Maps, Mapping, and Geospatial Technologies

Title: Fundamentals of Geographic Information Systems

Due Date: February 6, 2023 at 11:59 pm

Required Resources:

- An internet enabled computer that can play audio files
- ArcGIS Online
- Ability to access The ArcGIS Book, 2nd Edition

Purpose:

The purpose of this lab is for you to gain an appreciation and knowledge of the broader world of GIS. In this lab, you are encouraged to think creatively about how GIS can be used to solve problems that are geographical in nature as a prelude to developing your final project on a topic that is of interest to you. You will also gain experience and knowledge of how to build a thematic map in ArcGIS Online. Finally, you will be introduced to the ArcGIS Online Story Map and share your observations on your experience.

Learning Objectives:

- The variety of specific applications GIS can be used for.
- How to add a shapefile to ArcGIS Online and create a thematic web map
- Introduction to Story Maps

Deliverables:

A write-up of your response to the instruction questions. Upload your write up to the lab assignment on myCourses. All the tasks below should be included in the same word document (or PDF). Name your write-up using this convention before posting:

[your last name]_Week3_lab.docx

Grading:

This assignment will be graded out of 25 points. The number of points for each task is noted in the description of each task.

Task 1: Find and discuss a GIS Case Study (9 points)

For this task, find an example of an applied use of GIS for problem solving, decision making, or some other use case that is of interest to you. An example (and good starting point!) can be found at https://gisgeography.com/gis-applications-uses.

After you find a topic interesting to you, write a ~200-word essay (about 3 paragraphs) that:

a. Describes the nature of the problem/area that GIS is being applied to
b. Identifies the components of the GIS (hardware, software, data, people, methods and procedures)
c. Summarizes the outcomes, results, successes, or failures of the application of GIS to the issue

Use screen shots, images, or maps to support your writing as needed. Be sure to provide a link or citation for where you gathered information on your case study.

Task 2: Introduction to Story Maps (8 points)

For this of this task, you will read Chapter 3 ("Tell Your Story Using a Map") of The ArcGIS Book, 2nd Edition.

For this first part of this task, you will get a brief introduction on story maps and be presented with a series of hyperlinks to existing story maps produced by Esri or their partners (p. 41-43).

Open at least three different story maps and, in a brief response (<100 words), share your observations about how Story Maps can be used as an application of GIS to communicate geographic information, especially to the general public.

For the second part of this task, you will learn more about available Story Map templates from Esri (starting on page 45 – "What kind of story do you want to tell"). There are eight templates, including:

- Tour
- Journal
- Cascade
- Series
- Crowdsource
- Shortlist
- Map Swipe and Spyglass
- Basic

Read the summaries of each template and open and review each Story Map. Go back to Task 1 and your Application of GIS use case. Write a short response (<100 words) where you describe which story map template do you think would be the best to present the use case. Your response should include potential/hypothetical maps or graphics that would be included. You do not need to create a Story Map – just describe which template you think would fit the use case best and why!

You do not need to complete the QuickStart or the Learn ArcGIS Lesson for this chapter.

Task 3: Build a Thematic Map in ArcGIS Online (8 points)

In this task, you will build simple thematic maps displaying population by census tract. This may be familiar – it should be! You previously completed this task in ArcGIS Pro, and now we will use ArcGIS Online.

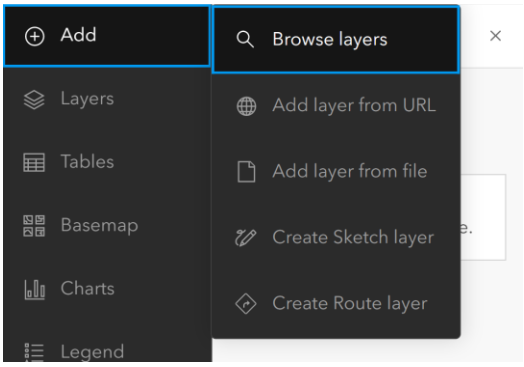
1. Download the Week03_ExerciseData.zip from myCourses. **Do not unzip!** Shapefiles need to be in a zip folder to load to ArcGIS Online.

2. Go to the RIT ArcGIS Online homepage: https://ritarcgis.maps.arcgis.com/home/index.html. You may need to log in with your RIT user name and password.

3. Click "Map" on the top ribbon. If your browser window is small, you may have to click the menu in the upper right to find it.

4. Change the basemap to "Light Gray Canvas".

5. Click on "Add" in the left-hand side menu and choose "Add layer from file".



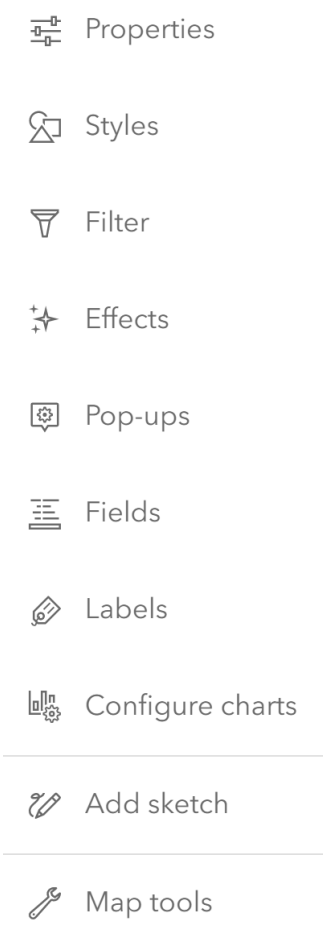
6. In the Add Layer window that appears, you can either "drag and drop" the Week03_ExerciseData.zip file from your File Explorer window or choose "Your device" and navigate to the location on your computer.

7. Ensure that you select "Shapefile" for the file type before selecting "Next".

8. Change the title to "World Countries". You can leave the rest as a default for now.

9. Select "Create and add to map".

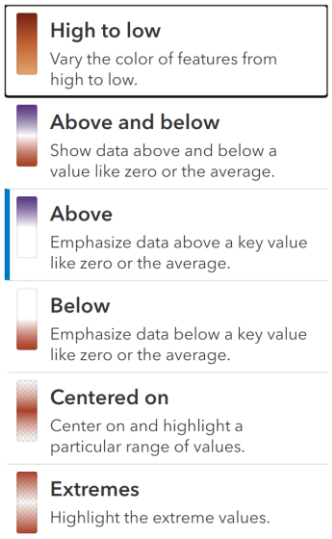
10. The data should now be added to the map. The "Properties" window should have automatically appeared. If it did not, it can be opened in the right-hand side menu.



11. Note the different properties you can adjust, including the transparency of the layer as well as the visible range (e.g., if you wanted the layer to automatically be hidden if you zoom in or out to a certain scale). After you review options, open the Styles menu (the button below properties).

12. Under choose attributes, select “POP2007” as the field. ArcGIS Online should automatically make a thematic map (most likely graduated colors).

13. Under the first option (“Counts and Amounts”), you will see a theme drop-down menu. This is a quick shortcut to change how the data is symbolized. Change the options and observe how the map renders differently each time.



14. Scroll down under “Pick a Style” and select different options. You should see the map automatically update based on your selection.

15. Scroll back to the top to “Choose Attributes” and add a new field: “LAND_SKQM”. Note how the style options change.

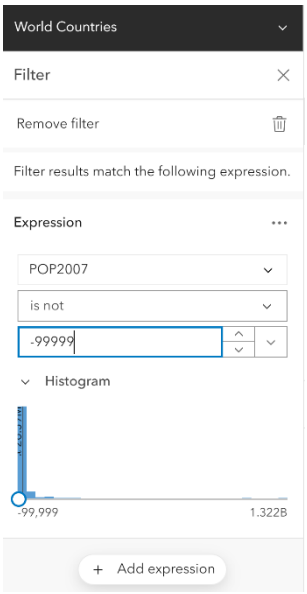
16. Select Color and Size. What do you observe? Note how the legend has changed as well, where POP2007 is reflected by a graduated color and the size of the country is a graduated symbol.

17. Select “Predominant Category”. This type of map shows which attribute has a higher value and by what amount based on transparency. It should not be surprising which countries have fewer people than square kilometers!

18. Select “Relationship”. This map uses different colors to view the relationship between two different attributes, with both color schemes converging to allow the user to explore where attributes may be related. We can easily find where population is low and area is high, but also the converse (especially look at Europe). Clearly, we would need further analysis into the data, but this map begins to tell a new story.

19. Select any of the maps you have viewed thus far as the one you would like to display. It could be either a single attribute or multiple. This will be the only map you will deliver for this assignment Under the theme, select “Style Options”. Feel free to change the symbol style, the range of values, or the option to classify the data.

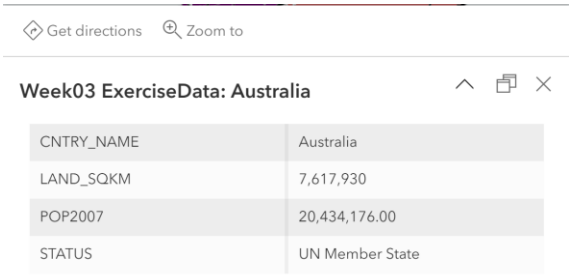
20. Select the “Filter” menu next (directly under Style). You may have noticed some areas had a value of -9999. This can occur when there is a null value for an attribute. Let’s filter those out so they do not impact our data! Select “Add expression” and match your filter to the image below and select “Save”.



21. The “Effects” menu provides the ability to highlight layers or features. Turn on and off some of the options and see the changes it makes to the map. Also not you can apply to the whole layer or specific features. You may choose to add any effects you like, but be sure that your map is still understandable for its purpose!

22. The “Pop-Ups” menu provides you with the option to change the content and display of the window when a feature is selected. You will see the title uses an expression “Week03 ExerciseData: {CNTRY_NAME}”, where the attribute CNTRY_NAME in the brackets will be driven by the selected feature.

23. To reduce the amount of information, let’s reduce the number of fields shown in the pop-up. Under “Fields List”, select “Select Fields” and click the “X” next to all fields **except** CNTRY_NAME, LAND_SQKM, POP2007, and STATUS. Your pop-up should then look like this (although the values will be based on the country you select):



24. Open the "Labels" menu and select "Add label class". Select "ISOSHORTNAM" as the label field. Note that this is a little busy, and we only want to label the countries with the highest population. To do this, we can add a filter. Select "Edit Label Filter" under Filter and choose "Add expression". Select "POP2007" for the field, "is at least" for the condition, and 50000000 for the value. Select the "X" to close the filter menu.

25. It is your choice to keep the labels, change the filter, or let the map choose how to display labels as they overlap.

26. Don't forget to save your work! Back in the left-hand side, select "Save and open" and choose "Save", naming it using the same convention as your deliverable ([your last name]_Week3_Map).

27. Select the print icon to export your map (we will not be sharing today as dynamic maps, but soon!).

    a. Select PNG32 as the file format

    b. Under advanced options, set your name as author and make sure "Include legend" and "Include north arrow" are selected.

    c. Increase DPI to 600.

    d. Select export, then insert you map into this document. It may take a minute to export. You will need to click on the link below "export" and the image should open in a new browser tab.

Under your map, briefly discuss your experience with ArcGIS Online. What was better than ArcGIS Pro? Worse? Did you feel you had the same control over the data and how it was displayed? Which would you work with more in the future? Consider the application of GIS in your answer. "It depends" answers are encouraged, assuming you back it up with a reason for both!