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 hang tight at the Sign in with dialogue. We’ll get you set up momentarily.
To begin, click the **Blank** template in the **Create a new project** pane. Give the new project a meaningful 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.**

![Import Map](image1)

2. **We want to search for Map Packages on UVA’s ArcGIS Online site. Under Portal select All Portal. On the top, far right of the dialog, click Search My Organization.**

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

![Search My Organization](image2)

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**.

6. The data appear as points on the map! (you can load these data from the results directory)

7. 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.

8. Select **Isolated** for the **Field**.

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**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.

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**

**Rematching Addresses Tutorial**

**What's included in the Geocoding Results?**

**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.


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