

Class Resources

Class Page

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

Click **Teaching Resources > Spring 2024 Courses**

Library of Congress

<https://loc.gov/maps/collections/>

David Rumsey

<https://www.davidrumsey.com/>

ArcGIS Online (UVA enterprise)

<https://uvalibrary.maps.arcgis.com/>

Georeferencing

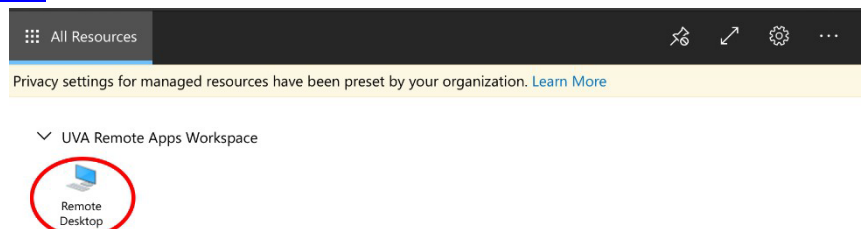
Georeferencing is the process of assigning spatial location to a raster dataset (for example the scanned image of a paper map) so it will align with other spatially-aware datasets for visualization and analysis in GIS software.

The general steps for georeferencing:

1. In GIS software, open your non-georeferenced raster dataset along with an accurate reference basemap.
2. Identify common locations and mark them with control points.
3. Adjust transformation for fit.
4. Commit georeferencing.

Starting Remote Apps

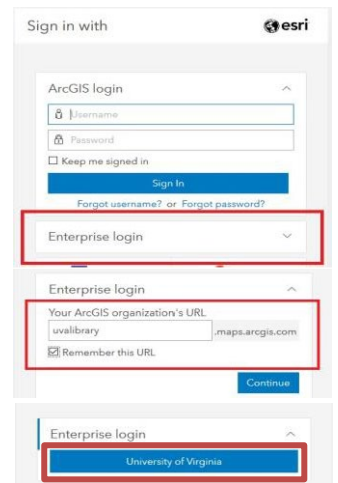
1. Go to <http://remoteapps.virginia.edu/>.
2. Login through Netbadge.
3. Select Remote Apps from the display window.
4. You may be asked to re-enter your Netbadge credentials.
5. Go to **Search** at the bottom of the Windows screen and search for “ArcGIS Pro”.



Logging in to Pro

Open ArcGIS Pro, and login using the UVa Enterprise AGOL.

1. Click **Enterprise Login**.
2. For the organization URL, type “**uvalibrary**”, and click **Continue**.
3. Click **University of Virginia**. You will be directed to NetBadge where you will login as normal.
4. Start a new project in Pro. **New Project > Map**. Give the project a meaningful name.

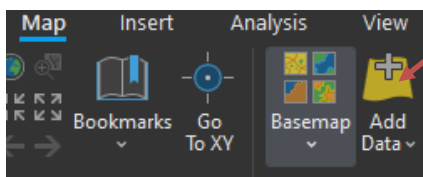
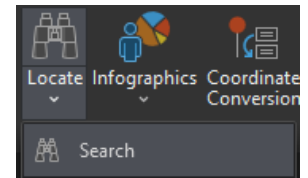


Let's get started!

1. In a web browser (Edge) on **Remote Apps**, go to the class page listed page above.
2. Click **Georeferencing Data** and **Download** the **Georeferencing_ArcGIS_Pro_Data.zip** archive.
3. Open the ZIP file and click **EXTRACT** to unpack all the zipped files to the desktop.

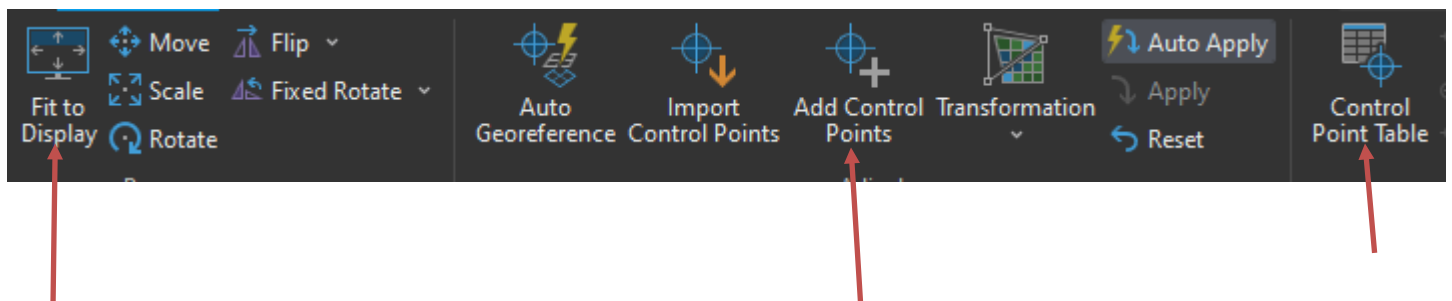
Exercise One: Georeferencing the Pratt Map

1. If you haven't already, open ArcGIS Pro and login with your UVA credentials using the Enterprise option described above.
2. Zoom to UVA by using the Search function, **Locate > Search**.



3. Add the Pratt Map from the download folder by going to the **Map** ribbon and clicking **Add Data**. Browse to desktop directory, select **1858 Pratt Map.jpg**, and click **OK**.

4. Activate the georeferencing toolbar. Select **1858 Pratt Map.jpg** in left-side Contents pane (“Drawing Order”), then select the **Imagery** ribbon and click **Georeference**.



5. On the Georeferencing toolbar, click **Fit to Display** to bring the Pratt Map image into the current view.

6. Use the **Add Control Points** tool to add common reference points. Add the control point to **I858 Pratt Map.jpg** first, then find the corresponding location on the base map and add the second control point. Pro will prompt you which layer you should be marking at the time.

The first control point shifts the layer. The second rotates and scales. More distributed control points make the map fit better.

Made a mistake when placing a control point? Open the **Control Point Table**, highlight the offending point and delete it. Or check/uncheck it to see how big an effect it has on your image.

Map: plat.jpg

7. Change the “fit” using the **Transformation** button to select different transformations.
8. Once satisfied, you can commit your changes using the **Save** button on the **Georeferencing** toolbar. This writes a world file to the image directory.

Note: If you don’t save, you’ll lose your work. Make sure to save your georeferencing!

9. Share your new layer to ArcGIS Online by right clicking on the layer and selecting **Sharing > Share as Web Layer**.
10. Give your new web layer a Name and optional Summary and Tags.
11. Select **Tile** from **Layer Type**.
12. Click **Publish**.

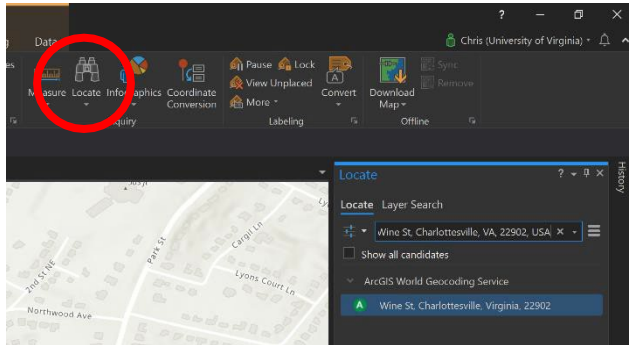
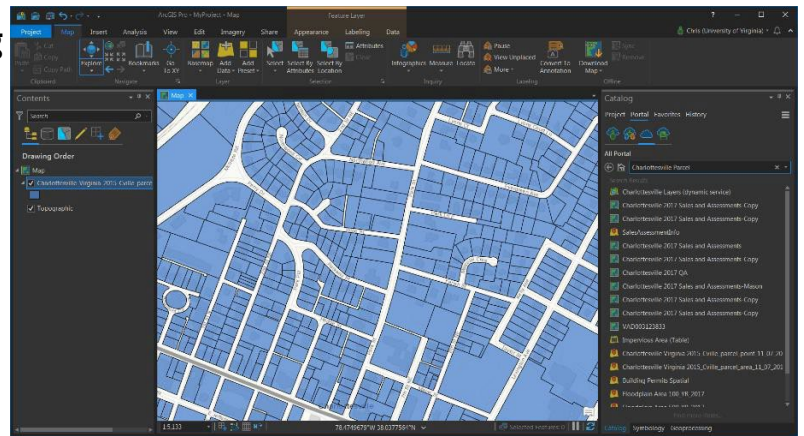
Your new layer will be published to ArcGIS Online, where you can view it when it’s complete.

Note: The system will create tiles of your image, which can take some processing time. It’s not unusual after publishing a tile layer for that layer to be blank when added to a map.

Exercise Two: Georeferencing subdivision plat

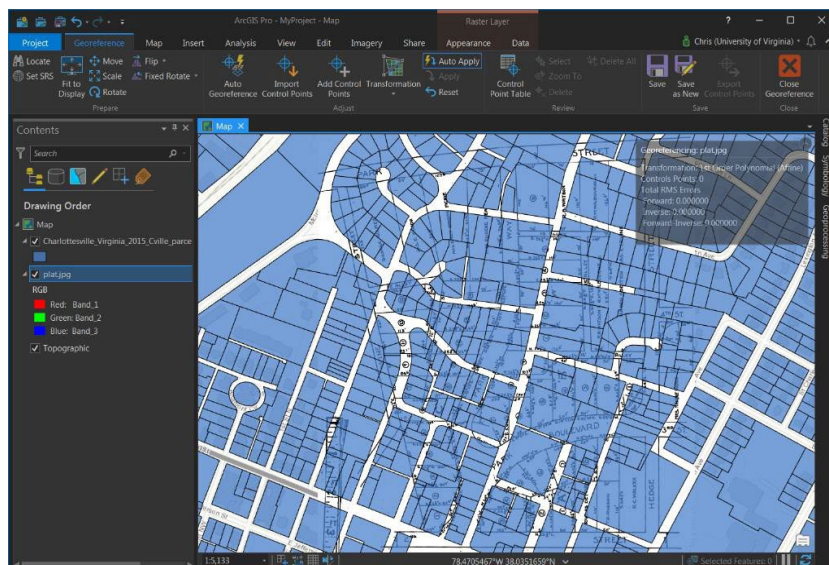
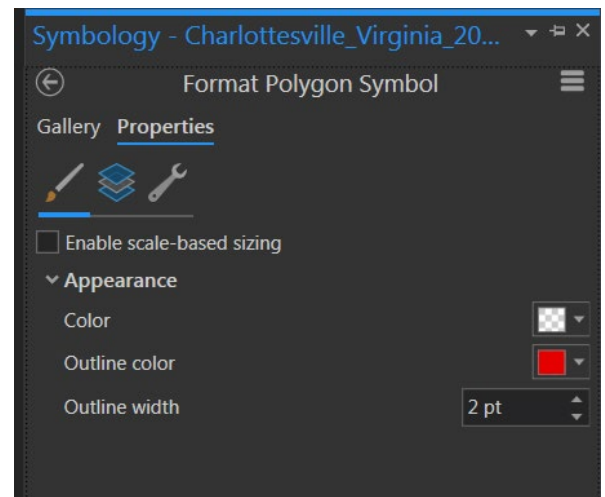
1. First, we need base data. What better to use than the current parcel boundaries? Luckily, we have Charlottesville parcel boundaries available through ArcGIS Online.

2. Go to the **View** ribbon and click **Catalog Pane**. Feel free to dock the Catalog in a more convenient location.
3. In **Catalog > Portal > My Organization > Search** “Charlottesville Parcels.”
4. Find the 2015 parcel area layer and add it to the map by dragging and dropping.



5. Zoom into the interest area in North Downtown using the **Search** tool. **Locate > Search** for Wine St.

6. We would like to be able to see the parcel layer and make the boundaries stand out. Change **Symbology** to be hollow with a red outline. Right-click on layer name > **Symbology**.



7. Add the parcel subdivision map from the downloaded folder. **Map > Add Data > browse** to desktop directory > choose **plat.jpg** and click **OK**.
8. Activate the georeferencing toolbar. Select **plat.jpg** in the **Contents > Imagery > Georeferencing**.
9. Use the **Fit to Display** button to bring plat.jpg into the current view.

Note: **plat.jpg** is rotated 90 degrees. Remember we can rotate as we add control points.

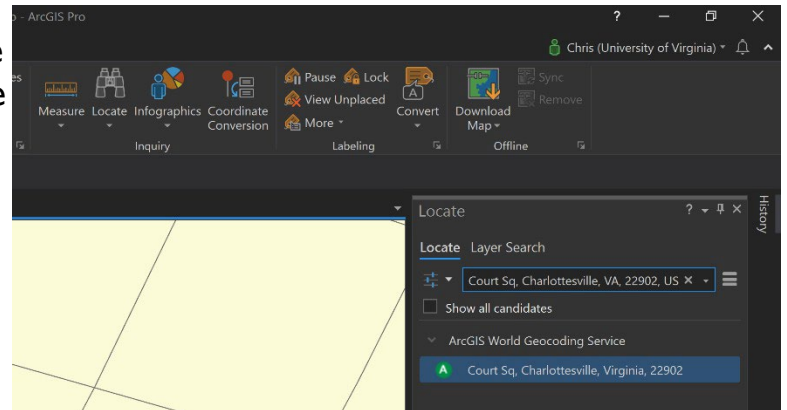
10. Use the **Add Control Points** tool to add common reference points. Work from **plat.jpg** to base data. Pro will prompt you to which layer you should be marking at the time.

Want to get exactly on the corner of a parcel vector? Turn on **Snapping** on, on the lower bar under the map.



Exercise Three: Georeferencing Johnson Map

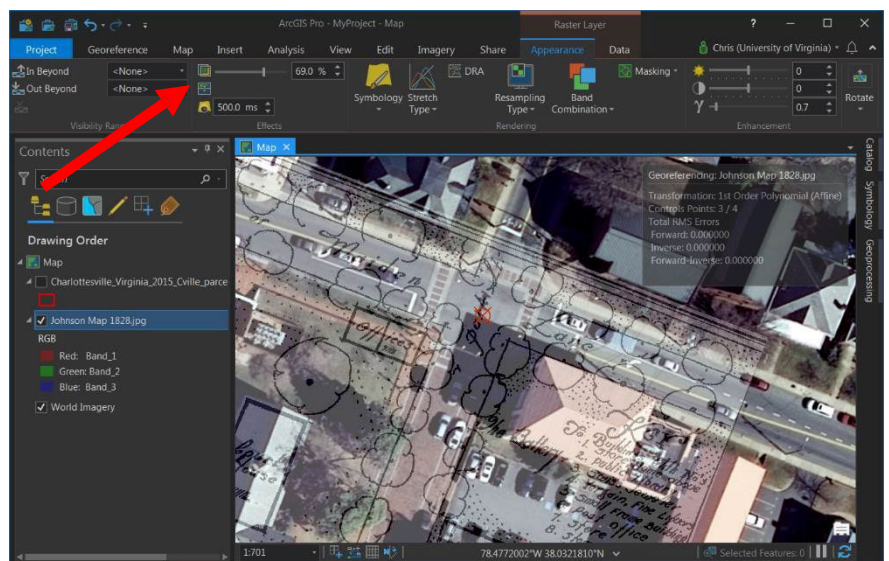
Sometimes, you cannot use exact features like the corners of parcels. Because drawings were not accurately drawn, or conditions have changed, you may need to estimate locations. The Johnston map is a good example of both. Most of the buildings represented on the map no longer exist and street corners are slightly off. For these reasons, estimating the center of the intersections for control points seems to work best. Work through the georeferencing process for the Johnson map.



1. Zoom to Court Square by using the **Search** function. **Locate** > **Search**.
2. Add Johnson map to Pro project using **Add Data** button.
3. Change basemap to imagery. **Map** ribbon > **Basemap** > **Imagery**.
4. Activate **Georeference** toolbar. Highlight Johnson Map > **Imagery** > **Georeference**.
5. Add control points using the **Add Control Points** tool. You must estimate the centers of all the intersections.

Does the courthouse line up? Turn on transparency of Johnson Map to find out.

6. With the Johnson Map layer selected, go to the **Raster Layer** ribbon > **Transparency**.



More Georeferencing Fun

Overview of Georeferencing

<http://pro.arcgis.com/en/pro-app/help/data/imagery/overview-of-georeferencing.htm>

ArcGIS Pro Georeferencing tools

<http://pro.arcgis.com/en/pro-app/help/data/imagery/georeferencing-tools.htm>

Google Earth Georeferencing: <https://support.google.com/earth/answer/148099?hl=en>

Online Georeferencing: New York Public Library: <http://maps.nypl.org/warper/>

About These Maps

Jordy Yager of the Jefferson School African American Heritage Center provided the subdivision map. He collected it as part of his research into racial covenants in Charlottesville neighborhood development. These properties were restricted to whites only.

<https://mappingville.home.blog/>

The Johnson map is from UVa Library's special collections and highlights an African American business and residential district that was raised in order to build the park for the Stonewall Jackson statue.