## **Introduction to ArcGIS 10x: Geocoding**

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# **Navigating ArcMap**

#### Toolbars

Tools you need for navigating and manipulating your data, at the top of the window. To choose which to display, go to Customize > Toolbars.



### Table of Contents



Shows you which data files have been added to your map and lets you control how the layers will be displayed.

Catalog Window

Allows you to navigate and organize the folders that contain your data. Also exists as a separate application, ArcCatalog.



## **Tutorial 1: From Addresses to Maps**

This tutorial will guide you through the process of geocoding—transforming a table of street addresses into points on a map. You will create a new file in the shapefile format.

- 1. Download and unzip geocode\_data.zip onto your desktop.
- 2. Open the spreadsheet wigshops.xlsx with Excel. These are the locations we will plot on the map. In order to use Excel files in ArcGIS, the file must be formatted in a certain way:
  - a. Column names must begin with a letter
  - b. Column names must contain only letters, numbers, or underscores (no spaces)c. Cells must contain less than 255 characters

Check that this spreadsheet meets those conditions and then close the file. (The file cannot be open in Excel at the same time you are working with it in ArcGIS.)

- 3. Start up ArcMap, then open Philadelphia.mxd, located in the folder with the unzipped files. This map shows the counties in the Philadelphia metropolitan area, with census tracts shaded according to median household income from the 2006-2010 American Community Survey.
- 4. In the Table of Contents (TOC), you will see a list of the files that have been added to the map. If the TOC is not displayed, select it from the menu Windows > Table of Contents. You should see a file titled "Wig Shop Addresses," which is the same file we viewed in Excel. If the tables do not show up, make sure the TOC is set to "List by Source" mode (see illustration). To view the table, right-click on "Wig Shop Addresses" and select Open.
- 5. To geocode one address at a time, as you would in Google Maps for example, ArcGIS has a tool called Find. To access it, click on the binoculars icon in the toolbar at top. Select the Locations tab, and next to Single Line Input, type in an address from the spreadsheet as one line, as in "2022 Duncan Rd Wilmington DE 19808."





Next you'll see a list of possible matches, listed by Match\_addr. Each match has a score from 1 to 100, reflecting the accuracy of the map. Some matches might be based on the full street addresses, while others might be simply the ZIP code or city. Right-click on the match address that looks like the most accurate and select "Pan to." This will show you where on the map this address is located.

i Find			? ×	
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Options Right-click a row to she	Show all candidates		<u>C</u> ancel	
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US_Streets 100	2022 Duncan Rd, Wilmington, DE, 19808	2		
US_Streets 79 US_CitvSt 95	2023 Duncan Rd, Wilmington, DE, 19808 South Wilmington, DE			
5 objects found			Pan To	
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- 6. Obviously, it would be tedious to enter each address this way. This is where geocoding comes in. Right-click on Wig Shop Addresses in the TOC, and select Geocode Addresses. This will essentially lead you through the same process but will match all addresses at the same time.
- 7. The first step is to select an address locator from the Choose an Address Locator to Use... menu. The Esri StreetMap data is available for this purpose on computers in Van Pelt Library in the Electronic Lookup Center, Moelis, and Goldstein Electronic Classroom on the first floor, in the DataSets > Streetmaps drive.

🅸 Choose an Address Locator to use		?×
Name	Description	Add
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9.3.1 North America Geocode Service (ArcGIS		
9.3.1 US Streets Geocode Service (ArcGIS Online) 0.3.1 Europe Geocode Service (ArcGIS Online)		
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* MGRS (Military Grid Reference System)	Locator sty	
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To locate this, click Add... in the Choose an Address Locator to Use... menu. Use the Connect to Folder button to connect to the Computer > DataSets drive and click OK; next, navigate to the folder Streetmaps > streetmap\_na > data. Choose Composite\_US and click OK. Back in the Choose an Address Locator to Use... menu, select the address locator that you added, then click OK.

8. The next menu sets up the geocoding. Under Address Input Fields, the software matches the columns of the spreadsheet to their probable content by title. Make sure that it has correctly identified the columns containing Address, City, State, and Zip.

Geocode Addresses: Compo	osite_NA						
Address table:							
Sheet1\$groomers 🔹 🗸							
Address Input Fields							
Street or Intersection:	Address 🗸						
<u>C</u> ity or Placename:	City						
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About geocoding a table of a	addresses OK Cancel						

Under Output, the only option is "Create static snapshot of table inside new feature class." This means that once you have geocoded the table, changing the data inside the table will not alter the shapefile output. (In order to create a "dynamic feature class related to table," the table must be part of a geodatabase, a particular way of organizing data in ArcGIS. We will only create static snapshots in this tutorial.) Under "Output shapefile or feature class," select a place on your computer where you will find the file again—for example, your desktop—and give it a meaningful name, such as wigshops.shp. Then click OK.

9. ArcMap will display its progress as it geocodes the addresses. When it's done, it will tell you how many addresses were matched (assigned one location), tied (two equally likely locations), or unmatched (no location assigned).

In this case, they should be 100% matched. Click on Close and you should see the wig shop locations mapped on top of the census tract layer. A new shapefile, Geocoding Results:wigshops.shp, should also show up in the TOC.

Geocoding Addresses			×
	Matched: Tied: Unmatched:	44 (100%) 0 (0%) 0 (0%)	
	100%	%	_
	Comple	eted	
Av	erage speed: 8,0	)40 records/hour	
	<u>R</u> ematch	⊆lose	

10. The above example should have gone relatively smoothly. The next example will show how to deal with common problems that arise during geocoding. We'll also examine a few more geocoding options.

In the TOC, look for the table entitled Pet Groomer Addresses, right-click, and select Geocode Addresses. Among the address locators, choose, "Composite\_US

11. As we did for the wig shop addresses, under "Output shapefile or feature class," select a place on your computer where you will find the file again and give it a meaningful name.

This time, click on Geocoding Options. The first item is the Locator drop-down menu. This shows that this particular address locator is a composite locator—many locators working together. They are listed in the drop-down in order from most to least precise. For example, the first listed, StreetAddr\_US, will interpolate the position of the point

based on the street and street number. If the software cannot make a match using this locator, it will next try the less precise locator, Postal\_US, which will simply put the point in the middle of the ZIP code. We will see more about this after geocoding.

For each locator, there are Matching Options below. These let you adjust how sensitive the software is to errors in the data. If there are a lot of typos in your table of addresses, you may want to lower the spelling sensitivity, but for this exercise let's leave the settings as they are. The minimum candidate and match scores refer to the score from 0-100 that the software gives potential locations based on the geocoded address. Leave the defaults.

If you change the locator in the drop-down menu to StreetAddr\_US, you will see a number of connectors listed under Intersections. You can use these when you do not have an exact street address.

Leave the other defaults and click OK, then OK again at the Geocode Addresses menu.

12. This time, you will get some tied scores—ArcMap could not decide which location was more accurate.

Geocoding Addresses			×
	Matched: Tied: Unmatched:	308 (99%) 4 (1%) 0 (0%)	
	100%	6	
	Comple	ted	
Av	erage speed: 96,9	900 records/hour	
]	<u>R</u> ematch	⊆lose	

Click on Rematch. This will allow us to check and control the results.

13. The Interactive Rematch menu shows the addresses from your table along with information about how the match was generated.

<b>1</b>	lnteractive Rematch - Geocoding_Result_4												_ 🗆 🗙						
Show results: All Addresses			▼	Ma	Manage result sets				Refresh		Rematch Automatically		Matched:	308 (99%)					
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F	(	) F	oi US	_RoofTop	М	100	A	124 Mario Dr, Bear, DE, 19701		R	-75.	39.6	-75.661	39.64	15633	Address		neu:	4 (170)
		1 F	oi US	_Streets	М	100	A	1772 Red Lion Rd, Bear, DE, 19701		R	-75.	39.5	0	0	71041	StreetAddress		Unmatched:	0 (0%)
	:	2 F	oi US	_RoofTop	М	100	A	4 Seminole Ave, Claymont, DE, 19703		R	-75.	39.8	-75.459	39.80	62076	Address			
	;	3 F	oi US	_RoofTop	М	100	A	950 Ridge Rd, Claymont, DE, 19703		R	-75.	39.8	-75.440	39.81	62068	Address			
	4	4 F	'oi US	_RoofTop	М	100	A	2600 Philadelphia Pike, Claymont, DE, 1	9703	R	-75.	39.7	-75.468	39.79	62194	Address			
	ţ	5   F	'oi US	_RoofTop	М	97.89	A	78 Clinton St, Delaware City, DE, 1970	6	L	-75.	39.5	-75.589	39.57	62187	Address			
	- 1	5   F	oi US	_Streets	М	100	A	501 Kirkwood Hwy, Elsmere, DE, 1980	)5	L	-75.	39.7	0	0	18840	StreetAddress			
	1	7   F	oi US	_RoofTop	М	100	A	7 Hunt Cir, Middletown, DE, 19709		L	-75.	39.4	-75.763	39.49	86156	Address			
	1	3   F	oi US	_RoofTop	М	100	A	131 Netherlands Dr, Middletown, DE, 1	9709	L	-75.	39.5	-75.623	39.52	62146	Address			
		9   F	oilUS	StreetNan	n M	100	A	Pulaski Hwy, New Castle, DE, 19720			-75.	39.6	0	0		StreetName			
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	Geocoding Options Zoom to Candidates 🎊 Pick Address from Map																		

An important field to check is the locator used, listed under Loc\_name. Locations mapped based on StreetAddr\_US will be fairly accurate, but Postal\_US less so. Right-click on Loc\_name and select Sort Descending, which could bring up locations based on ZIP code to the top.

14. For these addresses, you will see that the Match\_addr—the location the software matched to the address from the table—is simply a ZIP code. This means that the point for this address is simply the center of the ZIP code, which may not be near the actual point at all.

Scroll over within the table of results and look for the pet salon called Three Pooches. Click on the square to the left of the table; information on the address will show up in the boxes below, where we can adjust the match.

_ Locator	US_Zipcode	•
🔹 Addr <u>e</u>	255:	_
Address	17 BERLIN CLEMENTON RD	4
C <u>i</u> ty	BERLIN	
State	LN3	
<u>Z</u> ip	08009	
Zip <u>4</u>		
Country		•

The address to the left is listed as "17 BERLIN CLEMENTON RD." This looks a little strange considering that the city is also listed as Berlin. We can correct typos in addresses directly in this box and search for a new match. Delete the "BERLIN" in the address line and change the locator in the drop-down to <All>. New candidates will show up to the right. Find the candidate with a score of 100 from the StreetAddr\_US locator, click on it, and select Match. The location in the output is now updated.

15. You can continue this process for the rest of the addresses matched to ZIP codes. Some of these addresses, however, are not physical addresses at all; if you scroll over in the table of results and browse through the ARC\_Addres field, you'll see that some are P.O.

boxes. To get rid of these, select the results from the list and click Unmatch.

If you want to see where the candidate is located on the map, while the result is highlighted, click on the Zoom to candidate button below. Geocoding is not an exact process, so you will have to use your judgment about how accurate the matches need to be as you make your corrections. When you are satisfied, click Close.