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.

Class Page
http://guides.lib.virginia.edu/gis
Click Teaching Resources > Fall 2019 Courses

Open ArcGIS Pro, and login using the appropriate 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.
Exercise One: Georeferencing subdivision plat

First, we need base data. What better data to use than the current parcel boundaries? Luckily, we have Charlottesville parcel boundaries available in ArcGIS Online, along with the rest of our data and bookmarks, in a Project Package.

1. Click **Open an existing Project**
2. Click **Portal > Browse**

3. We want to search for projects on UVA’s ArcGIS Online site. Under **Portal** select **All Portal**. On the top, far right of the dialog, click the small **Search My Organization** button.
4. In the search box, type “**ARTH 4591**” and hit Enter. Click the **ARTH 4591 Georeferencing** package and click **OK**.
5. On the Map ribbon, click **Bookmarks > Parkway**.

6. Activate the georeferencing toolbar. Highlight **ParkwayPlat.jpg** in the **Contents** pane. Select the **Imagery** tab and click **Georeference**.

7. On the Georeference ribbon, click the **Fit to Display** button to bring **ParkwayPlat.jpg** into the current view.

8. Use the **Add Control Points** tool to add common reference points. Work from **ParkwayPlat.jpg** to base data. Pro will prompt you to 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 will make the map fit better.

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

Make a mistake when placing a control point? Open the Control Point Table and uncheck the box next to the offending point or highlight it and delete it.
9. Change the “fit” using the **Transformation** button to select different transformations. Compare the RMS errors.
10. Once satisfied, you can commit your changes using the **Save** button. This writes a world file to the image directory.

**Exercise Two: Georeferencing an historical 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. This historical map of Athens is a good example of both. Work through the georeferencing process for the Athens Map.

1. Uncheck the box next to the Parkway Map and the Parcels and check the box next to the Athens Map.

While we could try to work with a current basemap, we'll have better luck working with an existing historical map.

2. Click the **Add Data** button, on the **Map** ribbon. We want to search for layers on UVA’s ArcGIS Online site. 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 “FrantzTravlos5thCent” and hit Enter. Click the **Tile Layer (Hosted)** dataset and click **OK**.
4. On the **Map** ribbon, click **Bookmarks > Athens**.

5. Activate **Georeference** toolbar. Highlight FrantzTravlos5thCent > Imagery Tab > Georeference. Click **Fit to Display**.
6. Add control points using the **Add Control Points** tool. Use the corners of recognizable landmarks as control point locations

Does the map line up? Enable transparency on the Athens Map to find out.

5. On the **Appearance** tab, move the transparency slider.

6. When you’re done, click **Save** on the Georeference ribbon.
More Georeferencing Fun

Overview of Georeferencing

ArcGIS Pro Georeferencing tools

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

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

Charlottesville Historic Trolley:

About The Map

Jordy Yager 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://mappingcville.home.blog/

https://www.cvilletomorrow.org/specials/friendship-court/