Geocoding in ArcGIS Pro

Fall 2023

SCHOLARS' LAB

Drew Macqueen
GIS Specialist
dmacqueen@virginia.edu

Chris Gist
GIS Specialist
cgist@virginia.edu

Workshop Page

http://guides.lib.virginia.edu/gis

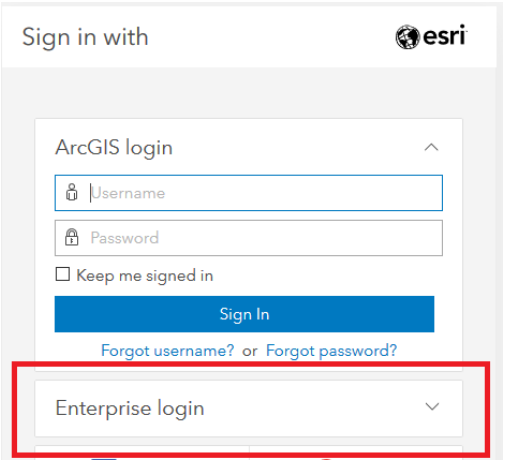
Click **Teaching Resources > Fall 2023 Workshops**

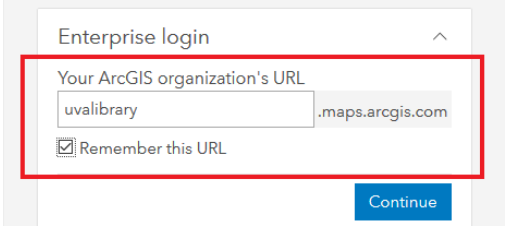
A strength of GIS is the ability to work with data in many forms. Often, we start with a spreadsheet of place descriptions like zip codes or street addresses and want to plot these places on a map. Once located, we can use GIS to visualize and analyze our locations in combination with other spatial datasets from other sources.

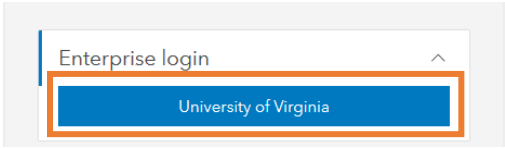
In this workshop we'll turn place descriptions in Excel spreadsheets into points on a map using geocoding tools in ArcGIS Pro desktop software.

Open ArcGIS Pro, and login using the appropriate credentials

If you have Netbadge credentials, click **Enterprise Login.** For the organization URL, type "**uvalibrary"**, and click **Continue.** Click **University of Virginia.** You will be directed to NetBadge where you will login as normal. If you do not currently have an ArcGIS Online account, this process will create one for you.

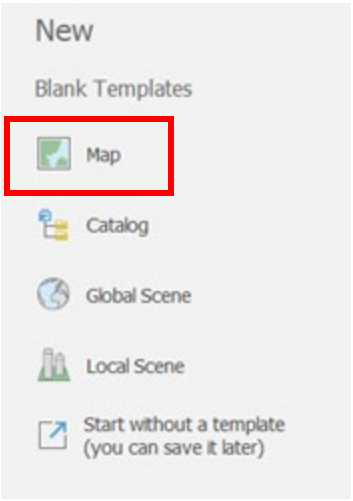




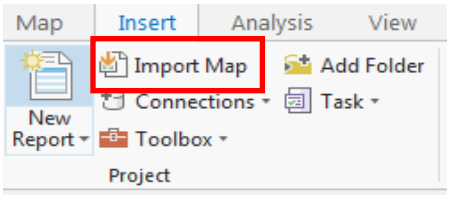


If you Do Not have Netbadge credentials, please contact us at uvagis@virginia.edu.

To begin, under New, Blank Templates click **Map**. Give the new project a useful name, accepting the default location. Be sure the box for "**Create a new folder for this project**" is checked.

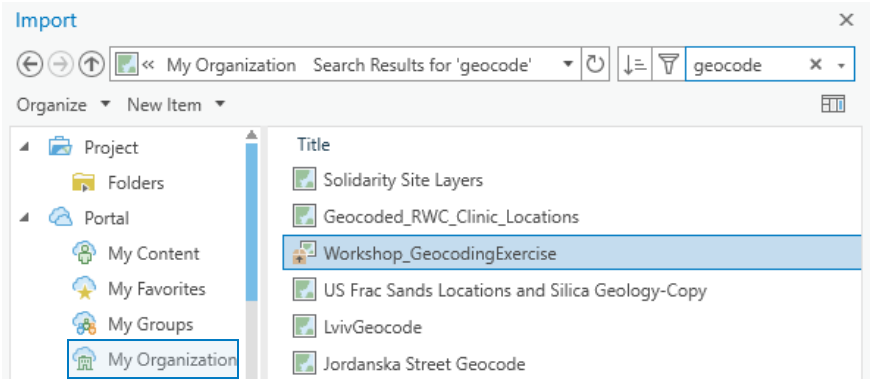


Adding a Map



ArcGIS Pro and ArcGIS Online allow us to not only share data, but fully formatted maps as well. Let's import the map and data for our project.

1. Click the **Insert** tab and click **Import Map**.



2. We want to search for Map Packages on UVA's ArcGIS Online site. Under **Portal** select **My Organization.**

*** On older versions of Pro, under **Portal**, select **All Portal.** On the top, far right of the dialog, click the small **Search My Organization** button.

3. In the search box, type **"Geocode Workshop"** and hit Enter. Click **Workshop_GeocodingExercise** and click **OK.**

Take a moment to look at the layers. You'll see typical spatial layers representing road centerlines and VA counties. You'll also see two CSV files represented as Standalone Tables. ArcGIS Pro allows us to add tabular data in addition to spatial layers. This can be in the form of Excel spreadsheets, CSV files, database tables, and more.

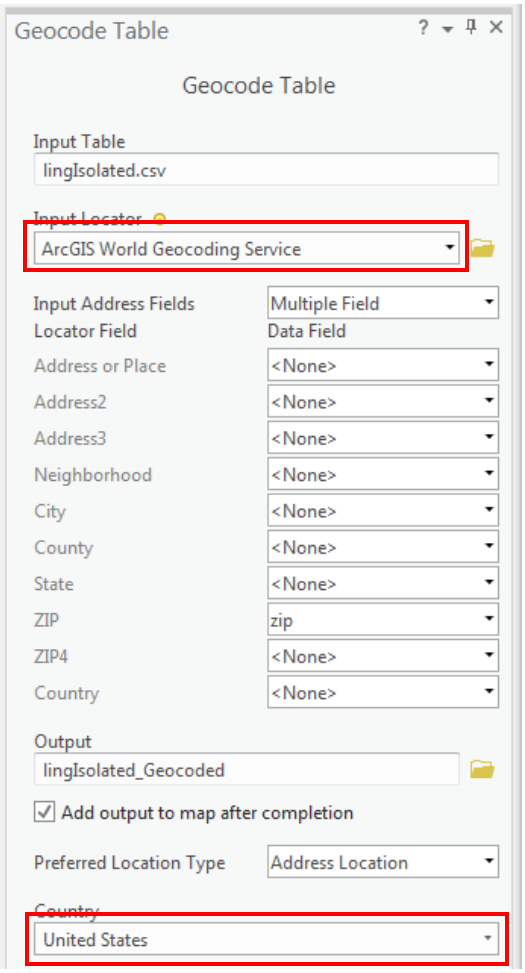
Geocoding Zip Code Data

Scenario: We have US Census counts of the number of households where no English is spoken, i.e. linguistic isolation. Due to privacy concerns, the households have been aggregated to the zip code level. We would like to visualize these locations on a map. In Pro we'll use the Geocoding tool to map them.

1. Right-click **lingIsolated.csv** and select **Open**. Notice there are only two columns of data one being the zip code. Close the table.

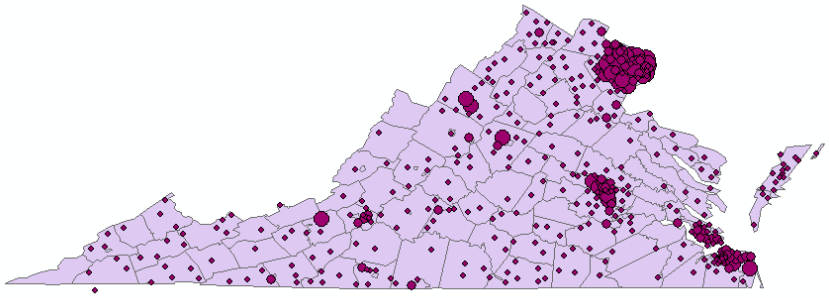
2. Right-click on the table and select **Geocode Table**. You're presented with a guided version of the tool. We're going to set the parameters on our own by clicking **Go to Tool** at the bottom left.

3. Set the parameters as seen in the image to the right, making sure to choose **ArcGIS World Geocoding Service** as the Input Locator and check **United States** in the Country section. Note that the **ZIP** field should already be populated with **"zip"** from our table.
4. Click **Run**.
5. Pro runs the **Geocoding Addresses** task with a 100% match. We're not going to Rematch these points, so click **No**.



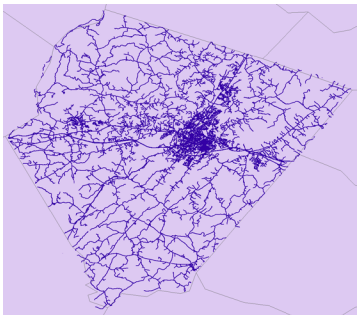
The data appear as points on the map!

6. One visualization technique is to use graduated symbols to represent data values. Right-click on the new layer's name in the **TOC** and select **Symbology.** Choose **Graduated Symbols** from the pull-down.
7. Select **Isolated** for the **Field**.



Geocoding Address Data

Scenario: We are interested in social issues/concerns around the Virginia Alcoholic Beverage Control stores in the Charlottesville area. Our first step is to convert the stores' street addresses to point locations on a map. As before, we're going to use the ArcGIS World Geocoding Service. However, it's possible to create our own service with the provided centerline data. This can be beneficial if using location-specific data, processing a very large dataset, or if iteratively geocoding a list and/or testing a process.



1. Turn off all the map layers except **serviceCenterlines**. Right click on **serviceCenterlines** and choose **Zoom To Layer** to center the map on Charlottesville

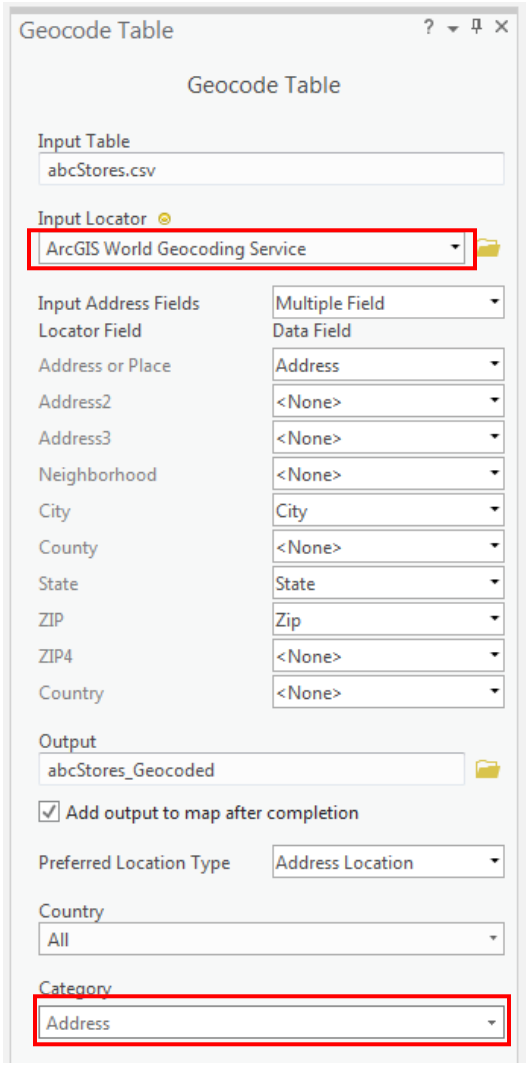
2. Right click **serviceCenterlines** and click **Attribute Table** to become familiar with the street centerline attributes including address ranges. Close the attribute table.

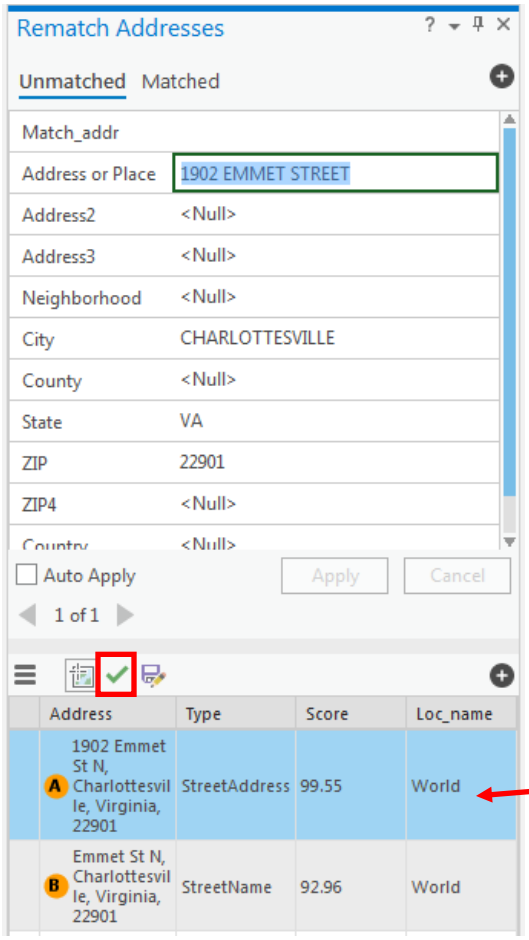
3. Right-click **abcStores.csv** and select **Open** to see Name, Address, City, State, Zip, Sales for the store locations. Close the table.

4. Right click on the **abcStores.csv** address table and click **Geocode Table**. Click **Go to Tool**.

5. Set up the **Geocode Addresses** dialog as shown. Verify that the Input Address Fields have populated properly. This time, check the **Address** group under the **Category** option. Click **Run.**

6. You will notice in the geocoding results that one of addresses did not match. We need to look at this result to see what is happening. Click **Yes**.





The **Rematch Addresses** dialogue will be displayed, and the **Unmatched** addresses tab will be selected. In the top section, we see the Address information from our table. Here, we can fix errors in our address to better find a match. Notice in the **Address or Place** box that there is a typo, "Emit" should be "Emmet Street".

7. In the **Address or Place** box, enter "1902 EMMET STREET", hit the TAB key, and click **Apply**. The system will search for matching addresses, which will be listed in the lower section.

8. Select the top result in the lower section, and click the Green Checkmark to Match the new address. This location will be moved to the Matched list, and the **Unmatched** tab will disappear.

In this case, we selected the first option. However, if there are multiple possible results, you can select each result to zoom in and verify the location. When the Checkmark is clicked, the selected result will be accepted and will be marked as Matched. **Close** the Rematch tool.

9. Uncheck the centerline layer. Right-click **abcStores_Geocoded**, click **Zoom To Layer**. Note: you can also review the Matched addresses. While the Rematch tool shows us the fields from the input table, the geocoding process adds a large amount of additional processing information. These additional fields can be viewed by clicking the plus sign  at the top right of the Rematch Addresses pane. However, with very large datasets, an easier way to view this information is the attribute table of the geocoding result layer.

10. Right click **abcStores_Geocoded**, and click **Attribute Table**.

We'll briefly go over a few of the more useful output fields. The Status column tells you the status of the match. **M** – Matched, **U** – Unmatched, and **T**- Tied. The Score column tells you the estimated accuracy of the result. The World Geocoding Service is very aggressive, and tries very hard to match every record. If it's unable to find a point or street address, it will move out to city or zip code. So, it's a good idea to look at the score of your matched results. If the score is below 85-90%, it's worth verifying the resulting location. The Addr_type column tells you the source of the result. Like the score column, this is a decent measure of success. If the goal is point or street level address results, "Postal" or "Locality" results should be further explored. The link below covers each of these fields in more detail.

Geocoding Links

Geocoding Tutorial
https://pro.arcgis.com/en/pro-app/help/data/geocoding/tutorial-geocode-a-table-of-addresses.htm

Rematching Addresses Tutorial
https://pro.arcgis.com/en/pro-app/help/data/geocoding/tutorial-rematch-addresses-from-a-geocoded-feature-class.htm

What's included in the Geocoding Results?
https://pro.arcgis.com/en/pro-app/help/data/geocoding/what-is-included-in-the-geocoded-results-.htm

U.S. Board on Geographic Names
http://geonames.usgs.gov/

Online Geocoding

Now with your new skills, you can try an online geocoder and compare the results to the above.

https://doc.arcgis.com/en/arcgis-online/reference/geocode.htm

http://www.findlatitudeandlongitude.com/batch-geocode/