



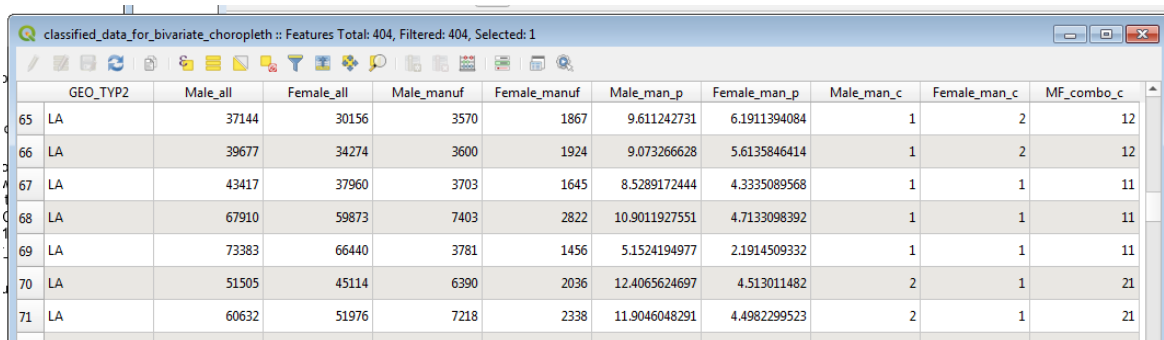
Creating a bivariate choropleth map from Census data in QGIS



Introduction

In this exercise we will use QGIS to create a bivariate Choropleth map in which 2 census variables are shown at the same time.

1. This exercise requires the use of a set of training data. Your instructor will provide you with details of how to obtain this dataset.
2. Start a new QGIS Project. From the Project menu select New.
3. Click the  icon to open the Data Source Manager. From the list of data types listed at left, click on **Vector**. Then click on the [...] button.
4. Navigate to the location of the infuse_dist_lyr_2011_clipped.shp shapefile that was used in Exercise 1. Click on infuse_dist_lyr_2011_clipped.shp and click on the Open button. Back at the Data Source Manager click the Add button and then Close the Data Source Manager. The infuse_dist_lyr_2011_clipped.shp shapefile should be shown in QGIS.
5. Now we need to add a CSV file to QGIS. So open the Data Source Manager again, but this time from the list of data types listed at left, click on **Delimited Text**. Again click on the [...] button.
6. Navigate to the location of the UKDSGeoDataViz/Exercise2 folder. Click on the classified_data_for_bivariate_choropleth.csv CSV file and click on the Open button. Leave the other options on the Data Source Manager at their defaults. Then click Add, followed by Close. The classified_data_for_bivariate_choropleth item should be shown listed in QGIS.
7. The shapefile from exercise 1 you should be familiar with.
8. Take some time to look at the classified_data_for_bivariate_choropleth.csv though. You can look at it's contents by using the Open Attribute Table  button.



	GEO_TYP2	Male_all	Female_all	Male_manuf	Female_manuf	Male_man_p	Female_man_p	Male_man_c	Female_man_c	MF_combo_c
65	LA	37144	30156	3570	1867	9.611242731	6.1911394084	1	2	12
66	LA	39677	34274	3600	1924	9.073266628	5.6135846414	1	2	12
67	LA	43417	37960	3703	1645	8.5289172444	4.3335089568	1	1	11
68	LA	67910	59873	7403	2822	10.9011927551	4.7133098392	1	1	11
69	LA	73383	66440	3781	1456	5.1524194977	2.1914509332	1	1	11
70	LA	51505	45114	6390	2036	12.4065624697	4.513011482	2	1	21
71	LA	60632	51976	7218	2338	11.9046048291	4.4982299523	2	1	21

9. As you can see the table has the Male_all; Female_all; Male_manuf; Female_manuf; Male_man_p and Female_man_p columns that we used in Exercise 1. In addition 3 new columns are provided – Male_man_c; Female_man_c and MF_combo_c. The Male_man_c column assigns a number from 1 to 3 to every local authority depending on the value of the Male_man_p column. A value of 1 indicating Low, a value of 2 indicating Medium and a value of 3 indicating High. The Female_man_c column does likewise for the Female_man_p column. The MF_combo_c column just combines these into a single item. So if you look through the attribute table for the Burnley record (Hint you can click on the column header to sort the attribute table by that column), this has the following columns:

Male_man_p: 25.894
 Female_man_p: 8.763
 Male_man_c: 3

Female_man_c: 2
MF_combo_c: 32

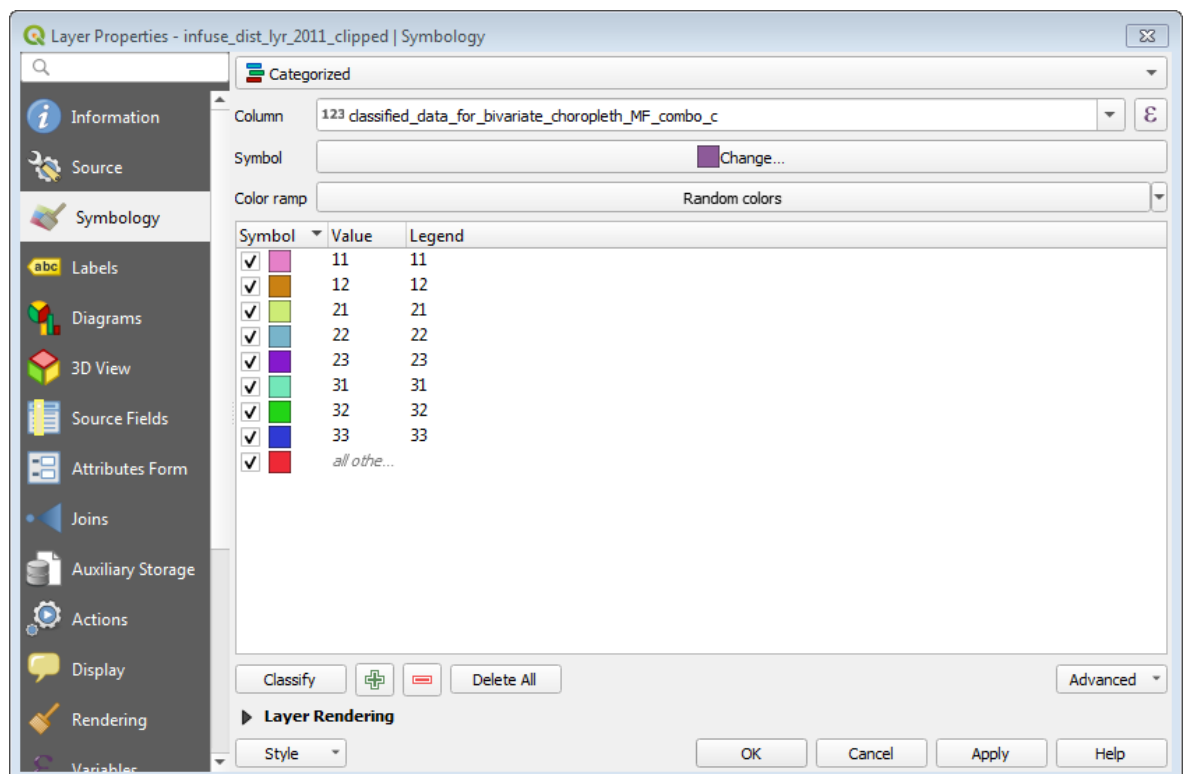
So in this case, Male manufacturing occupies the High (3) category; Female manufacturing occupies the Medium (2) category. The Male and Female categories can be grouped together to give a Combination Male/Female category – MF_combo_c which in this case has value of 32.

10. As in exercise 1, we now need to join the classified_data_for_bivariate_choropleth.csv to the infuse_dist_lyr_2011_clipped.shp shapefile.
11. Double-click the infuse_dist_lyr_2011_clipped layer to open the Layer Properties dialogue.
12. At left, click on Joins, then the green [+] button. This will open the Add Vector Join dialogue. Use the dropdowns to set the options as follows:

Join layer: classified_data_for_bivariate_choropleth
Join field: GEO_CODE
Target field: geo_code

Then click OK to return to the Layer Properties dialogue.

13. With the Layer Properties dialogue still open, click on Symbology at left.
14. From the dropdown, pick Categorized and set Column to MF_combo_c and click Classify.

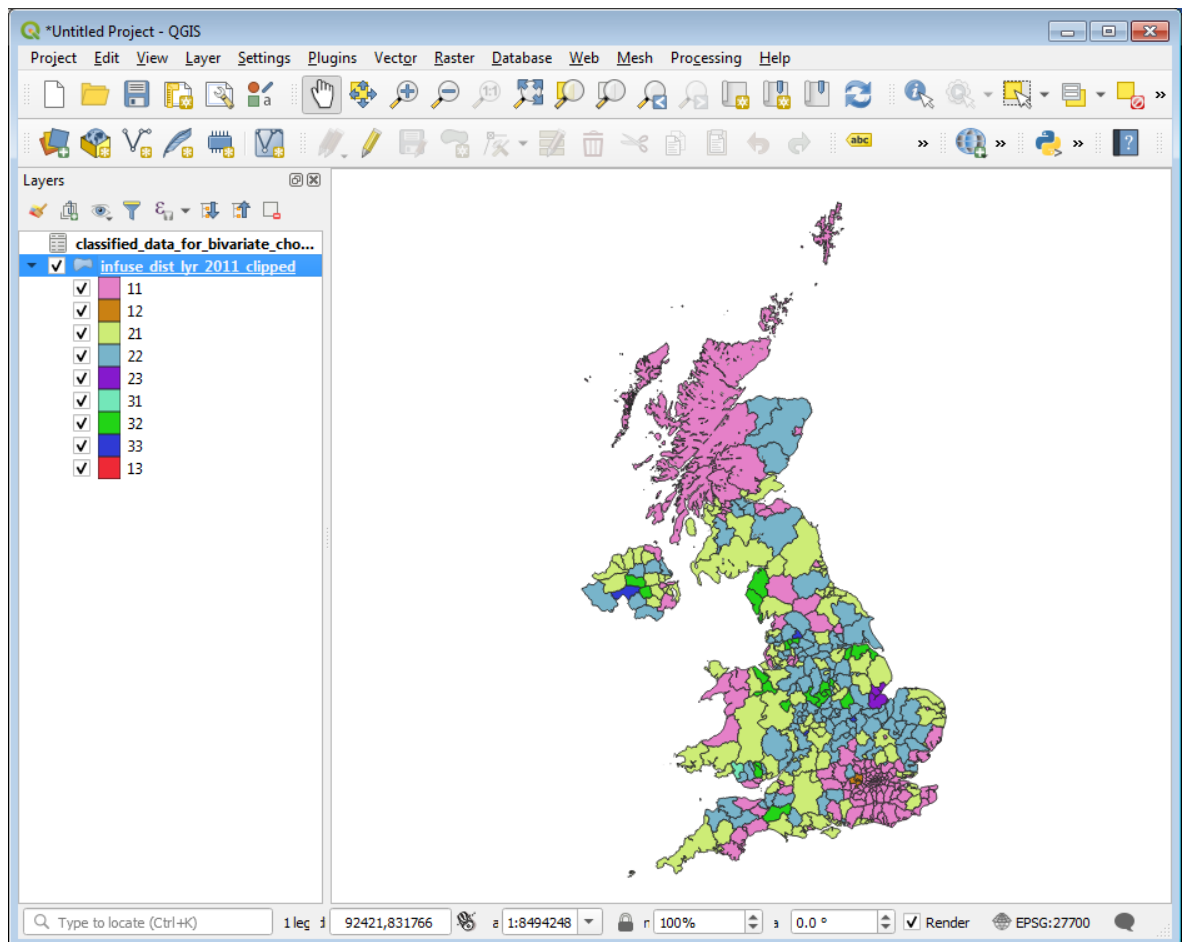


15. In the data, there are 8 unique values in the MF_combo_c column but for completeness we'll add the missing 13 combo to give 9 unique combinations.

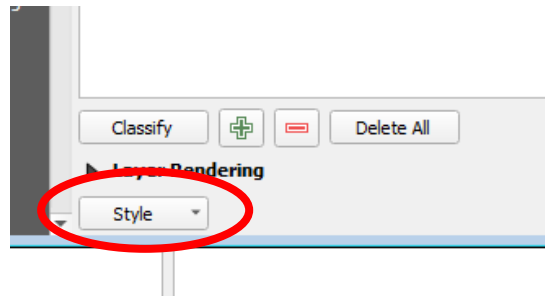
16. Under the Value column, below the 33 Value where Value is currently shown as “all othe...”, double-click on “all othe...” and enter 13. Do the same under the Legend column.
17. Either way make sure end up with 9 categories

Symbol	Value	Legend
<input checked="" type="checkbox"/>	11	11
<input checked="" type="checkbox"/>	12	12
<input checked="" type="checkbox"/>	21	21
<input checked="" type="checkbox"/>	22	22
<input checked="" type="checkbox"/>	23	23
<input checked="" type="checkbox"/>	31	31
<input checked="" type="checkbox"/>	32	32
<input checked="" type="checkbox"/>	33	33
<input checked="" type="checkbox"/>	13	13

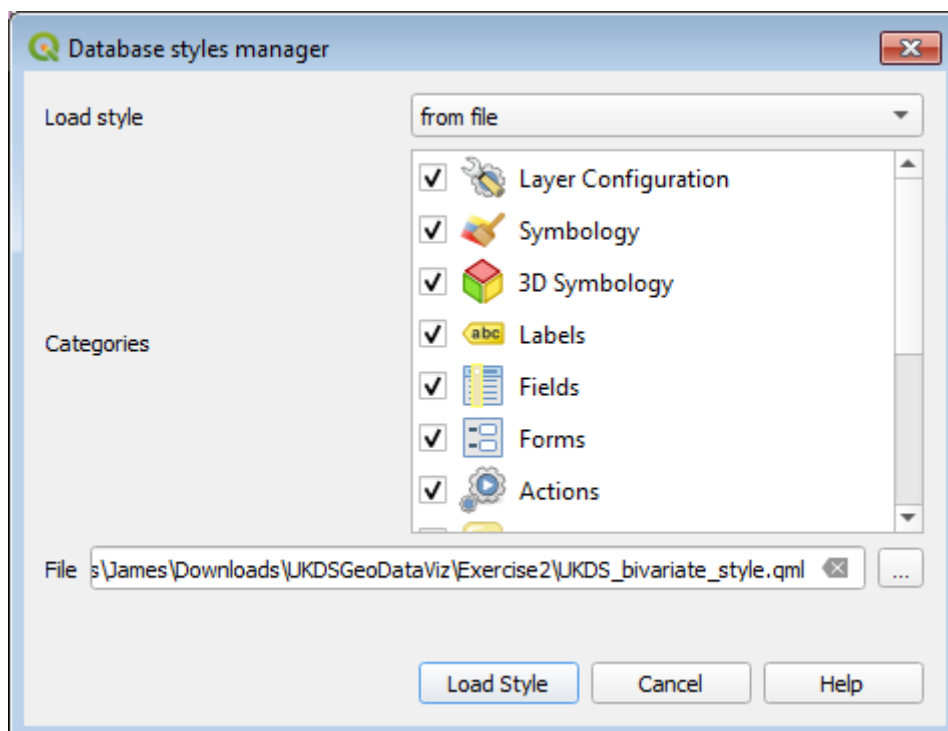
18. Click Apply. If you look back at the main QGIS window you can see that the style has been applied to the data. The default choice of colours is not so great.



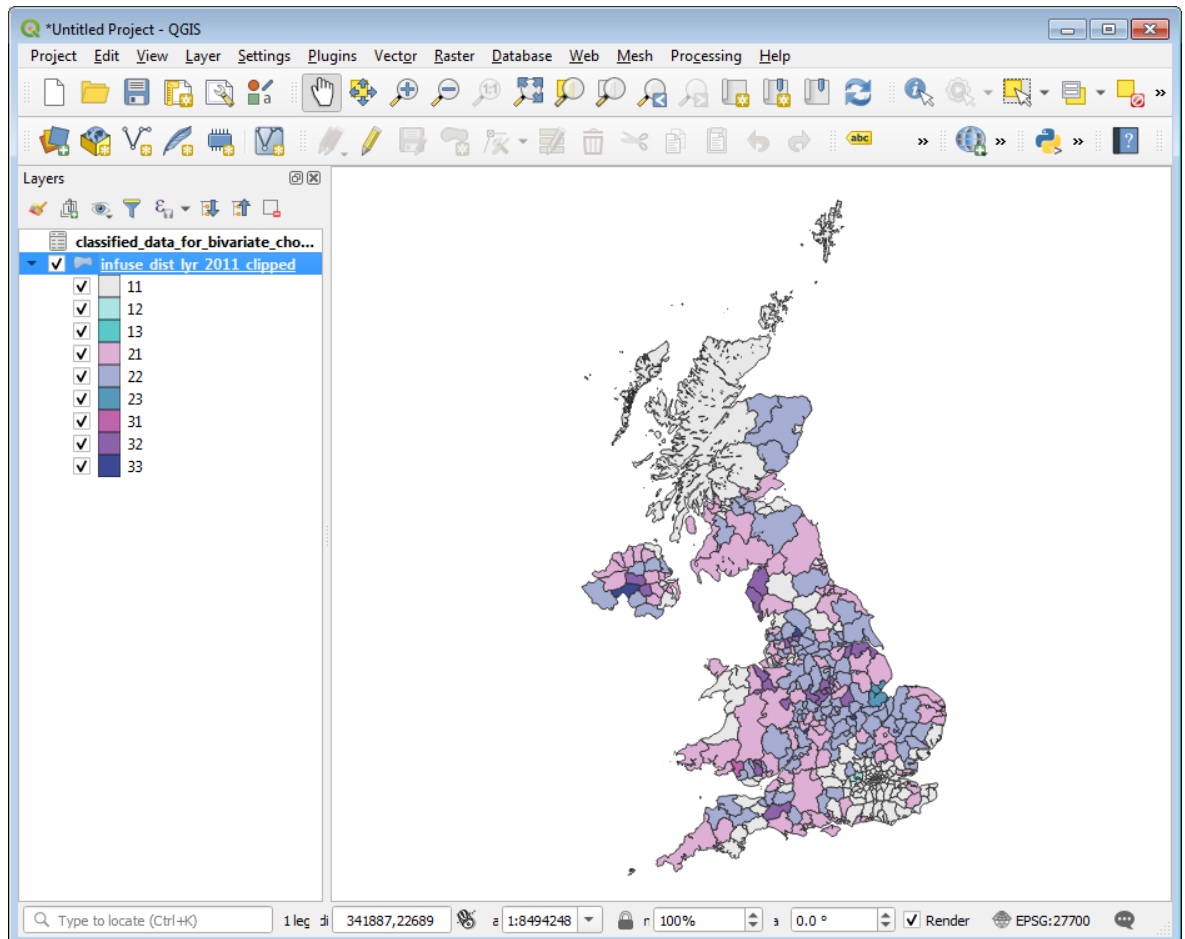
19. We can do better. We could manually set the colour of each category but an alternative is to load in a pre-defined style. In QGIS pre-defined styles can be exchanged in a file known as a QML file.
20. On the Layer Properties dialogue. Click on Symbology at left if it is not already selected and at the bottom under Layer Rendering click the Style dropdown and select Load Style...



21. This will open the Database styles manager. Ensure as shown that Load style from file is selected then click on the [...] button, navigate to the UKDSGeoDataViz/Exercise2 folder and select UKDS_bivariate_style.qml and then click Open, followed by Load Style. This will open the Database styles manager dialogue.
22. On the Database styles manager dialogue, ensure that as shown below, so Load style from file is selected in the upper dropdown. Then use the [...] button beside File to navigate to the location of UKDS_bivariate_style.qml located in the Exercise2 folder of the UKDSGeoDataViz zipfile that you downloaded. Then click the Load Style button.



23. The Database styles manager will close and back on the Layer Properties dialogue, a better colour style will have been applied to the categories. On the Layer Properties dialogue, click Apply, followed by OK to close the Layer Properties and return to QGIS where the new colour ramp will have been applied to the map as shown



24. This time, rather than our choropleth showing a single variable, we are displaying 2 variables at once Male and Female manufacturing.

We can see where:

manufacturing of both Male+Female is low (11) i.e. in rural North West Scotland; the Pennines; Scottish cities of Glasgow, Aberdeen and Edinburgh and in London and the South East


manufacturing of Male is high, but Female is low (31) around the area of Neath Port Talbot on the south coast of Wales. This likely corresponds to the male dominated steel works.

manufacturing of Male is low, but Female medium (12) around the area of Windsor and Maidenhead; South Buckinghamshire and Slough.


Manufacturing of Male is medium, but Female is high (23). This likely corresponds to South Holland food manufacturing industries.

25. As we did in Exercise 1, let's create another print layout to show this map.

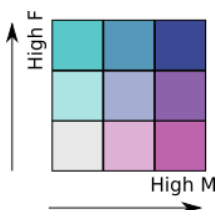
26. Create a new print layout. So from the Project menu, choose New Print Layout... and give the print layout a new name i.e. Bivariate Choropleth. Again as in exercise 1, right-click on the canvas and pick Page Properties. Then from Page Size at right, set page orientation to portrait.

27. Add a new map by clicking the  icon and dragging out a map frame with your mouse. Maybe set map scale to 5000000


28. A Bivariate Legend is not easy to create in QGIS. So we have created one for you as an

PNG image that we can add to the QGIS print layout. To add this click on the  add picture button and use your mouse to drag out an area on the map canvas to hold the picture.

29. At right, beside Image Source there is a [...] button. Click on this button and then navigate to the location of the UKDS_bivariate_legend.png image located as UKDSGeoDataViz/Exercise2/UKDS_bivariate_legend.png



The image can be resized and moved to a better location on the map.

30. Give the map a title by clicking on the Add Label icon  and dragging out the label. A title might be something like:

"Bivariate Choropleth map showing classified proportions of Males and Females working in manufacturing across the UK"

Also you might want to add a scale bar etc.



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