

ArcGIS 10.x Basic Exercise– Digital Scholarship Center

Goals of this exercise

- To introduce basic functions available in ArcGIS 10.x to create a simple thematic map

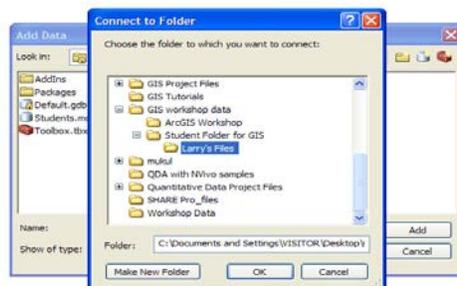
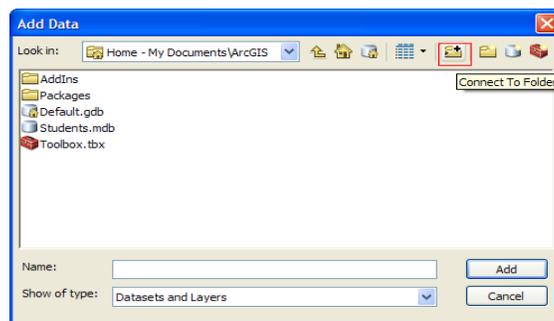
You are going to create a thematic map using VA county data for *elderly population (65 years old and above)*. The exercise includes skills on *importing data, joining tables, creating and calculating new field, classifying functions by quantity, layout data with essential map elements, export a finished map, and more.*

Importing data to ArcMap

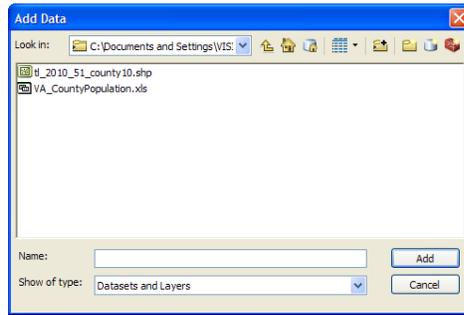
1. Create a folder (with your name) on the desktop on the lab computer (L drive or Mesa account) or your removable drive.
2. Collect the zip folder containing the tutorial data (“ArcGISBasicTutData.zip”) from the desktop on the data services lab computers (Click on Dropbox>GIS workshop files>GIS Basic Workshop>ArcGIS TutData.zip) or download the data from <https://infoguides.gmu.edu/geospatial/workshop> and move them to your folder.

[Use a zip tool such as WinZip to extract the tutdata.zip. You will see six files related to a VA County shape file and one excel file for VA elderly population].

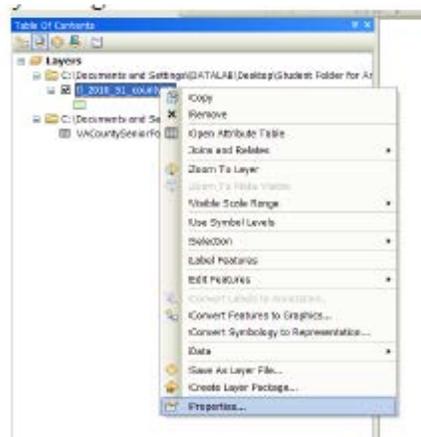
3. Open ArcMap. For most computers this can be done by going to Start>Programs->ArcGIS>ArcMap 10.x
4. Select to start with a Blank Map (go to Files>New if this is not the case).
5. Click the Add Data button  located on the toolbar.
6. Go to your local folder where your extracted files are located (using *Connect to your Folder*.



6. Select the “tl_2010_51_county10.shp” and click Add.



7. Click the Add data button again and add the “VA_CountyPopulation.xls” file.
8. Right Click on the “t1_2010_51_county10.shp” layer on the table of contents and select “Properties”

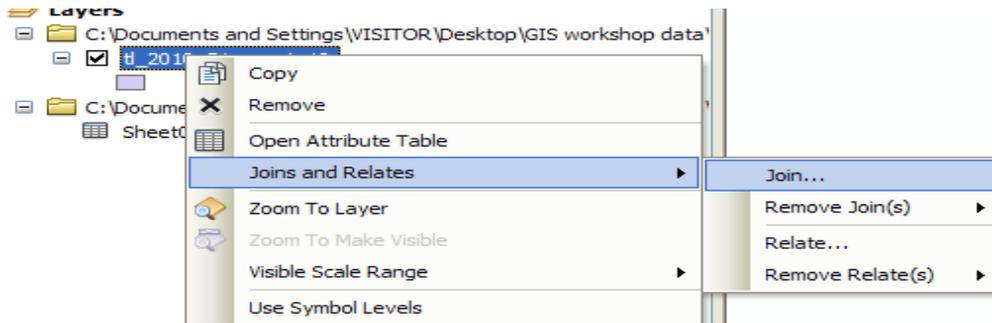


9. Click on the “general” tab of the layer properties dialog box and change the layer name as “VA County.”

Joining Excel tables (your data) to Shape file tables (w/a common variable existing both files)

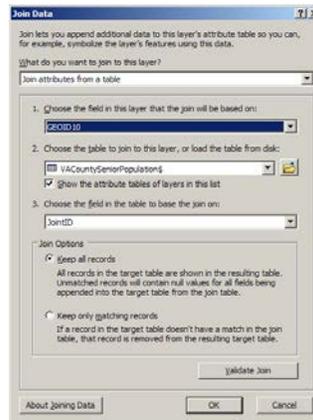
You are going to merge the VA County population data (excel file) to the attribute table of the VA_County layer (Shape file) based on a common variable with the same property between two tables.

1. Right-click on the “VA_County” layer in the table of contents and see which attribute is the same property as the attribute in the excel file that you are going to join. If there are two attributes that are common between two data tables, you can join two tables based on this common attributes.
2. Right click on the “VA_County” again, point to Joins and Relates, and click Join (must be the shape file to be highlighted) .



3. Click the dropdown arrow in the first text box and click the “Join attributes from a table” option

4. Choose GEOID10 from the VA County Shape file and JointID from VA Senior population table and then, click OK to execute Joining as the figure shown below.



Then right click on the “VA County” layer again and select “Open Attribute table”.

If you scroll to the end of the table, you will notice the newly joined data available in the shapefile.

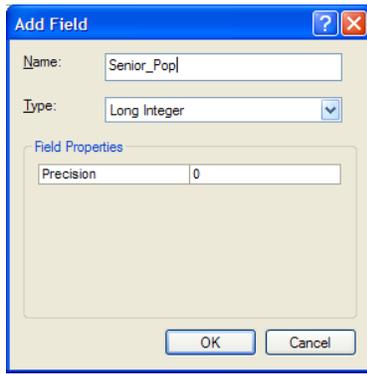
Save your work as a map document which can open only in ArcGIS (File>Save as> “xxx.mxd”)

Creating new fields to the attribute table

1. Right Click pointing to the “VA_County” layer in the table of contents window and click Open Attribute Table. If a message appears indicating the table is in use by another user, make sure ArcCatalog is closed.
2. In the Table Options choose **Add Field**, Type “**Senior_Pop**” as a field name (no space for the field name!).

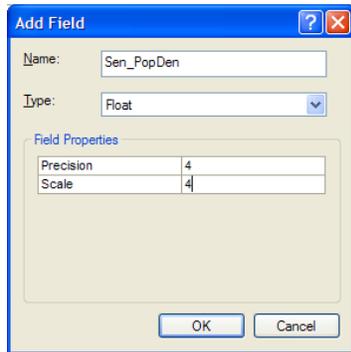


3. Click the Type dropdown arrow and click **Long Integer as shown below** and click on OK.



Now add another field, called “Sen_PopDen” by using the same step as we did for senior_pop. but this time, choose float that allows decimal numbers. Click the Type dropdown arrow and **click Float**.

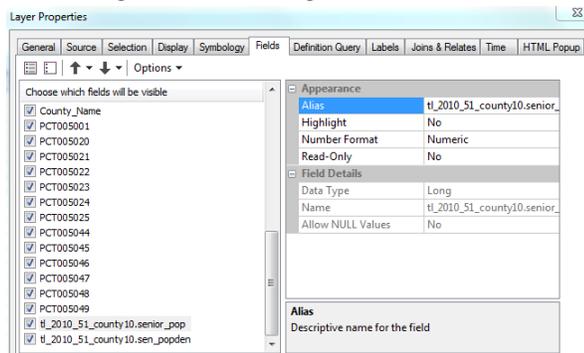
1. Enter the **precision as 4 and Scale as 4**.
2. Click OK.



The two new fields should be appeared at the end of the attribute table.

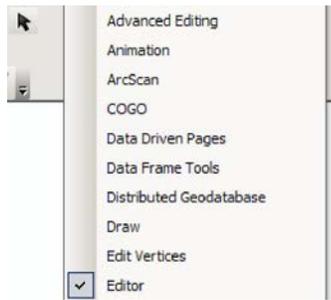
Option:

You can change the newly created default field name to your preferred one by the following steps: the layer properties>Fields> change a name through the “Alias” box



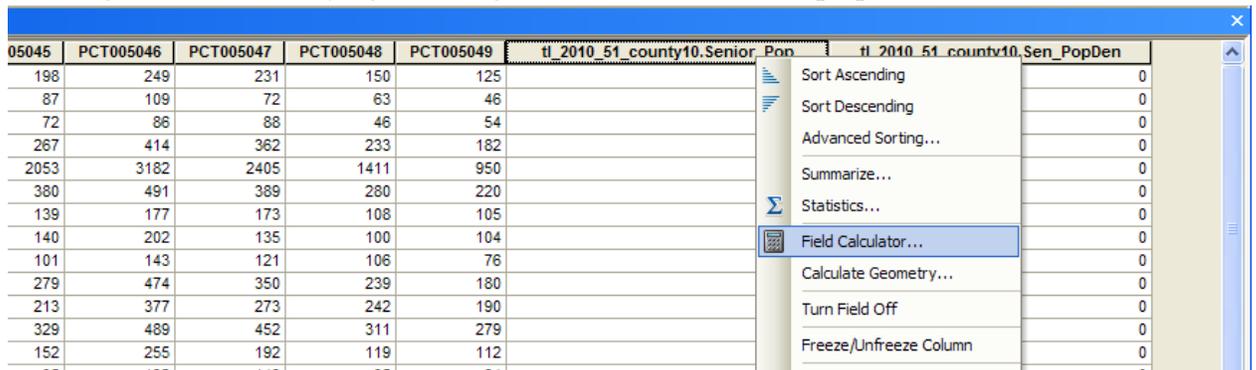
Calculating Attribute Values

1. Click the **Editor Toolbar** button on the Standard toolbar. If the toolbar is not present, Right Click on the Standard toolbar to make sure it is checked



2. A pop-up which asks the layer or workspace to edit (such as VA county layer or VA county senior population (excel sheet)> Select the VA_County Layer.

3. Right-click “Senior_Pop” and click Field Calculator. The Field Calculator appears (you can change the field name by right clicking on the field and click on “properties”



“Senior_Pop” needs to represent total senior citizen population. We need to sum the number of several age categories (starting “VACountySeniorPopulation\$.PCT005044 to the end of the categories) to make a total of senior population. “PCT005001” is the total population of each county.

The formula you have to enter is below. You can type the formula directly into the box or use the buttons on the dialog. Follow the steps below for assistance with entering this formula. [VACountySeniorPopulation\$.PCT005044] + [VACountySeniorPopulation\$.PCT005045] + [VACountySeniorPopulation\$.PCT005046] + [VACountySeniorPopulation\$.PCT005047] + [VACountySeniorPopulation\$.PCT005048] + [VACountySeniorPopulation\$.PCT005049]

4. Double-Click each field listed above in the formula and then the addition symbol. Repeat adding next field in the formula until you pick up the last field of the age group. Then click “OK”

5. When the dialog box closes, you can see the senior population value for each county similar to the table below.

PCT005022	PCT005023	PCT005024	PCT005025	PCT005044	PCT005045	PCT005046	PCT005047	PCT005048	PCT005049	tl_2010_51_county10.Senior_Pop	tl_2010_51_county10.Sen_PopDen
231	164	93	60	133	198	249	231	150	125	1796	1.323
106	56	38	19	69	87	109	72	63	46	745	1.547
67	64	26	20	45	72	86	88	46	54	634	1.255
368	289	170	85	149	267	414	362	233	182	2769	2.484
2521	1713	851	407	1457	2053	3182	2405	1411	950	18800	7.353
445	281	165	84	230	380	491	389	280	220	3246	1.098
190	139	79	40	110	139	177	173	108	105	1409	0.966
157	122	60	35	79	140	202	135	100	104	1238	1.378
138	93	65	42	62	101	143	121	106	76	1022	1.541
329	203	112	91	235	279	474	350	239	180	2771	1.075
253	204	114	59	142	213	377	273	242	190	2238	1.59
389	313	171	112	228	329	489	452	311	279	3350	1.434
232	138	87	72	93	152	255	192	119	112	1608	1.307

Let's now calculate the senior population percentage

1. Right-click "Sen_PopDen" and click Field Calculator. The Field Calculator appears. **(Make sure you click on the "Clear" button to clear the already present formula before you proceed this)**

Sen_PopDen needs to be represented as senior population percentage by using, the formula below:

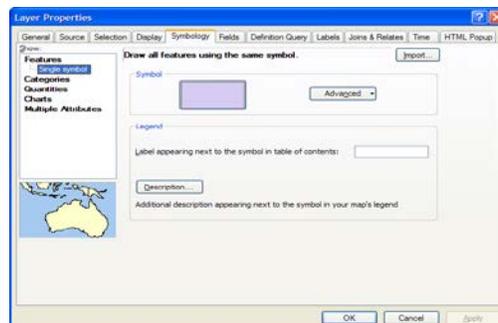
$$[\text{Senior_Pop}] / [\text{PCT005001}] * 100$$

You will see percentage values for each county similar to the table below.

PCT005022	PCT005023	PCT005024	PCT005025	PCT005044	PCT005045	PCT005046	PCT005047	PCT005048	PCT005049	tl_2010_51_county10.senior_pop	tl_2010_51_county10.sen_popden
231	164	93	60	133	198	249	231	150	125	1796	1.323
106	56	38	19	69	87	109	72	63	46	745	1.547
67	64	26	20	45	72	86	88	46	54	634	1.255
368	289	170	85	149	267	414	362	233	182	2769	2.484
2521	1713	851	407	1457	2053	3182	2405	1411	950	18800	7.353
445	281	165	84	230	380	491	389	280	220	3246	1.098
190	139	79	40	110	139	177	173	108	105	1409	0.966
157	122	60	35	79	140	202	135	100	104	1238	1.378
138	93	65	42	62	101	143	121	106	76	1022	1.541
329	203	112	91	235	279	474	350	239	180	2771	1.075
253	204	114	59	142	213	377	273	242	190	2238	1.59
389	313	171	112	228	329	489	452	311	279	3350	1.434
232	138	87	72	93	152	255	192	119	112	1608	1.307

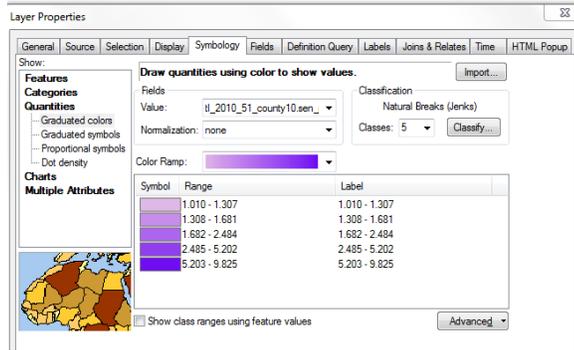
Classifying features by quantity with symbols (Mapping Visualization)

1. Right-click the "VA_County" in the table of contents and click Properties.
2. Click the Symbology tab. All geographies (county) are currently drawn using the same symbol (the same solid fill color)



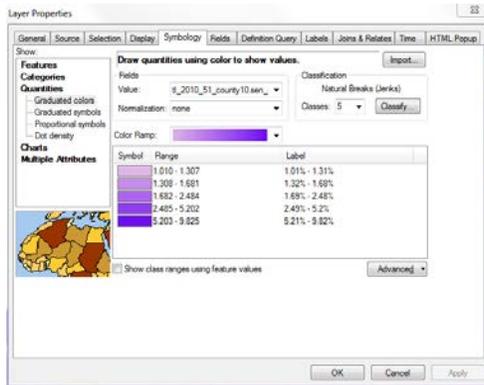
3. Click **Quantities** in the Show box and pick up "Graduated Color Symbols" and choose the "Senior_pop" as the field value to visualize (click on the "template" in the Symbology box to change the color of the symbol). Data such as percentage, average, medians & rates are normalized measures. In this case, recommend to use "Graduated color (shaded) symbol" to visualize the data.
4. Change the number of classification and classification method (to Quantile) to see how it looks. Click on the color ramp drop down to choose a different color also.

5.

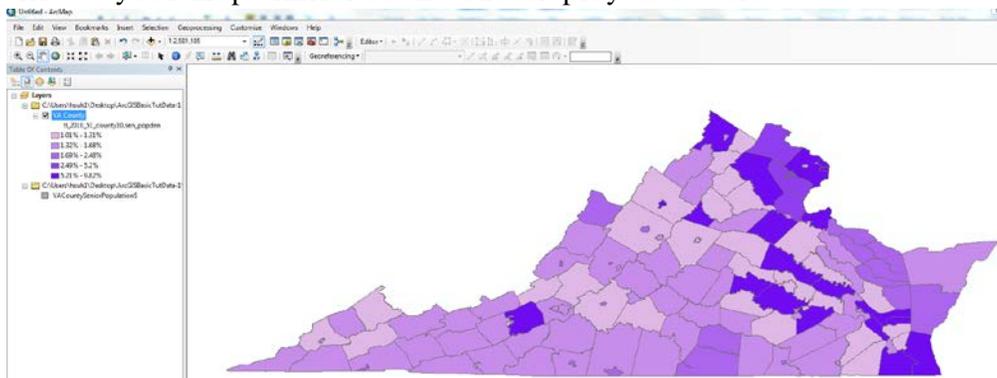


6.

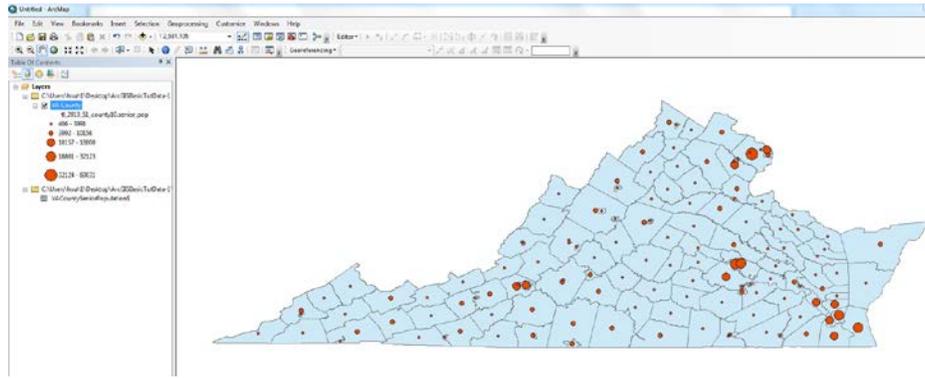
7. Now we see that the percent sign is not displayed in the labels. In order to add % sign in the classification data, go to the **symbology** box and click on “**Label**” and choose “**format labels**” and then choose percentage with two decimals (click on the “**numeric options**” box), then you will see like the figure below as well as the % signs appear in the classification data in the table of contents.



8. You will see your map similar to the one displayed as below.



Option: Create a map using a graduated (bubbles) or dot density symbol for count and number data (in this exercise, use “senior_pop,” un-normalized data as shown below.

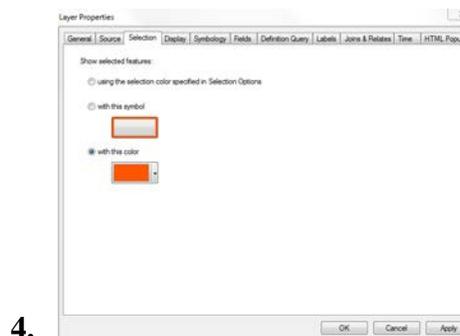


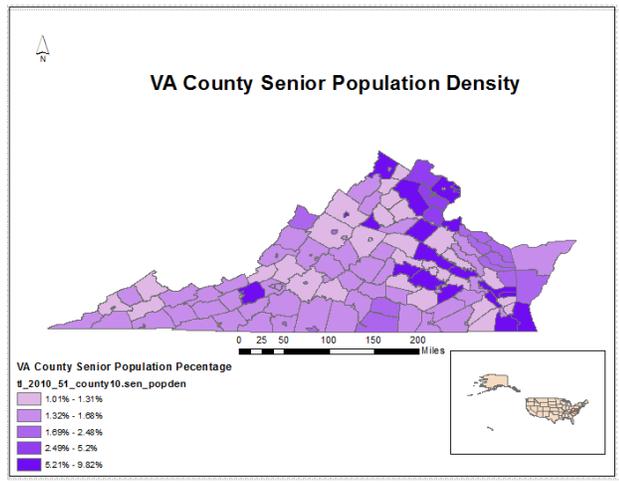
Publishing Your Map

1. Select View>Layout View from the menu bar. The layout toolbar will appear with a special set of tools which differ from the data view toolbar.
2. Click “Insert” from the tool bar. You need five essential map elements to add to your map: Title, Legend, Scale bar, N-S arrow & the source information (creator name, date of publication, etc) in addition to your map that you created with “Data View”
[You can insert pictures, statistical charts, and an inset map on your map layout].
3. After all map elements have been added, save your map (Files>Export Map>Save it in a **pdf** or a **bmp** format to your folder to publish or insert to other window environment.

Creating an Inset map (Optional Exercise)

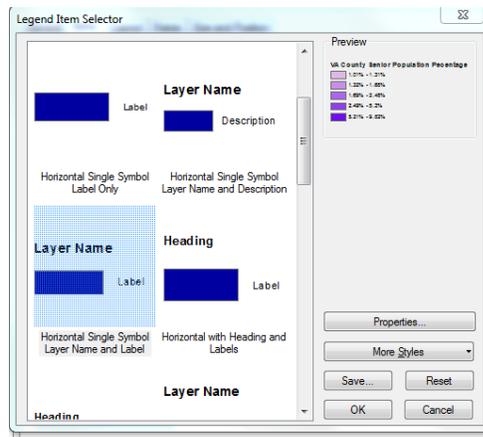
1. Click on “layers” and insert> create a new dataframe (meaning a new map creating enviroment)
2. Add a layer that you want to use as an inset map (e.g. US State layer and select the VA state to highlight.
[an **inset map** (usually a smaller than the main map) is used as a locator **map** that shows the area of the main **map** in a broader, more familiar geographical frame of reference]
3. Change the color of the VA state using the figure below (Click on the US State Layer and select the VA State, then go to the layer properties>selection and change the color for the VA state to stand out.





- Right-Click “VA County” in the table of contents and change the name to “VA County Senior Population Percentage” and select “LayoutView”>Insert>Legend.

Your legend is appeared in the figure above. In order to style your legend, double click on the legend box on the map and choose, Items>Styles, then select the option shown below to get rid of the “t1_2010...layer name”above. You will notice the change.



- If you are satisfied with your style option, then save your map (File>Export Map>Pdf or bmp format)

[Go back to the data view of this map and add a **base map** instead of not using an insert map or a layer available from the ArcGIS online (Add>ArcGIS online>) that you are found to be interested to add to your existing map to show a relationship between layers]

Updated September, 2018

Contact: hsuh1@gmu.edu for any questions.

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