Introduction to ArcGIS Pro I

S4 GIS Institute

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Introduction

This tutorial introduces the basic functionality of ArcGIS Pro. Before we begin, please download the tutorial data file `gisintro_sampledata.zip` from the Canvas GIS Institute page. Save it on your desktop or in the downloads folder for now. After launching ArcGIS Pro you will need to be connected to the internet so you can log into the software using your ArcGIS Online credentials, obtained through Brown's ESRI site license.

This and subsequent tutorials will cover the basics. For additional reference, visit the following sources:

ArcGIS Pro Getting Started :
`https://pro.arcgis.com/en/pro-app/latest/get-started/get-started.htm`

ArcGIS Pro Quick Start Tutorial :
`https://pro.arcgis.com/en/pro-app/latest/get-started/pro-quickstart-tutorials.htm`

ESRI Academy Course Catalog : `https://www.esri.com/training/catalog/search/`

Conventions used in this tutorial:

- Summaries of steps appear in **bold face**.
- Names of windows, tabs, and tools appear in *italic face*.
- Names of files, layers, and fields appear in `typewriter face`.

Notes on Sample Data

The sample data for this tutorial includes GIS data files for the locations of all public libraries in Rhode Island (from the Institute of Museum and Library Services Public Library Survey), census tracts in Rhode Island and counties in the US (from the US Census Bureau's Cartographic Boundary Files), and basic demographic data from the Census Bureau's 5-year American Community Survey. While public libraries serve all constituents in their communities, studies show that children and seniors tend to be particularly frequent library users. Libraries rely on census data for understanding their constituents and purchasing / providing relevant services and materials. In this tutorial and the ones that follow, we will use this data to showcase the basic features of ArcGIS Pro.

1 The ArcGIS Pro Interface

This section will familiarize you with the ArcGIS Pro interface.

1. **Launch the software**: Open the *Start Menu* in Windows, select the *ArcGIS* folder, and select *ArcGIS Pro* to open the software.

2. **Log in**: On the ArcGIS Pro Start Page, make sure that you are logged into your ArcGIS Online account; sign in in the upper-right hand corner of the screen.

3. **Start page**: The Start page is divided into three areas: a list of recent projects on the left, blank templates for starting a new project in the middle, and educational resources on the right. In the middle area, click on *Map* to start a new, blank project. Name your project `gis_introduction` and save it in the default user folder. Note: once created, project files can *not* be renamed. ArcGIS Pro will launch.

4. **Interface**: ArcGIS Pro's interface is divided into three sections: on the left is the *Content* pane, which shows you a list of layers in your project. In the middle is the *Map* view, which shows a visual image of your map layers; by default a topographic web map is displayed as a base map. On the right is the *Catalog* pane, which you can use for exploring data and other content stored on your file system. It is possible to add multiple views to Pro, so you will have tabs of views in the middle of the screen that you will toggle through. As you click on particular tools and features, the *Catalog* pane on the right may be temporarily swapped out with a different pane.

5. **Ribbon and tabs**: ArcGIS Pro employs a ribbon interface similar to many Microsoft Office products. Tools are logically grouped together under various tabs, and those tabs provide buttons and links for accessing different tools and features. Some of the tabs are constant, while others only appear when a particular layer is selected or a specific view is open. Click on the various tabs to explore their content. Select the `Topographic` map in the *Contents* pane, and notice that a context-dependent *Appearance* tab appears.

6. **Map tab and zoom**: Click on the *Map* tab. The *Explore* button allows you to pan and zoom around the *Map* view with your mouse. Hold the left mouse button down, and drag the cursor around the map to pan. Use the mouse wheel to zoom in and out (or, use the fixed zoom buttons that are beside the *Explore* button). Notice how the resolution and detail of the base map changes as you zoom.

7. **Explore base maps**: The base map is a raster layer accessed via the internet. It provides context for your project's layers. On the *Map* tab ribbon you can hit the *Basemap* button to select different maps. Experiment with this, and then return to the `Topographic` map.

Interface Summary

1. **Contents pane**: lists layers in the project.

2. **Map view**: visual depiction of active layers. Multiple views of different types can be added to this area and accessed via tabs.

3. **Catalog pane**: easy access to content and file system associated with the project. This pane can be replaced with other panes as needed.

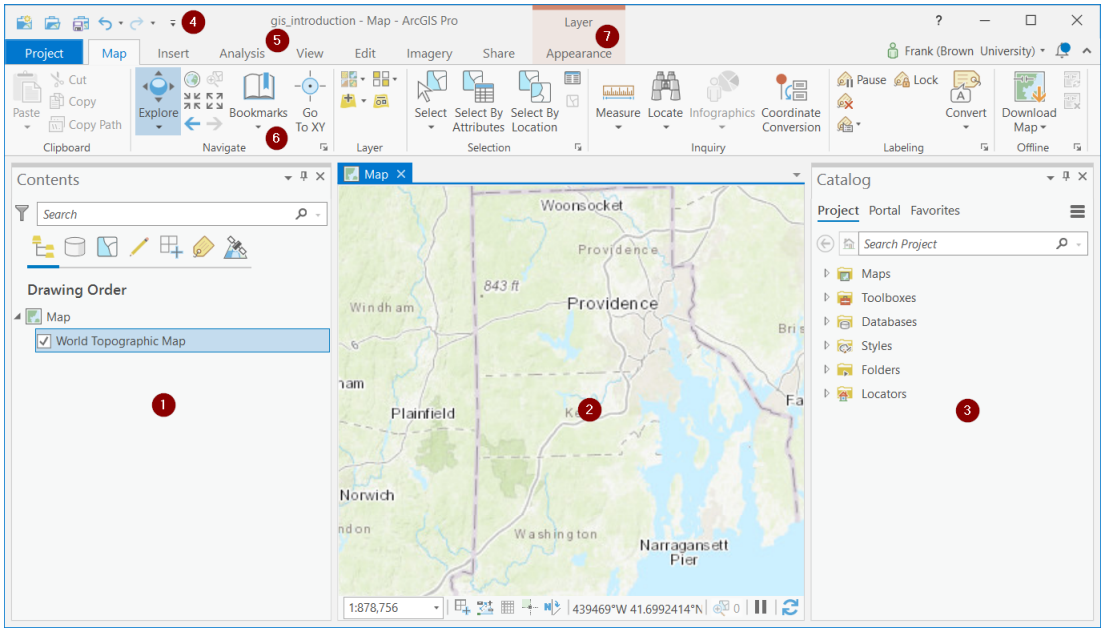
4. **Quick tools**: shortcuts for saving projects and un-doing and re-doing actions.

5. **Permanent tabs**: used for accessing a specific ribbon of tools.

6. **Ribbon**: groups of thematically related tools. Tools are subdivided into groups, and in some cases additional options are available via dropdowns and call outs.

7. **Context dependent tabs**: only appear when specific actions are taken, such as activating a specific layer or accessing a specific view.

To reset panes to their original configuration, click the *View* tab on the ribbon and select *Reset Panes - Reset Panes for Mapping*.

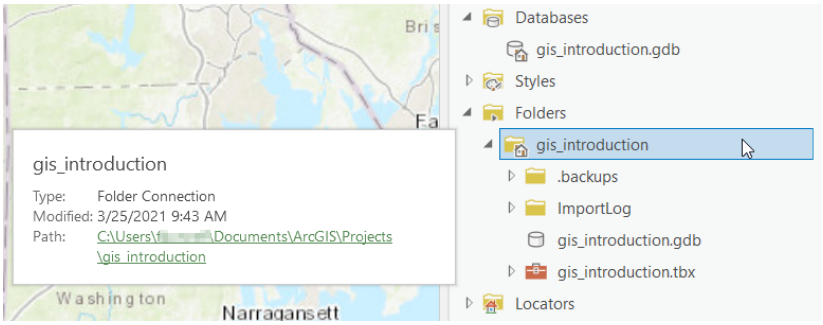


2 Using the Catalog

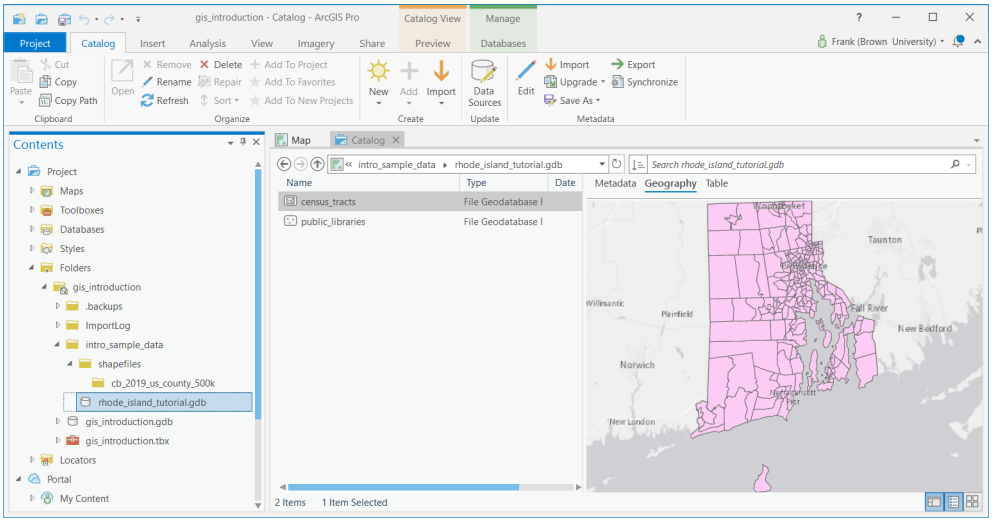
The catalog is useful for previewing your data files prior to adding them to a project, and for renaming and organizing your files. Use the catalog rather than than the MS Windows File Explorer for these tasks.

1. **Explore the Catalog pane**: In the *Catalog* pane on the right, hit the down arrow beside the *Databases* icon. You will see the `gis_introduction.gdb`, which is the geodatabase for this project; it was created automatically when you created the project, and is the default destination for storing files you create. Click the down arrow beside the *Folder* icon. This displays all folders on your file system that are part of this project; the default project folder is shown. If you want to add any other data to your project, you need to move it into this folder, or connect to another folder by selecting the *Folder* icon, right clicking, and adding a new folder.

2. **Add tutorial data**: To insure that all the pieces for your project stay together, let's add data to our project folder rather than connecting to another folder. Select the `gis_introduction` folder. In the pop-up window, click on the path to the folder. This opens the MS Windows file explorer. Take the tutorial data that you downloaded and move it into this folder. Next, select the file, right click, and extract or unzip the file. Then return to Pro, select the `gis_introduction` folder, right click, and hit the refresh button. You should now see the new `gisintro_sampledata` folder, and if you select the down arrows to expand each of its subfolders and the geodatabase you will see some features in each.



3. **Preview files in the catalog**: Click the *View* tab, and select the *Catalog View* button on the ribbon. This adds a new tab to the central view portion of the screen. The catalog is used for exploring and previewing the properties of GIS data files. Note that the *Content* pane on the left has changed to reflect this new view. In the *Content* pane, drill down into the `gis_introduction - gisintro_sampledata` folders and click on the `rhode_island_tutorial` geodatabase. This displays two feature classes in the database in the *Catalog* view: `census_tracts` and `public_libraries`. Select the tracts layer in the view, and you will see metadata describing the layer on the right. You can cycle through previewing metadata, geographic features, and the attribute table. To see the info more clearly, you can close the *Contents* pane (not the view) on the far right, as it's duplicates this view. Explore the features in the database, as well as the files stored in the folders.



4. **Preview properties in the catalog**: Select the `census_tract` features in the *Catalog* view, right click, and choose *Properties*. Under the *Source* tab expand the sections for *Data Source* and *Extent*. The former will give you details about the features and where they are stored, and the latter provides information about the spatial reference system (SRS) of the features. Layers with the same SRS can be overlaid in a map and used in the same analysis; if the layers have different systems you will run into trouble. Explore the properties of each of the two geodatabase features and the shapefiles.

5. **Connect to a database and change the deafult**: Instead of using the default `gis_introduction` database, we're going to make the `rhode_island_tutorial` database our default. First, establish a connection to it by clicking on the *Databases* folder in the *Contents* pane, right click, and *Add Database*. Drill down into the `gisintro_sampledata` in the `Projects` folder and select the `rhode_island_tutorial` database. Once it's added to the *Contents* pane, select it, right click, and choose *Make Default*. Now, each time we create new files, this database will be the default output location. Final note: this section of the *Catalog* view can be used for importing shapefiles and tables into a geodatabase, and for exporting feature classes out of database as shapefiles or tables.

6. **Return to the map view**. Click on the *Map* tab that appears just above the view window to return to the *Map* view. If you would like to restore the *Catalog* pane that we closed, go to the *View* tab on the ribbon and select *Reset Panes - Reset Panes for Mapping*. Otherwise, you can keep it closed, and if you want to access the catalog again you can tab back to the *Catalog* view as opposed to the pane.

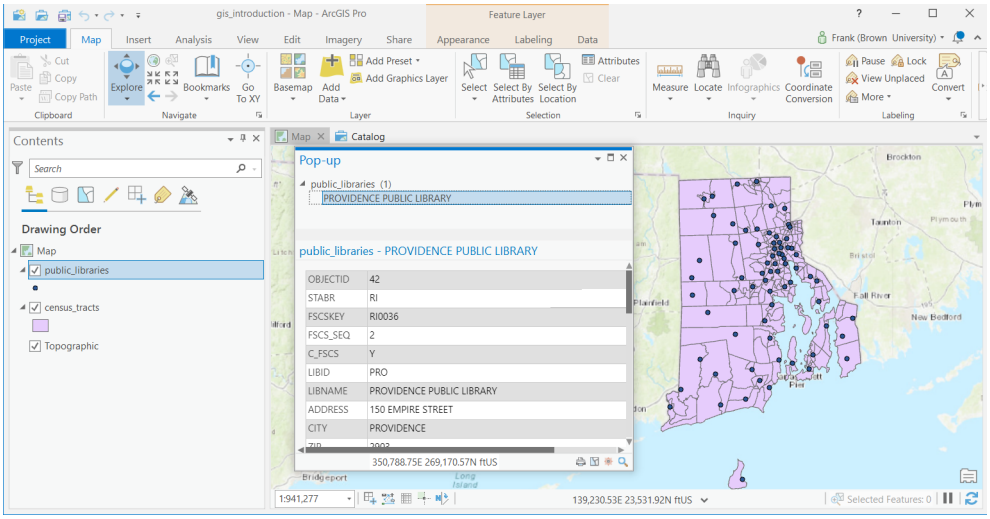
3 Add Data to Your Map

There are several ways you can add data to a map; this section demonstrates one way, and illustrates the basics for exploring and interacting with data layers.

1. **Add layers to the project**: Go the *Map* tab on the ribbon and hit the yellow *Add Data* button. Drill down into the *databases* and into the `rhode_island_tutorial` database, hold down the control key and select both the `census_tracts` and `public_libraries` feature classes and hit *OK*.

2. **Explore layers in content pane**: The layers are added to the *Content* pane and are drawn in the *Map* view, and the view is transformed to take the SRS of the first layer added to the project. In the *Content* pane you can uncheck and check the boxes to turn a layer on and off. If you select the bottom layer and drag it over the other, the drawing order of the layers changes. In this case, the libraries must be on top of the census tracts; otherwise the tracts will cover them up and they won't be visible. *Drawing Order* is the default display on the *Content* pane. Selecting one of the other icons will display alternate info; for example, the grey *Data Source* cylinder will indicate where the data is stored.

3. **Identify specific features**: On the *Map* tab hit the blue *Explore Data* button. Zoom into the map a little and click on a library. This will open a window that displays info about the library stored in the layer. Click on a census tract, and you will see info about the tract.



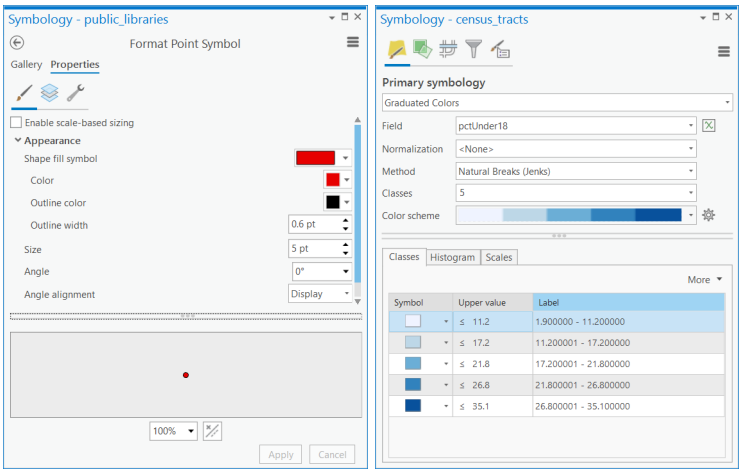
4. **View an attribute table**: To see where this data is coming from, select the `public_libraries` layer in the *Contents* pane, right click, and select *Attribute Table* in the menu. The table will open below the map, but you can pull out the window to undock and expand it to see it better. Scroll over and explore the table. If you select a column and right click, a number of options appears. For example, click on the `CITY` field. You can sort the cities alphabetically, or run some statistics to county records by city (if you do the latter, a new pane will appear in our project, and a new chart object appears in our layer list; when you are finished you can remove them both). When you are finished, close the table.

5. **Select some features**: On the *Map* tab, hit the *Select* button. Click on a census tract in the *Map* view to select one. Then, while holding down the shift key, select a couple of additional tracts. Then, select `census_tracts` in the *Contents* pane, right click, and open the *Attribute Table*. Scroll through the table, and you will see the tracts you selected highlighted in blue. You can select features in the map and highlight them in the table. You can also do the opposite; select a row in the table, and the feature will be highlighted on the map. When finished, close the table, and in the *Selection* portion of the ribbon, hit the small *Clear Selected Features* button.

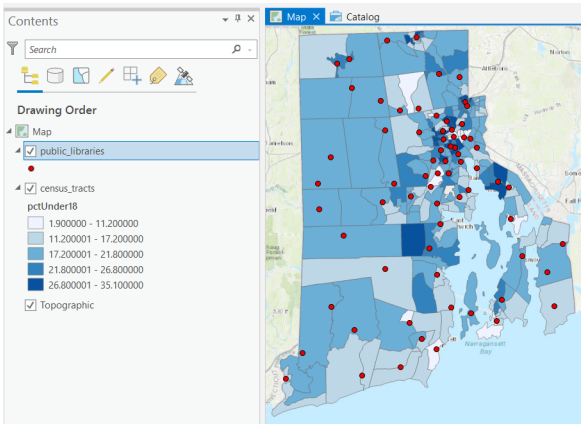
4 Symbolize Layers

All layers that you add are symbolized as single symbols. You can modify how these symbols are displayed, and can map data in the attribute table as categorized or graduated symbols (for qualitative and quantitative data respectively).

1. **Symbolize public libraries**: Select the `public_libraries` layer in the *Contents* pane to activate it. Select the *Appearance* tab on the ribbon and hit the yellow *Symbology* button. This opens the *Symbology* pane. Click on the circular library symbol for format it. On this next pane, you can choose from a number of different symbols under the *Gallery* option. Instead, click on the *Properties* option to format the basic properties of the existing symbol. Try changing the color of the fill, make the outline of the circle a little thinner, and make the circle size a little larger. Hit the *Apply* button, then close the window.



2. **Symbolize census tracts**: Open the *Symbology* pane for the `census_tracts`. Change the dropdown option from *Single Symbol* to *Graduated Colors*. In the *Field* dropdown, change the option from `ALAND` which is mapping the tracts by size of land area to `pctUnder18`, which is the percentage of the population under 18 years old. Hit the *Color Scheme* dropdown to choose a different scheme (choose an option that goes from light to dark using a single shade of colors; oranges, greens, blues, etc). Under the *More* dropdown, select *Format All Symbols*, change the outline width to make it a little thinner, and hit *Apply*. Hit the back arrow button to return to the main symbology screen. Note some of the other options that you can modify here. When finished, close the *Symbology* pane and examine your map.



3. **Save your project**: Hit the quick save button in the upper left hand corner of the screen.

5 Project Files

By default, all ArcGIS Pro projects in MS Windows are stored under the user's `Documents` folder, in a subfolder called `ArcGIS` that has subfolders named for each project. The actual project file has the extension `.aprx`. This file contains links to all databases and files in the project, and stores the map extent, symbolization, layer order, views, pane configuration, all map layouts. The project file

does *not* contain your data or databases, it simply contains links to them. For this reason, you cannot share the project file alone with someone else; the connections to the data sources will be lost and nothing will be displayed. To share projects, you must share the *entire project folder*. For this reason, it's good to be organized and to save all your data and outputs in the project folder, to insure that you can transfer it if you need to. For more information about project files and management, visit:

`https://pro.arcgis.com/en/pro-app/latest/help/projects/what-is-a-project.htm`

ArcGIS Pro project files cannot be opened in the older ArcGIS Desktop platform or in open source GIS packages. Most data sources (shapefiles, geopackages, rasters) are cross-platform and can be used in any software. ArcGIS geodatabases (which look like folders in your MS Windows file system) can be used with some versions of ArcGIS Desktop and previous versions of Pro, but there can be issues with backward compatibility as the format changes over time. You can always export feature classes out of a database as shapefiles or tables in the *Catalog* view, if you wish to use them in other GIS packages.

6 Experiment on Your Own

The next lessons in the seminar will delve into spatial reference systems and cartography, and then queries and analysis. Now that we have covered the basics, here are some things to try on your own:

1. Explore the different tabs and panes in the interface.
2. Try the different feature selection methods.
3. Experiment with different single symbols for mapping the public libraries.
4. Try mapping the public libraries as categorical variables. `C_OUT_TY` is the library outlet type (CE = Central Library, BR = Branch Library, BS = Bookmobile) while `FSCSKEY` identifies libraries that are part of the same system.
5. Try mapping the public libraries as graduated circles, based on square footage or the number of hours the library is open per week (these variables are in the attribute table).
6. Experiment with mapping the population that is 65 and over by `census_tract`.