

GIS Level 1: QGIS Workshop Exercises

Exercise 1

Open software

1. Open QGIS on your computer. Select the new Project icon.



2. A blank map will now open. Click the Save icon to name and save your project.

Add data

1. Click the top Layer Tab > Data Source Manager button.



2. Click the Vector icon on the left.



3. To the right of the 'Vector Dataset(s)' box, click the ... icon. Navigate to the workshop folder and GIS_Level1_Data/workshop_exercises.
4. Hold Ctrl and select the .shp files for each of the following layers:
 - a. *cambridge_demographics.shp*
 - b. *MBTA_ARC.shp*
 - c. *MBTA_NODE.shp*

When done selecting > click Open > and then click Add > and follow the instructions below.

5. A coordinate reference system window may appear because our project has a different coordinate system than our data layers. This tool will change the project coordinate reference system to that of the data layers so they appear less distorted on screen. We will discuss map projections more in GIS Level 2. You can select OK to close this window for now.
6. Now we will add raster data. Click the raster icon on the far left-hand side of the Data Source Manager window.



- a. Click the ... icon to the right of the Raster dataset(s) box and select *cambridge_dem.tif* from the data folder.
- b. Click Add and then close the window.

Note: if you accidentally added duplicate layers you can right click them and select to remove.

7. Make sure the Quick map plugin is installed by clicking Plugins > Manage and Install Plugins > and searching for QuickMapServices. Click the Install Plugin button. (This button will only be visible if the plugin is not installed.) Close the plugin window.
8. Add a basemap by clicking Web > QuickMapServices > OSM > OSM Standard.

Review the interface & organize data

- The center of the screen displays any data that we added.
- The names of data layers are shown in the Layers pane on the left.
- Move around the map using the pan and zoom buttons in the top menu bar.



- Right click on any layer and select Zoom to Layer to center it on the screen
- Turn layers on and off by checking/unchecking the box next to each name.

1. Drag the layers up or down in the Layers box so that they do not cover each other.

The menus at the top of the screen show various tools you can use to analyze vector or raster data. New menus may appear when you load additional plugins using the Plugins menu.

Identify types of data & explore attributes

1. Look at the data layers in the Layers pane. Are they vector or raster data? If they are vector, are they point, line or polygon?
2. To see the underlying data table for a layer, right click and select Open Attribute Table.
 - a. What columns are included with the *MBTA_ARC* data?
 - b. Is there an attribute table for *cambridge_dem*? Why might that be?

Creating geographic data from tabular data

The *cambridge_restaurants* data layer is currently not in a shapefile format so it was not added to the map, however we can convert it from a .csv to point data by plotting the coordinates included in the table.

1. Open the Layer > Data Source Manager again and select the Delimited Text tab.



2. Next to File Name > click the ... menu and navigate to the .csv in the data folder.
3. In the Geometry Definition section (click the arrow to extend the dropdown) select Point coordinates with the X Field as Longitude and the Y field as Latitude.
4. In the same section, for Geometry CRS, select EPSG:4326 – WGS 84 from the dropdown menu. If you don't see it listed, click the Select CRS button next to the dropdown menu to search for it.
5. Click Add and Close. Now see where the *cambridge_restaurants* show up as points.
6. Save your project and keep it open.

Exercise 2

Data can be symbolized in a variety of ways, depending on the data format and available attributes.

Change a single symbol

1. Double click on the *cambridge_restaurants* layer in the Layers pane.
2. Click the Symbology tab.
3. Click on the text, Simple marker. Down below, choose a symbol to represent the restaurants. You can make additional modifications to the symbol using the various dropdown menus.
4. Click Ok and close the Properties window when you are finished.

Symbolize categories

Now change the color of the mbta lines (*MBTA_ARC*) so they correspond to the correct color.

1. Right click on *MBTA_ARC* and select Properties. Select the Symbology tab.
2. From the dropdown menu at the top, choose the styling to be Categorized, which means that each value will be assigned a unique color, pattern, etc.
3. Look at the metadata (<https://www.mass.gov/info-details/massgis-data-mbta-rapid-transit>) to determine which column contains information about the name of the rapid transit line. Choose the appropriate column from the dropdown menu in the Value box.
4. Click the Classify button, at the bottom, to add all unique values found in the LINE column.
5. Double click on the line symbol in the Symbol column to select an appropriate color.
6. Click OK when you are finished.

Make a choropleth map

1. Double click the *cambridge_demographics* layer and select the Symbology menu.
2. Select Graduated from the dropdown menu at the top to create a choropleth map.
3. Open the metadata for this layer outside of QGIS. It is in workshop_exercise data folder and called *cambridge_demographics_variable_names.txt*.
4. Choose which data you would like to symbolize and choose the corresponding column from the Value dropdown menu.
5. Click the Classify button at the bottom of the window. Experiment with different break methods, classes, and color schemes from the dropdown menus until you are happy with your map.
6. Use the precision dropdown menu to alter the number of decimal places if needed. Click Ok when you are finished.

Symbolize a raster

1. Double click on *cambridge_dem* and select the Symbology tab.
2. Notice that there are different options for symbolizing raster data versus vector data.
 - a. The data are currently symbolized as Singleband gray, which assigns a continuous color scheme from the minimum to the maximum value of each raster cell.
 - b. Another option that could be appropriate for this data is Singleband pseudocolor, in which data value are grouped into classes, similar to when creating a choropleth map. Choose a color ramp to see the options for this rendering. Note: Paletted/Unique values would be the most appropriate for values that each represent a different data category, such as land use.
 - c. Experiment with the symbolization. When you are happy with your raster click OK.

See the take home exercise to learn how to create a layout for printing or how to export your map.

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RES.STR-001 Geographic Information System (GIS) Tutorial
IAP 2022

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