

Performing Spatial Joins

QGIS Tutorials and Tips



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Performing Spatial Joins

Spatial Join is a classic GIS problem - transferring attributes from one layer to another based on their spatial relationship. In QGIS, this functionality is available through the **Join Attributes by Location** tool.

Overview of the task

We will use 2 layers - A shapefile of borough boundaries of New York city and another shapefile of nursing home locations in New York city. We will use spatial join technique to find the total nursing home capacity for each of the buroughs.

Other skills you will learn

- Deleting columns from the attribute table of a layer.

Get the data

[NYC Open Data Portal](#) is an excellent source of free data for New York city.

1. Download the [Borough Boundaries](#) zip file using the Export option on the portal.

The screenshot shows the NYC Open Data Portal's interface for the 'Nursing Homes' dataset. The main area is a map of New York City and its suburbs, with numerous red circular markers indicating nursing home locations. The map is overlaid with major roads and highways. To the left of the map, there is descriptive text about the dataset and a link to the New York State Department of Health website. On the right side, there is a toolbar with icons for More Views, Filter, Visualize, Export, Discuss, Embed, and About. Below the toolbar, there are sections for 'Export' and 'Download'. The 'Export' section has a dropdown menu set to 'Shapefile' with 'Original' selected. The 'Download' section lists options for 'Download As' including KML, KMZ, Shapefile (with 'Original' selected), CSV, JSON, PDF, and RDF. At the bottom of the page, there are links for 'Map data ©2014 Google', '© 2013 The City of New York', and 'Contact Us | FAQs | Privacy Statement | Terms of Use | Site Map'.

2. Download the [Nursing Homes](#) zip file using the Export option on the portal.



NYC



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Borough Boundaries
GIS data: Boundaries of Boroughs (water areas excluded)

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Download a copy of this dataset in a static format

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Map data ©2014 Google

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For convenience, you may directly download a copy of the datasets from the links below:

[nybb_12c.zip](#)

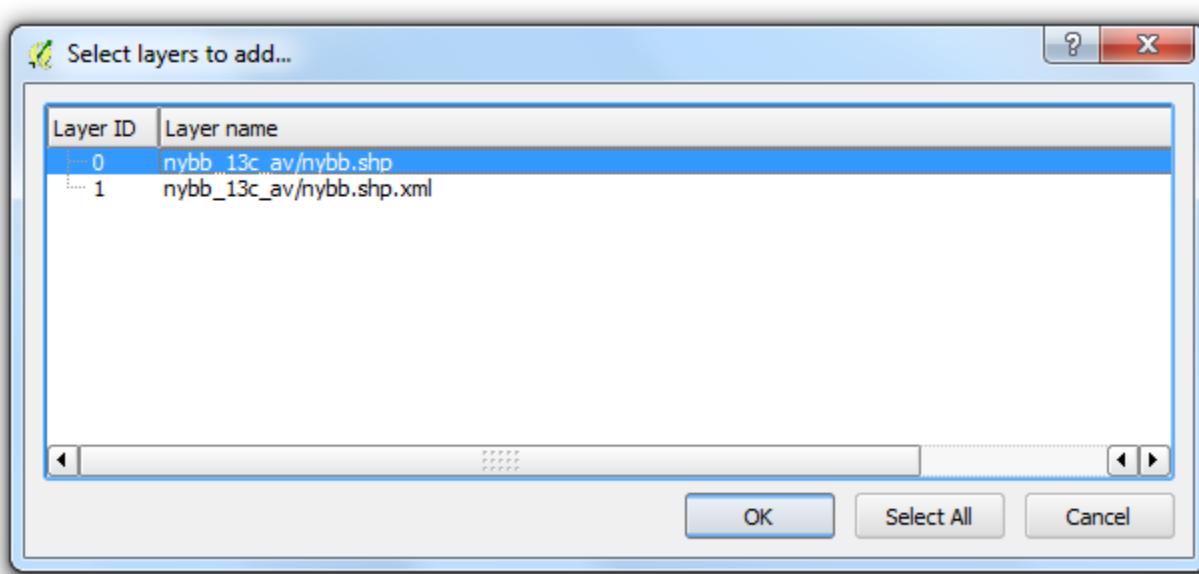
[OEM_NursingHomes_001.zip](#)

Procedure

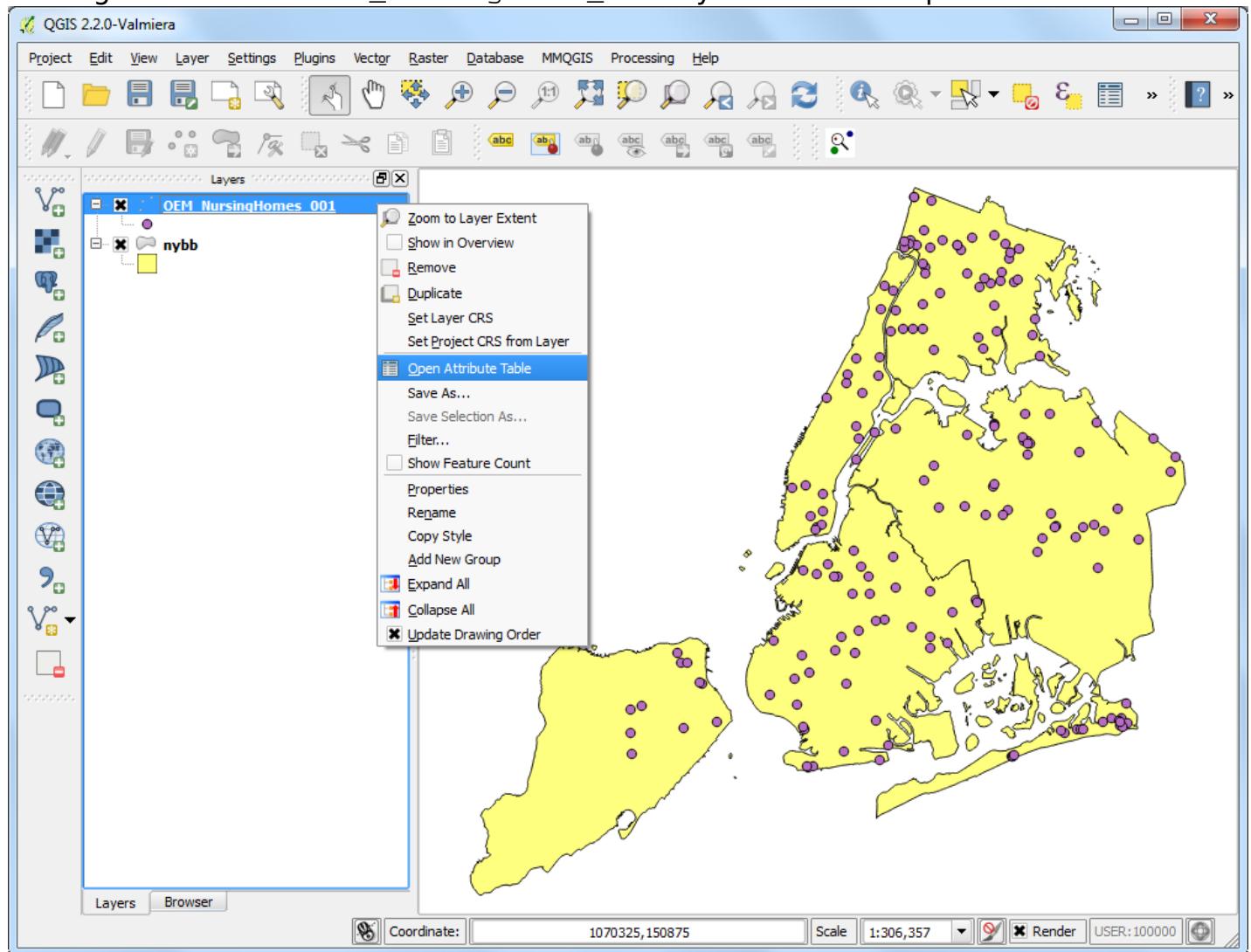
3. Go to Layer ▶ Add Vector Layer. Browse to the downloaded zip file nybb_12c.zip and select Open.



4. Select the layer `nybb.shp` and click OK.



5. Repeat the steps 3 and 4 for the another file OEM_NursingHomes_001.zip and load the OEM_NursingHomes_001.shp layer. Once both the layers are loaded, right-click on the OEM_NursingHomes_001 layer and select Open Attribute Table.



6. Examine the attributes available for each feature. Since our task is to calculate the total nursing home capacity for each borough, we can use the attribute **Capacity** which can join to the boundaries layer.

Attribute table - OEM_NursingHomes_001 :: Features total: 177, filtered: 177, selected: 0

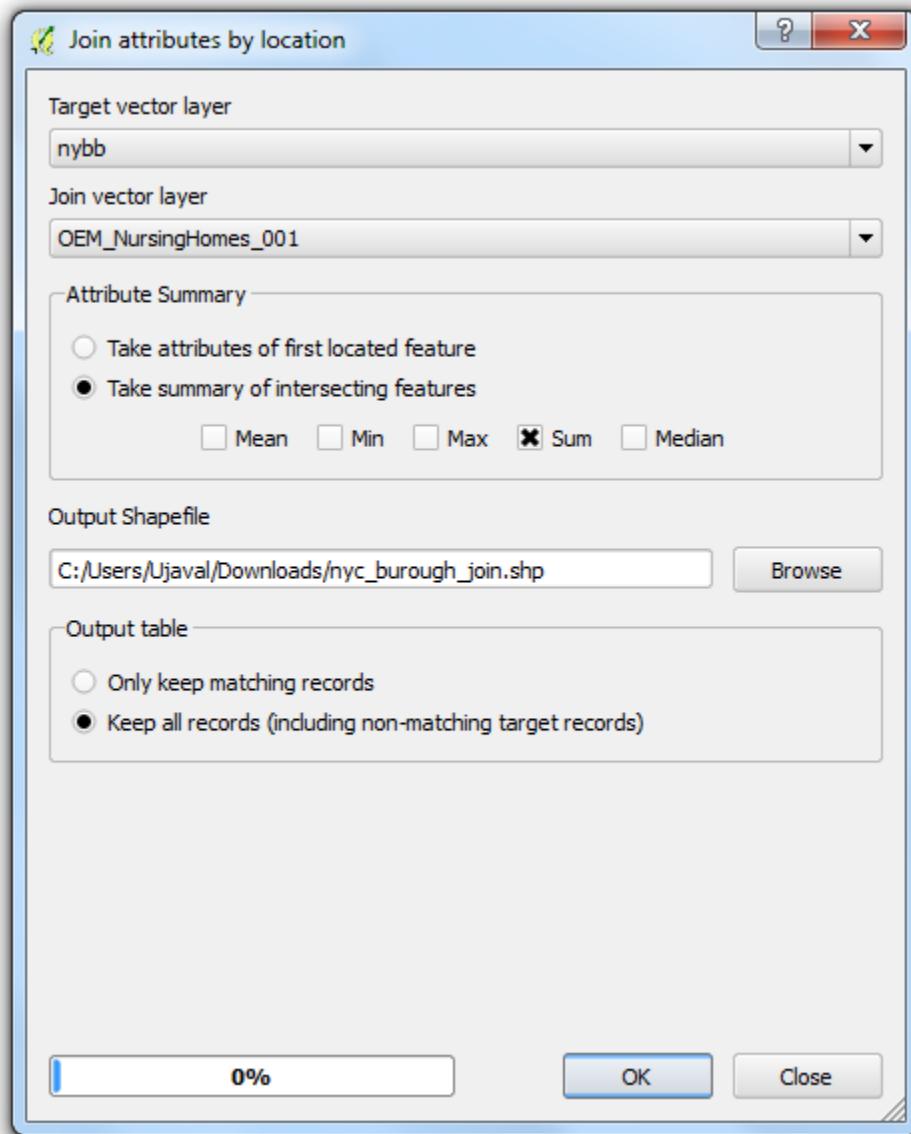
| | Label | Name | Address | City | Zipcode | PFI | OpCert | Capacity | Ba |
|----|------------------|-------------------|--------------------|----------|---------|---------------------|-------------------|----------|----|
| 0 | BISHOP MUGAVE... | BISHOP FRANCI... | 155 DEAN STREET | BROOKLYN | 11217 | 5546.000000000... | 7001377.000000... | 288 | |
| 1 | ROBERT MAPPLE... | ROBERT MAPPLE... | 327 EAST 17TH S... | NEW YORK | 10003 | 4807.00000000000... | 7002351.000000... | 28 | |
| 2 | NY CRN | NY CENTER FOR ... | 26-13 21ST STRE... | ASTORIA | 11102 | 6384.000000000... | 7003405.000000... | 280 | |
| 3 | ATLANTIS | ATLANTIS REHAB... | 140 ST EDWARD... | BROOKLYN | 11201 | 1405.000000000... | 7001389.000000... | 400 | |
| 4 | BISHOP HUCLES | BISHOP HENRY B... | 835 HERKIMER ST | BROOKLYN | 11233 | 7069.000000000... | 7001379.000000... | 240 | |
| 5 | BROOKLYN METH... | BROOKLYN UNIT... | 1485 DUMONT A... | BROOKLYN | 11208 | 1368.000000000... | 7001308.000000... | 120 | |
| 6 | BROOKLYN-QUEE... | BROOKLYN-QUEE... | 2749 LINDEN BLVD | BROOKLYN | 11208 | 277.00000000000... | 7001382.000000... | 140 | |
| 7 | BUENA VIDA | BUENA VIDA CO... | 48 CEDAR STREET | BROOKLYN | 11221 | 6248.000000000... | 7001383.000000... | 240 | |
| 8 | CABS | CABS NURSING ... | 270 NOSTRAND ... | BROOKLYN | 11205 | 1367.00000000000... | 7001307.000000... | 157 | |
| 9 | CATON PARK | CATON PARK NU... | 1312 CATON AVE... | BROOKLYN | 11226 | 1380.000000000... | 7001366.000000... | 119 | |
| 10 | COBBLE HILL | COBBLE HILL HE... | 380 HENRY STRE... | BROOKLYN | 11201 | 1381.000000000... | 7001323.000000... | 520 | |
| 11 | CONCORD | CONCORD NURS... | 300 MADISON ST... | BROOKLYN | 11216 | 1404.000000000... | 7001348.000000... | 140 | |
| 12 | DITMAS PARK | DITMAS PARK C... | 2107 DITMAS AV... | BROOKLYN | 11226 | 1576.000000000... | 7001393.000000... | 200 | |
| 13 | FOUR SEASONS | FOUR SEASONS ... | 1555 ROCKAWA... | BROOKLYN | 11236 | 3227.00000000000... | 7001385.000000... | 270 | |
| 14 | HAYM SALOMON | HAYM SALOMON ... | 2340 CROPSEY A... | BROOKLYN | 11214 | 1361.000000000... | 7001369.000000... | 240 | |
| 15 | HOLY FAMILY | HOLY FAMILY HO... | 1740 84TH STREET | BROOKLYN | 11214 | 1406.000000000... | 7001365.000000... | 200 | |
| 16 | KESER | KESER NURSING ... | 40 HEYWARD ST... | BROOKLYN | 11211 | 1409.000000000... | 7001387.000000... | 200 | |
| 17 | LUTHERAN AUG... | LUTHERAN AUGU... | 5434 SECOND A... | BROOKLYN | 11204 | 1372.000000000... | 7001313.000000... | 240 | |
| 18 | MARCUS GARVEY | MARCUS GARVE... | 810-20 ST MARK... | BROOKLYN | 11213 | 1407.00000000000... | 7001353.000000... | 295 | |
| 19 | MENORAH | MENORAH HOME... | 1516 ORIENTAL ... | BROOKLYN | 11235 | 2539.000000000... | 7001372.000000... | 320 | |
| 20 | MJG | METROPOLITAN ... | 4915 10TH AVE | BROOKLYN | 11219 | 1403.000000000... | 7001347.000000... | 354 | |
| 21 | NEW CARLTON | NEW CARLTON R... | 405 CARLTON AVE | BROOKLYN | 11238 | 1379.000000000... | 7001386.000000... | 148 | |
| 22 | NY CONGREGATI... | NY CONGREGATI... | 135 LINDEN BLVD | BROOKLYN | 11226 | 1369.000000000... | 7001309.000000... | 200 | |

Show All Features ▾

7. Go to Vector ▶ Data Management Tools ▶ Join attributes by location.



8. The Target vector layer is the one we want to add the attributes to. In our case, this will be the boroughs boundary `nybb` layer. The Join vector layer will be the nursing homes `OEM_NursingHomes_001` layer. As we want to sum the capacity of nursing homes, select `Take summary of intersecting features` and choose `Sum`. Name the output file as `nyc_borough_join.shp`. In the Output table select `Keep all records`.



9. Once the process finishes, select Yes when asked if you want to add the layer to TOC. The new layer `nyc_borough_join` would have the features from `nybb` layer along with spatially joined attributes from `OEM_NursingHomes_001` layer. Right-click on the layer and select Open Attribute Table.



10 You will see a column **SUMCapacity** in the attribute table. This is the sum of the **.Capacity** attribute for the nursing homes that fall within each borough feature.

Attribute table - nyc_borough_join :: Features total: 5, filtered: 5, selected: 0

| | BoroCode | BoroName | Shape_Leng | Shape_Area | SUMPFI | SUMOpCert | SUMCapacit | SUMBaselin | SUMAIDS |
|---|----------|---------------|-------------------|-------------------|-------------------|--------------------|--------------------|-------------------|------------------|
| 0 | 5 | Staten Island | 330454.8066070... | 1623846991.529... | 22348.00000000... | 77047456.00000... | 3149.000000000... | 11.00000000000... | 1.00000000000... |
| 1 | 1 | Manhattan | 357176.1325809... | 636397842.6720... | 57680.00000000... | 154051568.00000... | 7049.000000000... | 22.00000000000... | 5.00000000000... |
| 2 | 2 | Bronx | 464475.0676990... | 1186823812.599... | 83624.00000000... | 322016239.00000... | 11853.000000000... | 46.00000000000... | 8.00000000000... |
| 3 | 3 | Brooklyn | 742297.8304019... | 1937844335.480... | 95770.00000000... | 294056538.00000... | 10502.000000000... | 42.00000000000... | 1.00000000000... |
| 4 | 4 | Queens | 874225.1394040... | 3048478676.510... | 140279.0000000... | 392188459.00000... | 12297.000000000... | 56.00000000000... | 0.00000000000... |

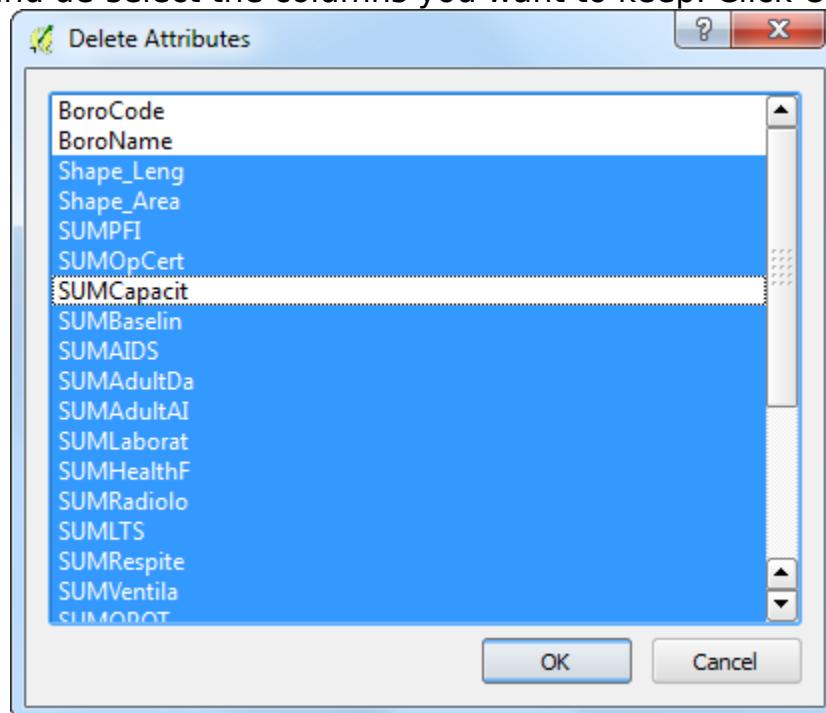
11 This is the answer we are looking for. But there are extra columns that we do not need in our output. Let's clean up our output. Click on the Toggle editing button and then the Delete column button.

Attribute table - nyc_borough_join :: Features total: 5, filtered: 5, selected: 0

The screenshot shows an attribute table window with the following columns:

| | BoroCode | BoroName | Shape_Leng | Shape_Area | SUMOpCert | SUMCapacit | SUMBaselin | SUMAIDS | |
|---|----------|---------------|-------------------|-------------------|--------------------|--------------------|--------------------|-------------------|------------------|
| 0 | 5 | Staten Island | 330454.8066070... | 1623846991.52... | 77047456.00000... | 3149.000000000... | 11.00000000000... | 1.00000000000... | |
| 1 | 1 | Manhattan | 357176.1325809... | 636397842.6720... | 57680.000000000... | 154051568.00000... | 7049.000000000... | 22.00000000000... | 5.00000000000... |
| 2 | 2 | Bronx | 464475.0676990... | 1186823812.599... | 83624.000000000... | 322016239.00000... | 11853.000000000... | 46.00000000000... | 8.00000000000... |
| 3 | 3 | Brooklyn | 742297.8304019... | 1937844335.480... | 95770.000000000... | 294056538.00000... | 10502.000000000... | 42.00000000000... | 1.00000000000... |
| 4 | 4 | Queens | 874225.1394040... | 3048478676.510... | 140279.0000000... | 392188459.00000... | 12297.000000000... | 56.00000000000... | 0.00000000000... |

12 Press Control-A to select all columns in the Delete Attributes dialog. Next hold the Control key and de-select the columns you want to keep. Click OK.



13 In the attribute table, click Toggle editing button again to save the changes.

The screenshot shows the QGIS Attribute Table dialog box for the 'nyc_borough_join' layer. The title bar indicates there are 5 features total, 5 filtered, and 0 selected. A red circle highlights the 'Toggle editing mode (Ctrl+E)' button in the toolbar at the top left. The table contains five rows of data:

| | Borough | SUMCapacity |
|---|---------------|-----------------------|
| 0 | Staten Island | 3149.000000000000... |
| 1 | Manhattan | 7049.000000000000... |
| 2 | Bronx | 11853.000000000000... |
| 3 | Brooklyn | 10502.000000000000... |
| 4 | Queens | 12297.000000000000... |

At the bottom left is a 'Show All Features' button, and at the bottom right are two small icons.

14 Back in the QGIS Canvas, use the Identify tool to verify that the output file has the desired attributes for each borough feature.

