

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 features a map of New York City with numerous red circular markers indicating nursing home locations. The map is overlaid with major roads and highways. To the right of the map, there is a sidebar with several sections:

- Export:** A button labeled 'Export' is circled in red.
- Download:** A section for downloading geospatial data, with 'Shapefile' selected and 'Original' highlighted with a red circle.
- Download Tabular Layers:** Options for CSV, JSON, PDF, and RDF.

The top of the page has a banner for 'NYC OpenData' with '1100+ Datasets Available'. The footer contains links for 'Contact Us', 'FAQs', 'Privacy Statement', 'Terms of Use', and 'Site Map', along with a copyright notice for '© 2013 The City of New York'.

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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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](#)

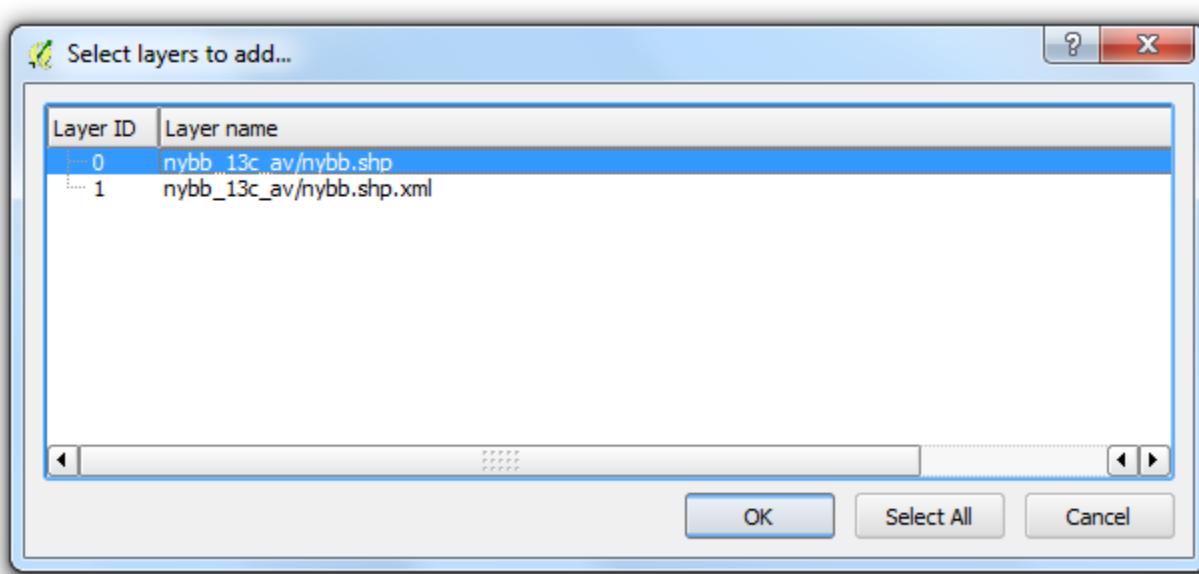
[OEM_NursingHomes_001.zip](#)

Procedure

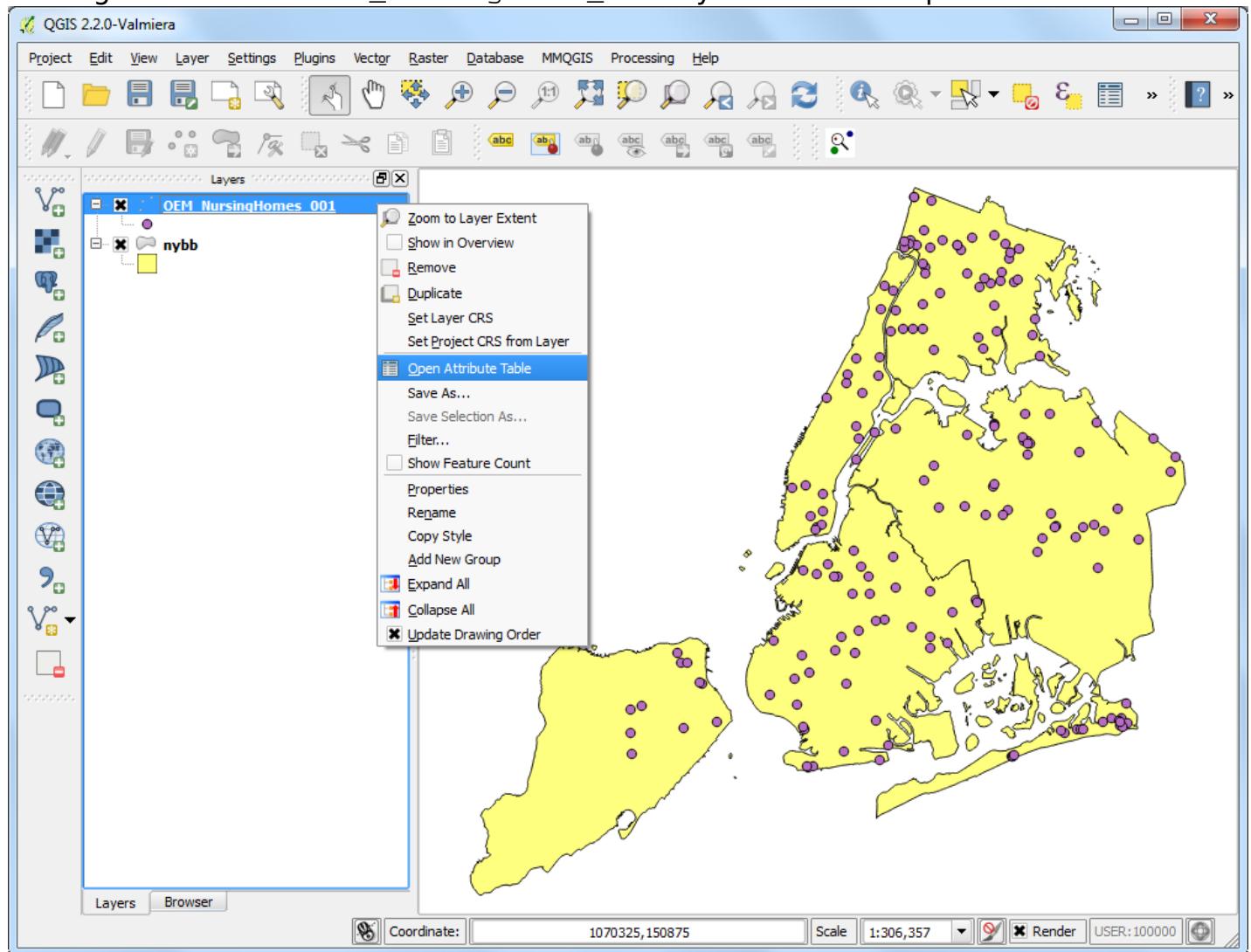
3. Go to Layer ▶ Add Vector Layer. Browse to the downloaded zip file nybb_12c.zip and select Open.



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...

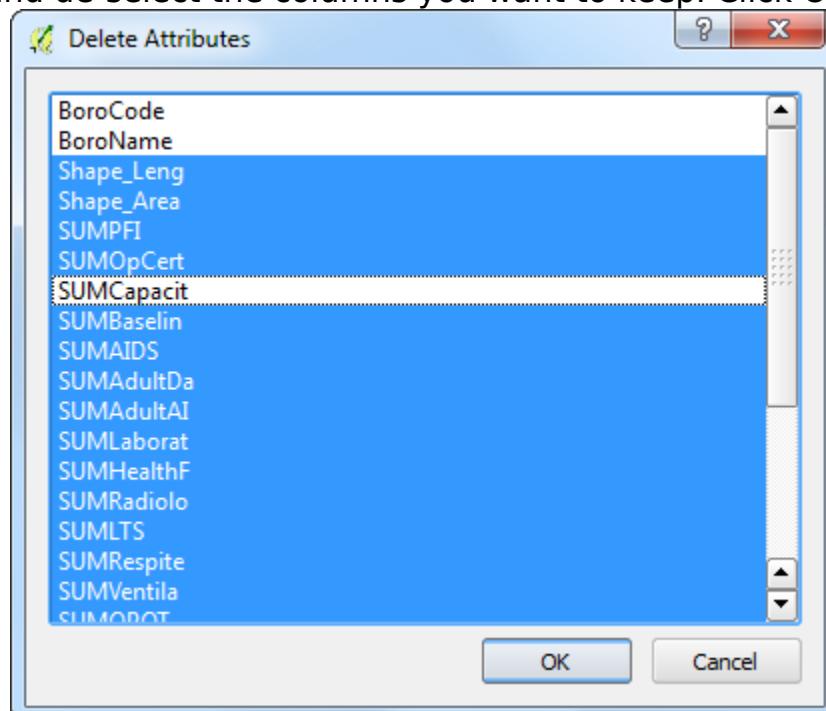
11 This is the answer we are looking for. But there are extra columns that we do not need in our output. Let's clean up our output. Click on the Toggle editing button and then the Delete column button.

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

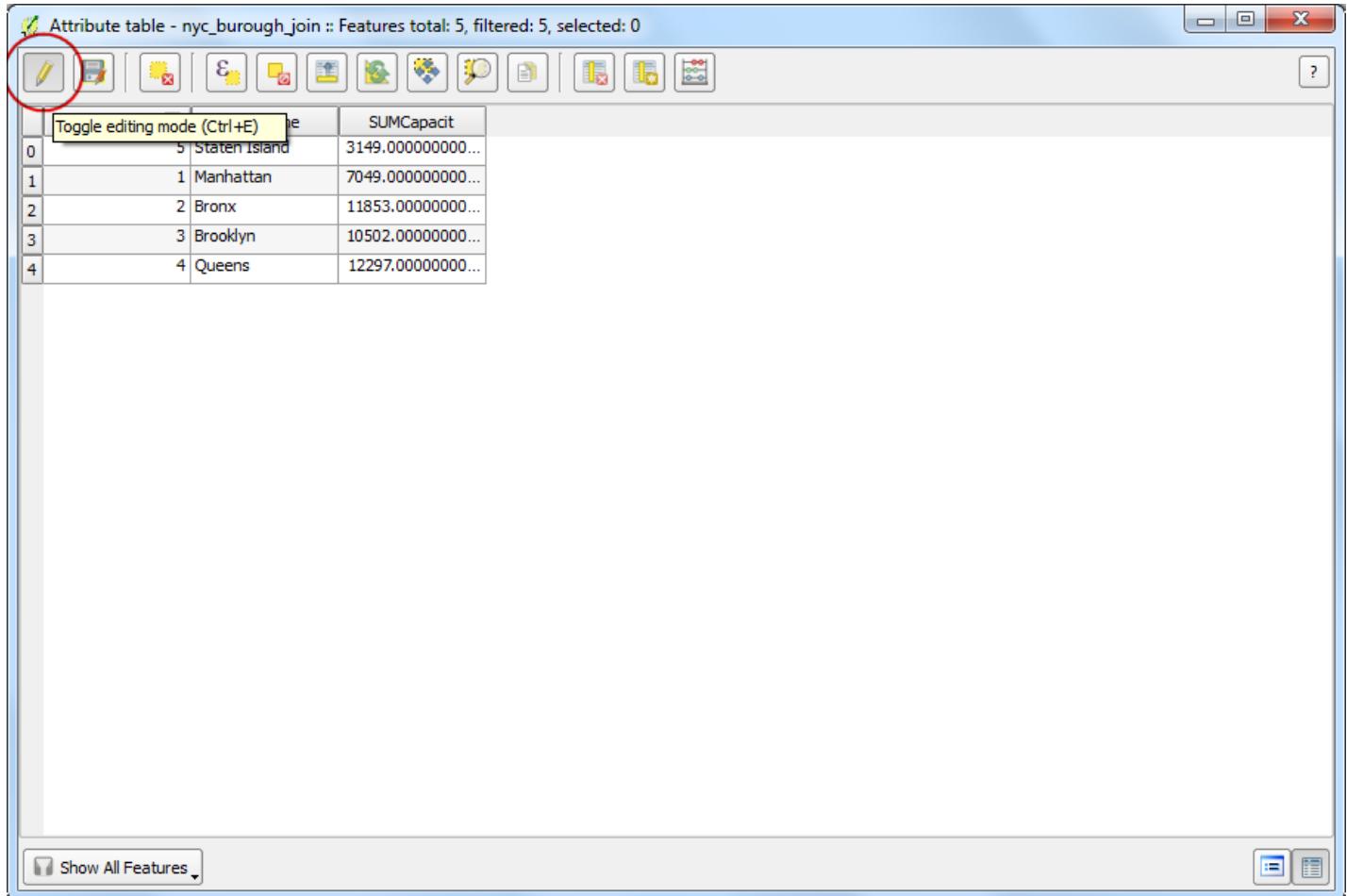
The screenshot shows an attribute table window with the following columns:

	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 window for the 'nyc_borough_join' layer. The window title bar reads 'Attribute table - nyc_borough_join :: Features total: 5, filtered: 5, selected: 0'. The toolbar at the top has several icons, with the first one (containing a pencil) circled in red. The table itself has three columns: 'id', 'name', and 'SUMCapacity'. The data rows are:

		SUMCapacity
0	5 Staten Island	3149.000000000000...
1	1 Manhattan	7049.000000000000...
2	2 Bronx	11853.000000000000...
3	3 Brooklyn	10502.000000000000...
4	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.

