The Data Journalist

**Chapter 7 tutorial** 

Geocoding in ArcGIS Desktop (ArcMap)

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Summary: In many cases, online geocoding services are all you will need to convert addresses and other location data into geographic data. When you have a larger number of points to geocode, however, and available lookup data, the case for doing the job yourself can be compelling. This tutorial shows you how to geocode addresses using the Qgis' built-in geocoding utility. If you are unsure of the basics of the Qgis user interface, see the quick tour of ArcGIS desktop tutorial.

For this exercise, we'll use a city of Ottawa discarded syringe file, but without the longitude and latitude coordinates. In many instances when obtaining datasets from open data websites or freedom-of-information requests, you will get addresses, that is a field with the number, address name and suffix (example: 2132 Bank St.).

While Fusion Tables can use street address, combined with the city, town or county; province or state; and country, all combined in one column to place the locations on a map, Qgis needs longitude and latitude coordinates. The good news is that Qgis can take the address information we've just described, and use open-sourced geocoding services to locate the latitude and longitude coordinates.

Where Fusion Tables needs the street address, city, province and country combined in one column, Qgis requires that they be separated in four respective fields. If the fields are not separated in this manner, you'll have to use some of the techniques described in the "Working with specialized functions in Excel" tutorial for Chapter 4. If they are, then you can follow the steps outlined in this tutorial.

## Skills you will learn:

How to create to geocode in Qgis.

To download the discarded syringe file we'll be using for geocoding, please click <u>here</u>.

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1	ID	Year	StreetAddress	City	P	rovince	Country	Ward_No		
2	1	2013	1534 BEAVERPON	D DR Otta	awa O	ntario	Canada	11		
3	2	2013	374 VALADE CRES	S Otta	awa O	ntario	Canada	1		
4	3	2013	370 KENNEDY LA	NE Otta	awa O	ntario	Canada	1		
5	4	2013	3045 BASELINE R	D Otta	awa O	ntario	Canada	8		
6	5	2013	2630 INNES RD	Otta	awa O	ntario	Canada	2		
7	6	2013	322 RIDEAU ST	Otta	awa O	ntario	Canada	12		
8	7	2013	382 RIDEAU ST	Otta	awa O	ntario	Canada	12		
9	8	2013	47 RIDEAU ST	Otta	awa O	ntario	Canada	12		
10	9	2013	4 RIDEAU ST	Otta	awa O	ntario	Canada	12		

As discussed above, the address fields are separated fields for each piece of geographic information:

- i. Address: 1534 Beaverpond Dr
- ii. City: Ottawa
- iii. Province: Ontario
- iv. Country: Canada

To geocode, you'll have to install the "mmqgis" plugin. In QGIS, click on Plugins > Manage and Install Plug-ins. Scroll down and click on "mmqgis" and click on install.



Once installed, you should see the "MMQGIS" in the menu bar.



Import the discarded syringe file through the MMQGIS plugin.

Click on MMQGIS (which will be located on the menu at the top) > Geocode > Geocode CSV with Google/OpenStreetMap.

MMQGIS Processing	Help
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Geocode 🔹 🕨	G Geocode CSV with Google / OpenStreetMap
Search / Select +	Geocode from Street Layer
Import / Export	<ul> <li>Street Address Join</li> </ul>
Modify •	]

Browsing, and then clicking on your file, should correctly populate Qgis' "Web Service Geocode" dialogue box.

Input CSV File (UTF-8)							
GeocodinginQgisDesktop/GeoC	odingUs	singQgis_updated.csv	Browse				
Address Field		City Field					
StreetAddress	-	City					
State Field		Country Field					
Province	-	Country					
Web Service		Google API Key (optional)					
Google Maps	-	(none)					
Output Shapefile							
GeocodinginQgisDesktop/GeoCo	odingUs	ingQgis_updated.shp	Browse				
Not Found Output List							
Chapter seven\7 10 Buffering	inQGIS	Desktop/notfound.csv	Browse				

Note: You'll notice the second category for the output file says "Not Found", which is where the non-matching lines in the csv get written to. In other words, all the files that are not geocoded end up in this file. So, simply browse to the same location that you've saved the original file, rename the file with something like "unfounded files", and then select the okay tab. Failing to do this will produce an error message which denies you permission.



Now, let's continue.

Not only will the web service geocode the address with longitude and latitude coordinates, but Qgis will create create a shape file, which you can see on the extension. For the purposes of this exercise, just ignore the category below the "Output Shapefile" label, and select OK.

The actual geoprocessing will take a few minutes, after which time, the points will be plotted

Once completed, the geocoded points will appear on the map. (NOTE: QGIS can be unpredictable. So, if the process stalls, or seems to be taking too long, try it

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Open the csv file's attribute to view the records that weren't geocoded and attempt to fix the addresses.

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	ID	Year	StreetAddr	City	Province	Country	Ward_No		addrtype	addrlocat	
	1	2013	1534 BEAVER	Ottawa	Ontario	Canada	11	NULL	NULL	street_address	
	2	2013	374 VALADE	Ottawa	Ontario	Canada	1	NULL	NULL	street_address	
	3	2013	370 KENNEDY	Ottawa	Ontario	Canada	1	NULL	NULL	premise	
	4	2013	3045 BASELIN	Ottawa	Ontario	Canada	8	NULL	NULL	premise	
	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address	
	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	
	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	
,	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NUEL	premise	
	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	
	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL	NULL	street_address	
0	11	2013	120 PARKDAL	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	
1	12	2013	840 NORTON	Ottawa	Ontario	Canada	7	NULL	NULL	street_address	
2	13	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	
3	14	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	
4	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	
	16	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	

You'll notice that the attribute table does not show the longitude and latitude coordinates, even though QGIS is using them to map the locations.

To obtain columns with the longitude and latitudes, we'll have to use Qgis's field calculator.

Stay in the attribute table, and select the icon to the far right of the menu.

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Γ		ID	Ye	ar	St	reetAd	ldr		City	/		Provir	nce		Count
1	1		2013		1534	BEAV	ER	Otta	wa		Ont	ario		Can	ada
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1	2	2013	374 VALAI	Create v	rirtual field	ł									
1	3	2013	370 KENNE	Output field	name					D					
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	8	2013	47 RIDEAU									row_nur	nber		
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	16	2013	292 LYON	Output previ	ew:							Pacant (fi	ialdeste)		
			1												

Make sure the box to the left of "Create a new field" is checked.

Next to "Output field name" type "X" for X-axis.

The "Output field type" is a "Decimal number (real)"

Output field length is 10 (Note: older versions of Qgis call this "Output field width")

The "Precision" is 5 ( for the five decimal points ).

In the "Expression" box, type "\$X".

Your "Field calculator" dialogue box should look like this:

Only update 0 s Create a new Create virtual f	elected features field	Update existing field
Output field name	x	
Output field type	Decimal number (real)	
Output field length	10 Precision 5	
Expression F	unction Editor	
= + - /	* ^    ( ) '\n'	Search
۲۹ Output preview: -:	75.5991599	Color  Color  Conditionals  Conversions  Co

Select the	"OK"	tab.
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Ī	ID	Year	StreetAddr	City	Province	Country	Ward_No	1	addrtype	addrlocat	x
	1	2013	1534 BEAVER	Ottawa	Ontario	Canada	11	NULL	NULL	street_address	-75.59916
1	2	2013	374 VALADE	Ottawa	Ontario	Canada	1	NULL	NULL	street_address	-75.49469
İ	3	2013	370 KENNEDY	Ottawa	Ontario	Canada	1	NULL	NULL	premise	-75.50322
1	4	2013	3045 BASELIN	Ottawa	Ontario	Canada	8	NULL	NULL	premise	-75.80788
Ī	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address	-75.56410
1	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.68456
1	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.68281
1	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.69330
1	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.69374
1	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL	NULL	street_address	-75.65386
	11	2013	120 PARKDAL	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.73358
1	12	2013	840 NORTON	Ottawa	Ontario	Canada	7	NULL	NULL	street_address	-75.78653
	13	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628
	14	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628
İ	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152

We now have a column displaying the longitude or "X" coordinates.

Repeat the same process for the latitude, which will be the "Y" coordinate.

Create a new	field	Update existing field
Create virtual f	ield	
Output field name	Y	ID .
Output field type	Decimal number (real)	
Output field length	10 Precision 5	
Expression F	Function Editor	
= + - /	* ^    ( ) '\n'	Search
\$ <b>Y</b>		<ul> <li>row_number</li> <li>Color</li> <li>Conditionals</li> <li>Conversions</li> <li>Custom</li> <li>Date and Time</li> <li>Fields and Values</li> <li>Fuzzy Matching</li> <li>General</li> <li>Geometry</li> <li>Math</li> <li>Operators</li> <li>Record</li> <li>String</li> <li>Variables</li> <li>Recent (fieldcalc)</li> </ul>

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_	1	2013	1534 BEAVER	Ottawa	Ontario	Canada	11	NULL	NULL	street_address	-75.59916	45.42281
_	2	2013	374 VALADE	Ottawa	Ontario	Canada	1	NULL	NULL	street_address	-75.49469	45.47597
-	3	2013	370 KENNEDY	Ottawa	Ontario	Canada	1	NULL	NULL	premise	-75.50322	45.47891
	4	2013	3045 BASELIN	Ottawa	Ontario	Canada	8	NULL	NULL	premise	-75.80788	45.33520
	5	2013	2630 INNES RD	Ottawa	Ontario	Canada	2	NULL	NULL	street_address	-75.56410	45.43152
	6	2013	322 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.68456	45.42889
	7	2013	382 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.68281	45.43001
,	8	2013	47 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	premise	-75.69330	45.42605
	9	2013	4 RIDEAU ST	Ottawa	Ontario	Canada	12	NULL	NULL	street_address	-75.69374	45.42526
	10	2013	221 PRINCE ST	Ottawa	Ontario	Canada	13	NULL.	NULL	street_address	-75.65386	45.42455
0	11	2013	120 PARKDAL	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.73358	45.40815
1	12	2013	840 NORTON	Ottawa	Ontario	Canada	7	NULL	NULL	street_address	-75.78653	45.36148
2	13	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628	45.40693
3	14	2013	4 MANCHEST	Ottawa	Ontario	Canada	15	NULL	NULL	street_address	-75.72628	45.40693
4	15	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152	45.41448
15	16	2013	292 LYON ST	Ottawa	Ontario	Canada	14	NULL	NULL	street_address	-75.70152	45.41448

The new columns will allow you to map these locations using ArcGIS Online, Fusion Tables, or Tableau, once you 've exported the layer as a csv file.

The coordinates will also allow you to perform the kinds of spatial joins in Qgis that we learned in the "7\_13\_SpatialJoinsQGISDesktop" tutorial.