Maps, Mapping, and Geospatial Technologies

Title: Georeferencing and Editing

Due Date: April 10, 2023 at 11:59 pm

Required Resources:

- An internet enabled computer
- ArcGIS Pro

Purpose:

The purpose of this lab is for you to get hands-on experience creating a file geodatabase and feature class, establishing domains, georeferencing a raster map, and creating vector data. This lab will continue to build upon your experience using ArcPro as well as an appreciation for how geospatial data can come in different forms. As you complete the lab exercise today, think about how you could use this in future projects, especially considering the elements of what makes a good web map.

You will also notice that there are fewer cues in the exercise – you can always reach out with any questions (jxsigm@rit.edu), but I would like to challenge you to learn more about the software and the methods, tools, and operations to complete your tasks. **This week's lecture includes a lot of helpful tips!**

Learning Objectives:

- Create a File Geodatabase
- Create Feature Classes
- Georeference a raster file
- Create vector data

Deliverables:

This week, you will have two deliverables: an ArcPro Project File (PPKX) and a write-up based on the questions below. ***Your write up should not be a copy of this assignment, but a new word document that answers the questions below.*** The data created may be used in future assignments, so it is important you complete this assignment! 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]_Week11_lab.docx

Grading:

This assignment will be graded out of **20** points.

Task 1: Create a File Geodatabase and Feature Class

For this task, you will create a file geodatabase and two feature classes (Wetlands, Buildings). You will also create domains for each feature class to use in a future task.

1. Open the Catalog Pane or View.
2. Find the folder you that was created when you started your project, or the folder you have added that will be your final deliverable.
3. Create a new File Geodatabase and name it {Your Last Name}-Week11.
4. Create a new Feature Class:
    a. Name the Feature Class **Wetlands**
    b. **Polygon** Feature Type
    c. The Feature Class should have a field called **Type** (Text)
    d. The Feature Class should use the **State Plane NAD 1983 New York West (US Feet)** Projection
5. Create a new domain for Wetlands in the File Geodatabase using the following codes:
    a. CW = Contiguous Wetlands
    b. IW = Isolated Wetlands
    c. WW = Wooded Wetlands
    d. W = Water
6. Using the Data Design >> Fields (Right Click on Wetlands Feature Class), set the newly created domain for Wetlands.
7. Create a new Feature Class:
    a. Name the Feature Class **Buildings**
    b. **Polygon** Feature Type
    c. The Feature Class should have a field called **BldgNumber** (Text)
    d. Create another field called **BldgType** (Text)
    e. The Feature Class should use the **State Plane NAD 1983 New York West (US Feet)** Projection
8. Create a domain for Buildings using a similar approach for the **Building Type** attribute (e.g., Residential, Academic, Athletic, Student Life, Other, etc.).
9. ***Don't forget to save your changes!!!***

Task 1 Question: What was the domain you created for Building features? Why did you select those codes/descriptions?

Task 2: Georeference the RIT Master Plan

For this task, you will georeferenced the old RIT Master Plan using control points based on existing buildings or road intersections.

1. Locate the Week11-LabFiles.zip in myCourses and download to your local computer.
2. Unzip the folder. You should see two TIF files, MPNatSys2 and MPNatSys2-GR.
3. Add the image **MPNatSys2.tif** to your map using **Add Data**. Take the defaults in the "Build Pyramids and Calculate Statistics" window.
4. Open the Georeferencing Tab by first selecting "Georeference" from the Imagery tab.

5. Try to georeference the image with at least 6 control points using the **First Order Polynomial (Affine) Transformation.**
    a. **HINT #1:** Set basemap to one with satellite imagery.
    b. **HINT #2:** Go to RIT and set a bookmark so it is easier to move between the image and the correct location. (Map >> Location >> Search for Rochester Institute of Technology). You can also use the blue arrows in navigation to go "backwards" and "forwards" from previous views.
    c. HINT #3: Building Numbers…
        i. Building 2 = Ritter Arena
        ii. Building 3 = Clark Gymnasium
        iii. Building 5 = Wallace Center
        iv. Building 8 = Gosnell Hall
        v. Building 23 = Hale-Andrews Student Life Center
        vi. Building 72 = Slaughter Hall
        vii. Building 76 = Carlson Center
        viii. Building 99 exists in imagery basemap, as do the Perkins Green Apartments
6. Use the "swipe" tool (Raster Layer tab) to compare the map to imagery (or turn off layer in Table of Contents) to determine if you want to add more control points.
7. **Don't forget to SAVE!!!**
8. Select **Generate Report** to create an HTML document. Take a screenshot of this document and paste into your final write up.
9. Now load the MPNatSys2-GR.tif image to your map. This has previously been georeferenced (note the additional files in the folder). Use the "swipe" tool to compare this georeferenced map to yours.

Task 2 Question: Write a short response (~100 words) about using the georeferenced tool and your results. What was the experience like? What was easier, what was harder? How did you do compared to the "MPNatSys2-GR.tif"?

Task 3: Create Vector Data

For this task, you will create building and wetland features by tracing on the original RIT Master Plan. You can use either the raster you georeferenced in Task 2 or the MPNatSys-GR file. Just make sure you use the same one!

You are not going to be graded on the quality of the features since this may be your first time collecting data. Rather, it will be on your effort (trying to collect all) and short answer question.

1. Set your symbology for both feature classes to use **Unique Values** based on the attribute with the affiliated domain (*Type).
2. Use the **Create Features** tool in the **Edit** tab to create building and wetland features.
    a. Wetland Features should use the proper code in the **Type** field based on the legend in the map. All visible Wetland Features must be captured. You can use the tools demonstrated in the lecture to create and modify features (including Snapping).
    b. You can attempt to clip features with embedded features, or simply draw both. Either way - try your best.

    c. Building Features should capture the proper **Building Number** and the additional attribute code created in Task 1. You only need to digitize (create a feature) for the buildings with numbers.
3. **Don't forget to save!!!!!**

Task 3 Questions:

1. How many features did you create in both feature classes (open attribute table to enumerate).
2. In the attribute table, do you see the codes or the description as values for the fields with domains? Do you think this is valuable for an end user?
3. In a short response (~100 words), provide feedback on creating data in ArcPro. Recall a prior lab when you created data in GeoJSON.io. Which did you prefer? Which method do you think makes "better data"?
4. Include a screenshot of the attribute table for both feature classes.

Task 4: Share your Project

1. Go to the Share tab.
2. Select Project.
3. The output name should be [your last name]_Week11_lab.ppkx.
4. The summary should include your last name as well.
5. **Select "Share outside of organization" and unselect "Include Toolboxes" and "Include History Items".**
6. Select Analyze to ensure there are no errors.
7. Select Package.
8. Upload the .pptx file to myCourses with your writeup.