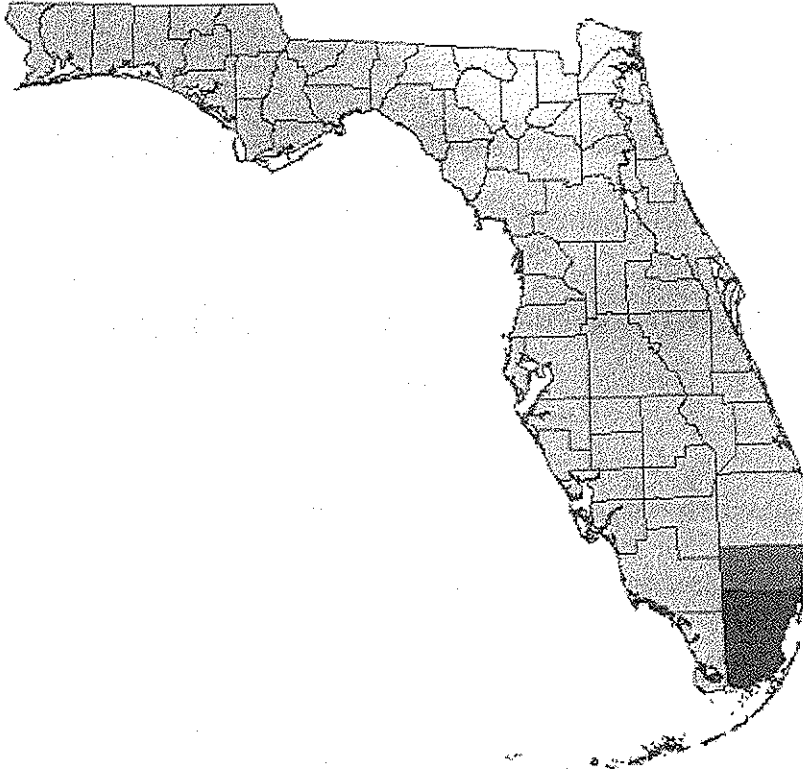
Ⓛ Set the number of classes to **3**.

Ⓜ Click OK.

Ⓝ If necessary, choose the same Purple Bright color ramp.

*Hint: Right-click the color ramp to turn off the graphic view.*

- ⓐ Click OK to close the layer properties and examine your map.



Because you have only three categories, you have a generalized map. It is difficult to recognize trends with only three classes because the data representation is overly generalized. In this map, almost all the features are in the lowest category, and the middle and highest categories each only have one feature. With this data, Equal Interval would not be a good choice of classification method.


#### Step 4: Compare quantitative maps

In this step, you will look at your maps and compare their symbology.

- ⓐ If necessary, maximize your ArcMap window to fill your screen.

- ⓑ Change your view to Layout View.

*Hint:* Remember the buttons below your map that allow you to change views.

- ⓒ On the Layout toolbar, click the Zoom Whole Page button .

Both quantitative maps that you symbolized appear in the layout.

- d) While pressing the Ctrl key, click to expand the Natural Breaks data frame in the table of contents.

This expands all of the data frames in the table of contents.

- e) Compare the Natural Breaks and Equal Interval maps.

Notice how they are different in terms of the distribution of their symbols. Both maps represent your data by grouping values differently. Notice the difference in class breaks between each of the corresponding map legends.

8. What can you infer by comparing these two maps?

---

---

---



Finding the best method to render your data often requires experimenting with different classification methods and number of classes.

- f) Exit ArcMap and do not save the changes.

