11.205 – Intro to Spatial Analysis – Fall 2019

Exercise 2 – Working With Spatial Data: Tables, Joining, and Querying
Due: Before midnight, Thursday of week 3

[OCW Users: The following document refers to the course website (Stellar), which is not available to users outside MIT.]

In lab this week, you learned the fundamentals of joining tabular data to geometry. This included:

1. Joining tabular data to geometry.
2. Querying a dataset to extract information.
3. Making a map with categorical data.
4. Adding fields and calculating basic statistics.

Our client, the Bronx River Alliance, has requested to learn more about the land use in the Bronx and around the Bronx River Watershed, and is concerned that local automotive shops, garages, and gas stations are contributing to pollution problems in the river because they are unaware of how to properly dispose of hazardous chemicals. This is a two-part exercise: you will first create a land use map of the Bronx; you will then zoom in on a local area and identify potential pollution sources where group members can visit and distribute pamphlets on proper chemical disposal.

Part 1. Bronx Land Use Map

The Bronx River Alliance would like to know the types of land uses around the Bronx River. For Part 1, we are going to visualize the land use by parcel for the Bronx and create a land use map, similar to the one we created for Cambridge in class.

We have data from the NYC PLUTO dataset (Primary Land Use Tax Lot Output dataset), along with some supplemental layers like street centerlines, parks, and water. The land use data comes in two parts - a geometry file contains the parcel geometries and a DBF file contains the land use codes for each parcel. The common field that serves as the Unique ID for both of these tables is called **BBL**.

As their consultant, the Bronx River Alliance would like you to join the two files and create a map of the Bronx that visualizes the land use information. Provide them a map that displays the land uses. Use the **LandUse** field to determine the land use of each parcel. This map will be used in presentations and perhaps in publications, so it needs to be clear and concise and be able to speak on its own. Make sure the map has the basic elements, such as a title, date, legend, and scale bar (in miles). Use the supplemental files to provide greater context, the Bronx should not be floating in space, and you should show where the Bronx is in relation to the rest of boroughs in New York City.

The map should use the standard land use colors.

> Commercial = Red
> Mixed Use = Orange
> Residential = Yellow (there are 3 residential types; you can make them variations on yellow)
> Open Space = Green

Institutional/Cultural = Blue
Industrial = Purple
Transportation and Parking = Grey

The codes for the land uses, which are found in the **LandUse** field are as follows. This can also be found in the metadata.

01 - One & Two Family Buildings
02 - Multi - Family Walk-Up Buildings
03 - Multi - Family Elevator Buildings
04 - Mixed Residential and Commercial Buildings
05 - Commercial and Office Buildings
06 - Industrial and Manufacturing
07 - Transportation and Utility
08 - Public Facilities and Institutions
09 - Open Space and Outdoor Recreation
10 - Parking Facilities
11- Vacant Land

Note: You may need to refer to last week's exercise notes if you need a refresher on adding legends and scale bars to your map.

*Some of the parcels in the PLUTO data do not have a "landuse" variable. This is an issue with the completeness of the PLUTO data. Consequently, you will have a 12th field that can be symbolized or removed. If symbolized, this field should be classified as either "Other" or "Unknown."

Part 1 Deliverable:

Create a Land Use map that will fit on an 8.5 inch by 11 inch piece of paper (portrait or landscape orientation is your choice), saved as a PDF. Post one copy to Stellar and, if you'd like for your own portfolio, place one on your portfolio webpage (we will not be grading the latter). Please follow the naming convention of 'ex2_<yourname>_landuse_11205.pdf'. Points will be taken off if you do not follow this convention.

Part 2. Visualize Local Garages and Gasoline Stations

Using the land use data that you joined for part 1, query the data to find the parcels that represent potential point sources of pollution. The pollution category you create should include all of the categories below – meaning you should have one legend category on your map for all these uses called Garages and Gasoline states.

These include:

- All Parking Garages
- Auto Body/Collision or Auto Repair
- Gas Station with Retail Store
- Gas Station with Service/Auto Repair

- Gas Station only with/without Small Kiosk
- Miscellaneous Garage or Gas Station
- Car Wash or Lubritorium Facility

Hint: Refer to the in-class lab exercise to refresh your memory on how to query codes for specific attributes in a data set!

This specific type of land use can be found in the "BldgClass" field of the parcel data. Use this field to make your query. As discussed earlier the focus of the exercise is on the businesses that have garages potentially polluting water quality. The "BldgClass" codes are described in the "PLUTODD18v1.pdf" which you should find in your data folder.

Once you query the data, the Bronx River Alliance would like you to create a map focused on an area where several pollution sources are clustered. You can visually identify where clusters seem to appear for this exercise. (There are scientific methods that exist to determine clustering, but visual assessment will work for this exercise.)

The Bronx River Alliance would like to use this map for canvassing these local areas, so it should include street labels to assist them in navigating streets. Use the provided street centerline file. You choose the local area to zoom in on, and it should be approximately 5-10 blocks across. They only want to do a few blocks at a time. Don't forget to provide the context in the form of a locator/inset map, a scale bar, a legend representing one color for each of the 7 categories that compose pollution, along with the other elements of a map. Community organizers will need to know what part of the Bronx we are canvassing.

For informational purposes, the Bronx River Alliance would also like to know the average lot size of only the parcels that contain garages and gas stations throughout the Bronx. The field statistics provide this information. Put this number on your map.

Part 2 Deliverable:

Create a map identifying potential pollution sources (listed above) that will fit on an 8.5 inch by 11-inch piece of paper that the Bronx River Alliance can give to canvassers. Remember to include the average lot size of only the parcels that contain garages and gas stations throughout the Bronx. Portrait or landscape orientation is your choice. Save the map as a PDF. Again, post one copy to Stellar and, if you'd like for your own portfolio, place one on your portfolio webpage (we will not be grading the latter). Follow the naming convention of 'ex2_<yourname>_canvass_11205.pdf'. Points will be taken off if you do not follow this convention.

Notes
For both maps, remember to use the **11.205/11.520 Cartographic Checklist** so you get the seven elements on the map, and pay particular attention to the following elements when working on Exercise 2, just as on Exercise 1.

1. Is your map well designed? Does it highlight the necessary features to support your story and message?
2. Does your map layout help the reader focus on the content?
3. Did you use colors and symbols that are easy to distinguish and accurately and honestly visualize the data?

Grading

Your grade for this exercise will be out of 21 points, based on the following parameters: (1) inclusion of the seven basic map elements; (2) overall composition and completeness of your map; (3) legibility of features on the map (you have to be able to read it); (4) proper querying of the data and correct classification of the land use types; and (5) whether or not you effectively employed the concepts discussed in lab, lecture, and the assigned readings.

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