Introduction to Geographic Information Systems (GIS)

Week 9

This week will go over some techniques that may help in completing your project. Some will be review and some will be new. For these techniques, please watch the videos.

**This week we look at a few techniques (some of which we looked at earlier):**

1. *Layer transparency* allows you to see through a layer. This is useful when you have more than one polygon file and want to see the outlines of both. You will remember that the layer that appears first in the Table of Contents will hide the other polygon layers.
2. *Map scale* defines the size relationship on your map. For example, 1 inch may equal 1 mile. Scale is usually expressed as a ratio of the distance of the map to the distance on the ground. So a scale of 1:1 (indeed very large) would mean 1 inch is 1 inch (if we are using inches). A scale of 1:12 would mean that 1 inch is 12 inches (or 1 foot). One typical scale (e.g. for USGS maps) is 1:24000.

Note that the larger the number on the right, the smaller the ratio (1/12 is greater than 1/24000). For this reason, scales with the largest right hand numbers are the smallest scale, showing more territory (very confusing).

What we sometimes want to do to make the map more readable is set when features or labels become visible as we zoom in and out. The parameters of when this happens are the scale. Fortunately, there is a nice way to set this (see the video).

NOTE: You have to set the projection on the data frame (called “Layers”) before creating the map. Otherwise there is no “scale” reference.

1. *Multiple maps.* Sometimes our project may contain two maps (or more) – in this case we can set it up so that both maps can be worked on independently and can display in Layout Mode (again see the video).
2. *Density (Heat Maps).* Sometimes we want to show density visually. This comes up in many applications (population density, crime incident density, retail store density, etc.). Heat maps are a good way to do this.

**Map Assignment (Due 11/5/2019)**

In your folder for this week:

1. Download and unzip from the Tigerline website Westchester County Subdivisions, Westchester Roads, and Westchester Voting Districts
   * 1. Tigerline - <https://www.census.gov/cgi-bin/geo/shapefiles/index.php>
     2. Westchester - <https://giswww.westchestergov.com/wcgis/Facility.htm>
2. Download and unzip from the Westchester website, Gas Stations

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**Map showing Transparency**

Sometimes we want to show more than one polygon layer at the same time. One way is to make the one on top “transparent”.

1. Create a new map and add the Westchester Towns, Roads, Voting Districts and Gas Station layers.
2. The order of the layers should be Gas Stations, Roads, Voting Districts, Towns.
3. Enhance the boundaries of the polygon layers (Voting Districts and Towns) by modifying width and color.

Voting Districts:

Width: 1.5

Color: Red

Towns:

Width: 1.8

Color: Blue

1. Save the map as yourlastnameTransparencyScaleDataFrames.mxd
2. Since we can’t see the Towns layer because it is hidden by the Voting Districts. We’ll make the Voting Districts transparent.
3. Right click Voting Districts ->Properties->Display
4. Set the transparency to 70% -> Ok
5. In Layout View:
6. Add the Title, Legend, Scale Bar, North Arrow, background color.
7. Make sure the symbology (size of points and color of polygons) make sense and is readable).
8. Export the map as a jpg: yourlastnametransparency.jpg
9. Save the map.

**Layer/Label Scale**

1. At this point the map is a bit cluttered with the road. Let’s make it more cluttered – turn on the labels.
2. We will set it up so that the roads layer doesn’t show until you are zoomed into one of the towns (e.g. Pleasantville)
3. Zoom into a town. Right click the Roads -> Layer Properties->General->Don’t show layer when zoomed:->*Out beyond->Use current scale*.
4. This will take care of the labels as well.
5. In Layout View:
   * Add the Title, Legend, Scale Bar, North Arrow, background color.
   * Make sure the symbology (size of points and color of polygons) make sense and is readable).
6. Save the map.
7. Export 2 jpgs from your map – one zoomed out not showing the roads and labels and one zoomed in showing the roads.

*yourlastnameScaleZoomed.jpg*

*yourlastnameScaleNozoom.jpg*

1. Extra credit (no points): do the same for the gas stations.

**Multiple Maps,and Data Frames**

There are many situations in which we want to display multiple maps on a single display. One commone example is the map within the map. Another is when comparing, showing maps side-by-side.

1. With this map, create a new “data frame”.
   * From the top menu -> Insert->Data Frame
   * Highlight all the layers in the original Data Frame -> Right click-> Copy.
   * Right click the New Data Frame and paste the layers.
   * You can rename the Data Frames.
2. To switch between Data Frames, Right-click->Activate.
3. They can also be renamed:
   * *Westchester Zoomed Out* for the original
   * *Westchester Zoomed In* for the new Data Frame
4. Create the zoomed in and zoomed out maps in each Data Frame in the Data view. Make sure all the layers are visible in the zoomed in map, and only the Towns are visible in the zoomed out map.
   * If you need to, change the color of the maps to make them distinct. Right-click the Layer Name->Properties>Frame
5. In Layout View, resize the map borders to show the zoomed out and zoomed in maps either side-by side or one within the other (see the video). I recommend the side-by-side.
6. Export this map (with the 2 data frames) as a “jpg” – *yourlastnameDataFrames.jpg*
7. Save the map.
8. NOTE. The maps should have a separate title, scale bar, legend and north arrow for each Data Frame Map.
9. NOTE: To go between data frames, right click the data frame and select “Activate” near the bottom.
10. NOTE: The video goes through how to set up and modify the Data Frames
11. Save the map

**Density: Heat Maps**

Let’s see where the concentration of gas stations are.

1. Start new map.
2. Reload the Westchester Towns and Gas Station Layers.
3. We will be using the “Spatial Analyst” and so must make sure it is enabled. Select the top menu, “Customize”. Select Extensions and check “Spatial Analyst”.
4. Open the Toolbox and select “Spatial Analyst” and then select Density->Kernal Density.
5. For the Input feature select the Gas Stations layer.
6. For the output raster, navigate to your folder to the week and set the name to GasDensity – click Save->OK
7. Move the Gas Station Layer to the top.
8. Set the Transparency of the new GasDensity heat map to 50%: Right-click the layer->Properties->Display->Transparency
9. Change (if you want to) the Color-ramp. In Properties use the color ramp pull down menu.
10. Export the map as a jpg, *yourlastnameGasStationHeatmap.jpg*
11. Save the Map

**Term Project Part 1 (Due 11/12/2019)**

Term Project Assignment (10 points of your final project grade). See the additional write-up for this part of the project, in the Folder:

*IntroGIS - FA19 - Final Project - Part I*

**What is due this week (11/5/2019)**

1. Place one word document with:

*yourlastnametransparency.jpg*

*yourlastnameScaleZoomed.jpg*

*yourlastnameScaleNozoom.jpg*

*yourlastnameDataFrames.jpg*

*yourlastnameGasStationHeatmap.jpg*

NOTE: Remember that all maps must have background color, titles, legends, north arrow, scale bar; the legend should have informative labels; the orientation should take into account the area you are displaying.