SOC 4650/5650: PS-03

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Directions

Please complete all steps below. Your final map images and markdown file with answers should be uploaded to your GitHub assignment repository by 4:20pm on Tuesday, February 14th, 2017. This lab uses data found in `MOBoundary`, a folder containing shapefiles for Missouri and surrounding states.

For this assignment, you are asked to take on the role of a demographer to analyze county-level demographic trends in the State of Missouri. Maps are expected to be well designed and normalized.

Create a Basemap

1. In a new map document, right click on the `Layers` data frame and select New Group Layer. Group layers are helpful organizational tools for your Table of Contents.
2. Rich click on `New Group Layer` and select Properties ▷ General. Under Layer Name, rename the group layer to `Basemap`.
3. Add the Missouri state boundary shapefile to your map. In the Table of Contents, make sure that you drag the shapefile *under* the `Basemap` group layer.[1]
4. Symbolize this layer with a white fill and no line. This will provide a background if certain counties are missing numeric data.
5. Add the remaining shapefiles for surrounding states to the `Basemap` group layer:
   (a) Arkansas
   (b) Illinois
   (c) Iowa
   (d) Kansas
   (e) Kentucky
   (f) Nebraska
   (g) Oklahoma
   (h) Tennessee

[1] *Hint:* You can confirm this by unchecking and re-checking the `Basemap` group layer. If the Missouri state boundary disappears and reappears when your turn the `Basemap` group layer off and on, you have done this successfully.

6. Using Colorhexa.com, identify three shades of gray that have significant contrast with each other because they vary in value. These will be your "ground" layers. To do this:

   (a) Begin by searching for "Gray" in the homepage's search bar. You should find the shade of the gray hue with the hexdecimal value `#808080`. Use the "Shades and Tints" section of that hue's webpage to make color selections.

   (b) Pick a light shade (i.e. a *high* value on the Munsell color model) for the surrounding states fill.

   (c) Pick a darker shade (i.e. a *lower* value on the Munsell color model) for the surrounding states outline color.

   (d) Pick a dark shade (i.e. a *low* value on the Munsell color model) for the surrounding state labels.

   (e) For each selected shade, hover your mouse over it to reveal the RGB color values. Note these down so you can reference them later.

7. For each surrounding state layer, set the fill and boundary colors to the RGB values you have selected. Set the outline width to 0.4.

8. Assess how well these three shades of the gray hue work together. Make adjustments as needed.

9. For each surrounding state layer, turn labeling on. Use the attribute `STATE_ABBR` as the label field. For Illinois, use the attribute `STUSPS` as the label field. Use "Arial" for the label font and use size 12 point font size. Set the font hue to the RGB color value you have selected.

10. Zoom to the Missouri state boundary layer.

11. Use the small minus sign icon on the Table of Contents to collapse the `Basemap` group layer without turning it off.

Map 1 - Qualitative Map of Missouri Counties

12. Add the Missouri county boundaries shapefile *above* the `Basemap` layer on the Table of Contents.

13. Rename the layer `Counties Qualitative`.

14. Symbolize this layer using unique categorical values. Use the attribute `CNTY_FIPS` to accomplish this.

15. Select a color ramp from ArcGIS's default color ramp options that is not overly distracting and provides *high* visual contrast.

16. Zoom to the `Counties Qualitative` layer.

17. Export the map as a `pdf` file at 300 dpi.

18. Turn off the `Counties Qualitative` layer by un-checking it in the Table of Contents. Use the small minus sign icon on the Table of Contents to collapse this layer.

Map 2 - MO Population Density per Square Kilometer

19. Add the Missouri county boundaries shapefile *above* the `Counties Qualitative` layer on the Table of Contents.

20. Rename the layer `County Outlines`.

21. Re-symbolize the layer `County Outlines` to match the outline color that you used for the basemap outline color.

22. Add the Missouri county boundaries shapefile *above* the `Counties Outlines` layer on the Table of Contents.

23. Rename the layer `County Pop Density`.

24. Calculate the area covered by each county in *square kilometers*.

25. Create a choropleth map of the 2010 population (`POP_2010` attribute) normalized by the square kilometers of each county. Use the default Jenks natural breaks classification system with 5 data classes.

26. Use Color Brewer to select a *single hue sequential* color scheme that is both color blind and LCD friendly with 5 data classes.

27. In the panel where you see the individual color swatches and their hexdecimal values, switch the dropdown menu from "HEX" to "RGB", and note the RGB values for each of the five colors.

28. Manually enter the appropriate RGB values for each data class in ArcGIS. The *lowest value* (darkest) color should be associated with the *highest numeric value range*, and the *highest value* (lightest) color should be associated with the *lowest numeric value range*.

29. Zoom to the `County Pop Density` layer.

30. Export the map as a `pdf` file at 300 dpi.

31. Turn off the `County Pop Density` and `County Outlines` layers by un-checking tgen in the Table of Contents. Use the small minus sign icon on the Table of Contents to collapse these layers.

Map 3 - Unemployed Veterans in MO

32. Add the Missouri county boundaries shapefile *above* the `County Pop Density` layer on the Table of Contents.

33. Rename the layer `County Vets`.

34. Create a choropleth map of the unemployment rate for veterans (`VET_UNEMPL`) by county in Missouri. This should be normalized by the total number of veterans in each county (`VET_POP`). Note that there is *missing data* here - we do not have county level estimates for these data in some parts of the state. Use the default Jenks natural breaks classification system but *change the number of data classes to 4*.

35. Use Color Brewer to select a *multi-hue sequential* color scheme that is both color blind and LCD friendly with 4 data classes.

36. Follow the same steps you have used previously to manually transfer these values into ArcGIS. The *lowest value* (darkest) color should be associated with the *highest numeric value range*, and the *highest value* (lightest) color should be associated with the *lowest numeric value range*.

37. Zoom to the `County Vets` layer.

38. Export the map as a `pdf` file at 300 dpi.

39. Turn off the `County Vets` layer by un-checking it in the Table of Contents. Use the small minus sign icon on the Table of Contents to collapse this layer.

Map 4 - Vacant Housing Units in MO

40. Add the Missouri county boundaries shapefile *above* the `County Vets` layer on the Table of Contents.

41. Rename the layer `County Vacancies`.

42. Create a choropleth map of the number of vacant housing units (`VACANT`) by county in Missouri. This should be normalized by the total number of housing units in each county (`HSE_UNITS`). *Use the quantile breaks classification system with 5 data classes.*

43. Use Color Brewer to select a *divergent* color scheme that is both color blind and LCD friendly with 5 data classes.

44. Follow the same steps you have used previously to manually transfer these values into ArcGIS. The *warmest* color should be associated with the *highest numeric value range*, and the *coolest* color should be associated with the *lowest numeric value range*.

45. Zoom to the `County Vacancies` layer.

46. Export the map as a `pdf` file at 300 dpi.

Follow-up Questions

In a new Atom document, switch the language to `GitHub Markdown`. Expand the `headMarkdown` snippet and fill in the header with the assignment title, your name, and the date. Answer the following questions:

1. What gray colors did you select for the ground layers, and why?

2. For map 2, which color ramp did you select from Color Brewer and why? How does this color ramp facilitate interpretation of your data?

3. For map 2, why do you think normalizing by area is the most appropriate technique?

4. For map 3, which color ramp did you select from Color Brewer and why? How does this color ramp facilitate interpretation of your data?

5. For map 3, why do you think normalizing by total number of veterans is the most appropriate technique?

6. For map 4, which color ramp did you select from Color Brewer and why? How does this color ramp facilitate interpretation of your data?

7. For map 4, why do you think normalizing by total number of housing units is the most appropriate technique?