# Step-by-step to map geo-coded data using QGIS

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# 1. DOWNLOAD QGIS:

- ▶ If you haven't already downloaded QGIS, do so following using this <u>site</u>.
- > This <u>video</u> provides more download details if you need it.

# 2. GET GEO-CODED DATA TO MAP:

- > You need data that is geocoded a GEOID, latitude/longitude, or x/y coordinate.
- There are several places you can find this kind of data, in this class we'll consider two sources: <u>The CENSUS</u> and <u>NYC OpenData</u>. (If you want detailed building/lot information, you can explore <u>PLUTO</u> data).
  - NOTE: Not all NYC OpenData is of the kind that can be mapped, in other words it may not include geo-coding.
  - TIP: In the census, choose the tracts level for all of your county instead of individually selecting your neighborhood's census tracts—this is because you can simply map it all and zoom into your neighborhood and see your neighborhood in comparison to others.

**To use Census data**: once you identify the dataset you are interested in working with, be sure to download the <u>ZIP file</u> of data as this will have .csv files that include geo-coded data (just downloading excel will not include the geo-codes.

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You will then be asked what years you want of all those available – if you want to compare maps from two different times you can select another year here.

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ACS 5-Year Estimates Subject Tables									

**Save the ZIP file** (for example: ACSST5Y2019.S2503\_2022-11-08T120614.zip) to your computer then extract the files by right clicking and selecting Extract All...

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You can choose a location to extract/save the files to (I tend to just keep it where the Zip file is stored). An unzipped folder is created with the files you need.

NOTE: It's a good idea to start a folder for you to keep all of your QGIS data and projects so to can stay organized.



The file you'll use is the -Data.csv. Open the file and you'll see the GEOID column. The example below is at the census tract level.

NOTE: You'll want to work with data that has multiple regions to map. In other words, multiple tracts, multiple blocks etc. If you just use the zip code, you may only have one or two mappable regions, so it won't make for a very informative map.

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1	GEO_ID	NAME	S2503_C02	S2503_C
2	Geography	Geographic Area Name	Estimate!!	Margin (
3	1400000US36081000100	Census Tract 1, Queens County, New York	4367	43
4				

Save an excel (.xls) version of the .csv file so you have it if you need it. QGIS uses .csv files.

## **3. DOWNLOAD AND SAVE THE SHAPEFILE**

- You'll need the appropriate shapefile geometry to be able to "join" your .csv data in QGIS.
- The shapefile is the underlying geometry (i.e., counties, tracts, etc.) that your data gets mapped onto.
- Navigate to the <u>Resources tab</u> on the course website and <u>download and save the shapefile ZIP file</u> for the scale of geography in your .csv dataset (e.g., tract, zip code, block). Extract the files and save the unzipped folder.
  - NOTE: In QGIS you will only import the .shp file, but all those other files need to be in the same folder with the .shp file for it to work.
- The shapefiles to the left are census tracts for all of New York state (FIPS #= 36)

## 4. IMPORTING THE SHAPEFILE INTO QGIS

The first thing you need to do is import your shapefile into QGIS. You can't do any mapping without the shapefile.

**Open QGIS:** Then go to Layer > Add Layer > Add Vector Layer...



- « \_URBST 200\_F2022 > QGIS > tl\_2019\_36\_tract (1)
  - Name
  - tl\_2019\_36\_tract.cpg
  - tl\_2019\_36\_tract.dbf
  - tl\_2019\_36\_tract.prj
  - tl\_2019\_36\_tract.shp
  - tl\_2019\_36\_tract.shp.ea.iso.xml
  - tl\_2019\_36\_tract.shp.iso.xml
  - tl\_2019\_36\_tract.shx

In the dialogue box, under Source Type, make sure File is bulleted and Encoding is Automatic. Under Source, click the [...] button to the right of Vector Dataset(s) and navigate to your shapefile folder and select the .shp file.

Leave everything else as Default and click the Add button.

Now you have the shapefile layer imported and are ready to join your dataset.

NOTE: The tract file we are using (tl\_2019\_36\_tract (1)) has the census tracts for ALL of New York Q Data Source Manager | Vector Source Type 🖲 File 🔇 Directory O Database O Protocol: HTTP(S), cloud, etc. Vector Encoding Automatic ٠ Raster Source 🏹 Mesh Vector Dataset(s) JNY\_EP\Teaching\\_URBST 200\_F2022\QGIS\tl\_2019\_36\_tract (1)\tl\_2019\_36\_tract.shp Point Cloud • Options ₹ Text Consult ESRI Shapefile driver help page for detailed explanations on options ENCODING 🚰 GeoPa DBF\_DATE\_LAST\_UPDATE 📑 GPS ADJUST\_TYPE <Default> ADJUST\_GEOM\_TYPE <Default> 🕻 Spatia AUTO\_REPACK <Default> + Postgi DBF\_EOF\_CHAR <Default> 📭 MSSQI 🖳 Oracle Virtua Layer + HANA 😭 wms, wmts Close Add Help

state. Your .csv data would only map on to your specific tracts—you can either zoom into your tracts using the magnifying tool OR extract your county as its own layer (to do this watch the tutorial video here)



# **5. PREPARING THE GEO-CODED DATA**

- Before you can import your data set and "join" it to your shapefile, you need to remake the GEO\_ID column so it contains only the numbers to the right of US.
- > Be sure all the data cells that look like numbers are formatted as numbers.
- Make sure the data is in the format you want to map. For example, if you want to map percentages, you'll need to calculate percentages.
- > It is also a good idea to clean up this dataset, so it is easier to work with in QGIS. I recommend:
  - Deleting any data column you don't want to map.
  - Renaming the column headings so they are shorter and easier to comprehend (these should be row 1 so they show up when you join in QGIS).

# Remake your GEOID column:

- a. Open your .csv file in excel.
- b. Insert a column to the right of the GEO\_ID column and label it Join\_GEO\_ID. This will be your new column B.
- c. Enter the formula =MID(A3,10,LEN(A3)) (instructions also <u>here</u>) into the cell of your new Join column so it is next to the cell with the GEO\_ID Geography number (e.g., 1400000US36081000101). This should be cell B3.

	А	В	С
1	GEO_ID	Join_GEO_ID	NAME
2	Geography		Geographic
3	1400000US36081000101	=MID(A3,10,LEN(A3))	Census Trac
4	1400000US36081000102		Census Trac
5	1400000US36081000103		Census Trac

d. Hit enter and this will give you a new GEO\_ID. Copy it down the column by dragging or double clicking the little box on the bottom right of the cell.

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1	3	1400000US36081000101 1400000US36081000102	36081000101	Census Tract 1. Census Tract 1.	8	1400000US36081000400	36081000400	Censu
	5	1400000US36081000103 1400000US36081000104		Census Tract 1. Census Tract 1.	9	1400000US36081000600	36081000600	Censu
7	7	1400000US36081000200		Census Tract 2,	10	1400000US36081000701	36081000701	Censu

e. Save the file (keeping it as a .csv).

## 6. IMPORTING THE .CSV FILE INTO QGIS

**Import updated .csv file:** Go to Layer > Add Layer > Add Delimited Text Layer...

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I Spatial Bookman	Copy Style	📲 Add Delimited Text Layer	Ctrl+Shift+T			
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In the dialogue box click the [...] button to the right of File name and locate your .csv file. Leave all other settings as shown below and click Add.

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#### Now the layer is added to you project.



### 7. SAVE YOUR PROJECT!

- Now is a good time to save your project.
- ➢ Go to Project > Save As....
- Give it a logical name.



## 8. JOINING YOUR DATA TO THE SHAPEFILE



- a. In QGIS, right click on your shapefile in the Layers window and go to Properties.
- b. In the Properties dialogue box, click Joins (you may need to scroll the left panel to see it).



- c. Click the green plus button to join the .csv file to the shapefile (bottom left).
- d. In the dialogue box select your .csv datafile from the Join layer drop down menu.
- e. In the Join field select the Join\_GEO\_ID column you made.
- f. In the target field select GEO\_ID (referencing the shapefile).
- g. Make sure Cache join layer in memory is checked

h. Check the Joined fields box and click the box for the data you want to join (NOTE: this is where renaming your column titles comes in handy).

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i. Click OK and see the Join listed, then click OK in the other dialogue box.



j. To confirm the join, right click on the shapefile in the Layers window then click Open Attribute Table. You should see your .csv file data in the attribute table.

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1	344	1400000US360	36081044800	Census Tract 44	841	287	148	88
2	261	1400000US360	36081045800	Census Tract 45	665	302	187	111

k. Save you newly joined-up shapefile by right-clicking and selecting Export > Save Features As...; Keep the settings shown below, save it with a descriptive name and in the same location as your working QGIS project file.

You can right-click and Remove layer all of the other layers if you want to you only have joined-up shapefile you just saved.



#### 9. MAPPING YOUR DATA!



- a. To visualize the data in your shapefile, right-click and select properties, then from the properties dialogue box select Symbology (you may need to scroll in the left column).
- b. Select Graduated from the top dropdown
- c. In the Value dropdown select the data you want to map

NOTE: if you don't see any of your data categories in the dropdown, that means datatype is not stored as an Integer. Watch this <u>video</u> to fix this. You know it's stored as Integer if you see the **123** before the column name.



Now you have a map!

- d. Set the precision set to 0
- e. Set mode to Quantile and Classes to 4
- f. Click OK

NOTE: As you get more used to the program you can play around with these settings to see what works best for displaying your data.



#### **10. EXPORTING YOUR MAP!**

a. Fit the area you want to export in the viewing window using the zoom and pan tools.



b. Click the print composer to start the export process, name it something appropriate—the example

below is T(otal)O(wner)O(ccupied) 0.50 or less occupents per room.

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Enter a unique print layout title (a title will be automatically generated if	left empty)
TOO 0.50 or less occupants per room	
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c. Click the Add Map icon in the lefthand layout panel then drag a drafting area into the blank canvas.

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- d. Using the same lefthand layout panel add a scale bar and legend . Click these buttons then click into the map area to locate it.
- e. To edit the legend:
  - highlight legend in the righthand Item tab
  - uncheck Auto update in the Item Properties tab (you can rename layers by right clicking the layer in the regular workspace and Auto update the legend)
  - click the layer you want to remove from the legend and click the red minus button



f. From the layout panel add a label into the map area and give it an appropriate title using the righthand properties panel.

#### g. Export the map as a JPEG or PDF

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# **Tutorial Videos**

Importing shapefile & .csv file into QGIS https://share.vidyard.com/watch/7USaL4ptHjvzYzzkLnyRRr?

Extracting Queens County from NYS shapefile https://share.vidyard.com/watch/CU1yCi6VrrRrzZpjpUjD6R?

TROUBLE SHOOT: Refactor fields: when you can't find your data to map <u>https://share.vidyard.com/watch/pfPJDeddxkuvTBL34YapcC?</u>

Visualizing the Map and Exporting

https://share.vidyard.com/watch/wP8skcpEhznEbmCjmzJHrd?