Instructions for Installing and Running *MF-W0476572_GISY6060-Assignment5.ipynb*

INTRODUCTION
My submission for GISY 6060: Assignment 5 – Putting It All Together is an ArcGIS Notebook I aptly named *MF-W0476572_GISY6060-Assn5.ipynb*.

These instructions will introduce you to the installation of ArcGIS Pro and ArcGIS Notebooks on your local computer, if you do not already have these programs installed. Next, it will show you how to clone environments within ArcGIS Pro. It will show you where to unzip the folder containing the ArcGIS Notebook. Finally, it will show you how to use the Notebook.

The term *Notebook* refers to Jupyter Notebook, an open-source web application that enables you to create and share documents that contain rich text, equations and multimedia, alongside executable code, and visualization of analysis outputs.

ArcGIS Notebooks are Python Notebooks that are well-integrated within the ArcGIS platform. ArcGIS Notebooks combine the ArcGIS API for Python and ArcPy in combination with thousands of open-source Python libraries to enhance your analysis and visualization.

ArcGIS Notebooks come pre-installed with ArcGIS Pro and ArcGIS Online. However, a subscription – either a personal or organizational account – is needed to access the ArcGIS Notebook feature in ArcGIS Pro and ArcGIS Online.

Materials and Technology Required:
- *Required:* ArcGIS Pro 2.9+ recommended (2.5+ minimum)
- *Recommended:* ArcGIS Online subscription account with permissions to use advanced Notebooks and GeoEnrichment
- *Optional:* Notebook Server for ArcGIS Enterprise 10.7.1+
  Notebook Server for ArcGIS installation guide for administrators:
  https://enterprise.arcgis.com/en/notebook/latest/install/windows/welcome-to-the-arcgis-notebook-server-install-guide.htm

Data:
All required data is included within the folder.

INSTALLATION
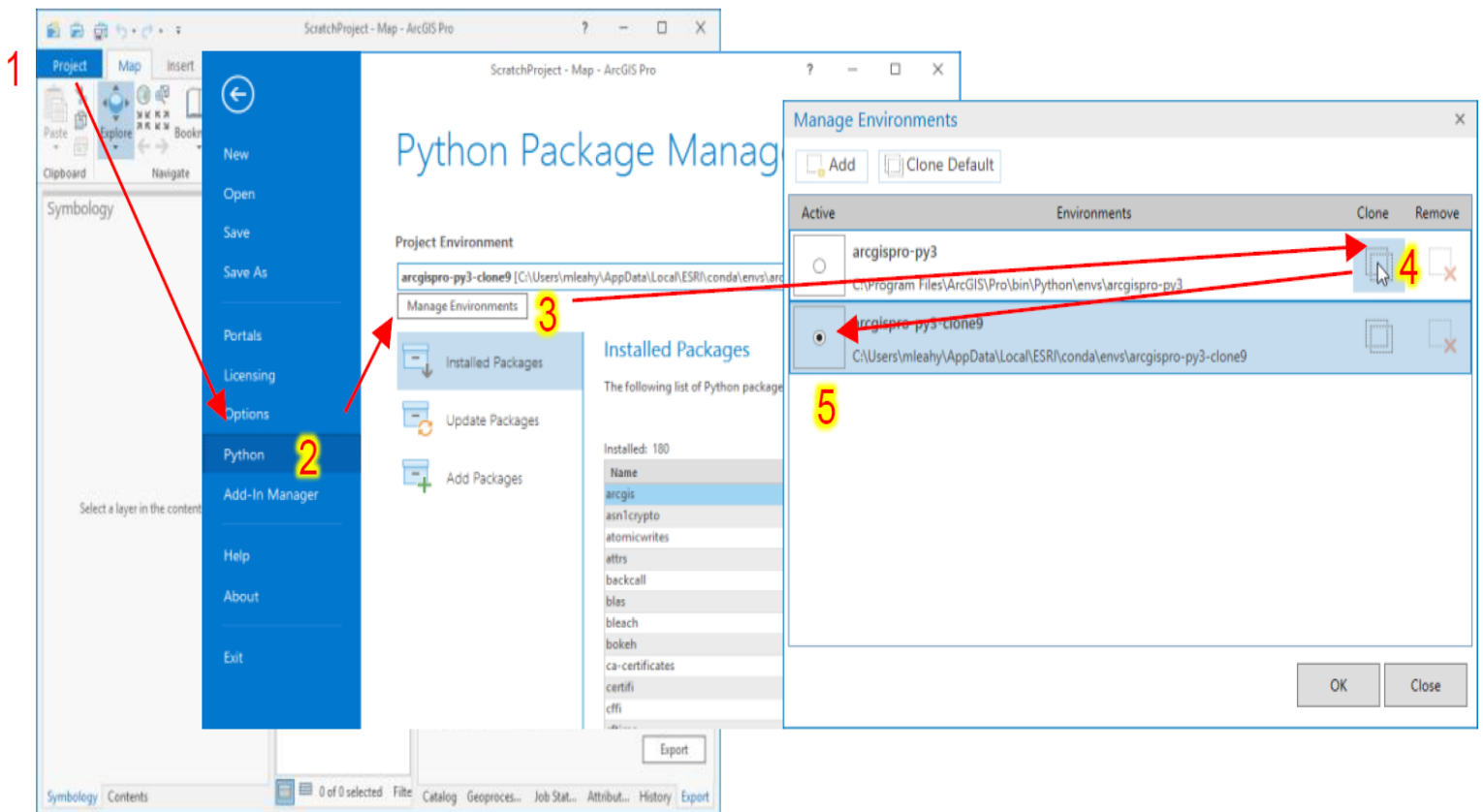
Step 1 – Installing ArcGIS Pro on your local computer:
First, ensure that you have **ArcGIS Pro** 2.9+ recommended (2.5+ minimum).
- *If necessary*: obtain a trial copy of ArcGIS Pro.
  (https://www.esri.com/en-us/arcgis/trial).
- *Optional*: authorize ArcGIS Pro for offline use.
  (https://pro.arcgis.com/en/pro-app/get-started/start-arcgis-pro-with-a-named-user-license.htm#ESRI_SECTION1_15AD453E27C446CE9B51D45C021E8067).

Step 2 – Cloning the default Python environment:
With ArcGIS Pro installed and licensed, prepare a clone of the default Python environment installed with ArcGIS Pro. To do this use the following steps:

1. Open the ArcGIS Pro settings (or when working on a project in Pro, click the **Project** tab on the top left).
2. Select **Python** in the left-hand menu to access the Python Package Manager interface.
3. Click **Manage Environments**.
4. Click the clone button next to the default environment named **arcgispro-py3**.
5. Enter a name for your new environment and click Clone in the following prompt. Wait for the clone operation to complete (this may take a few minutes). Activate your new cloned environment.
6. Close ArcGIS Pro.
7. My Notebook uses the pre-installed Python packages in ArcGIS Pro. No further modification is necessary. No extra Python packages are required.
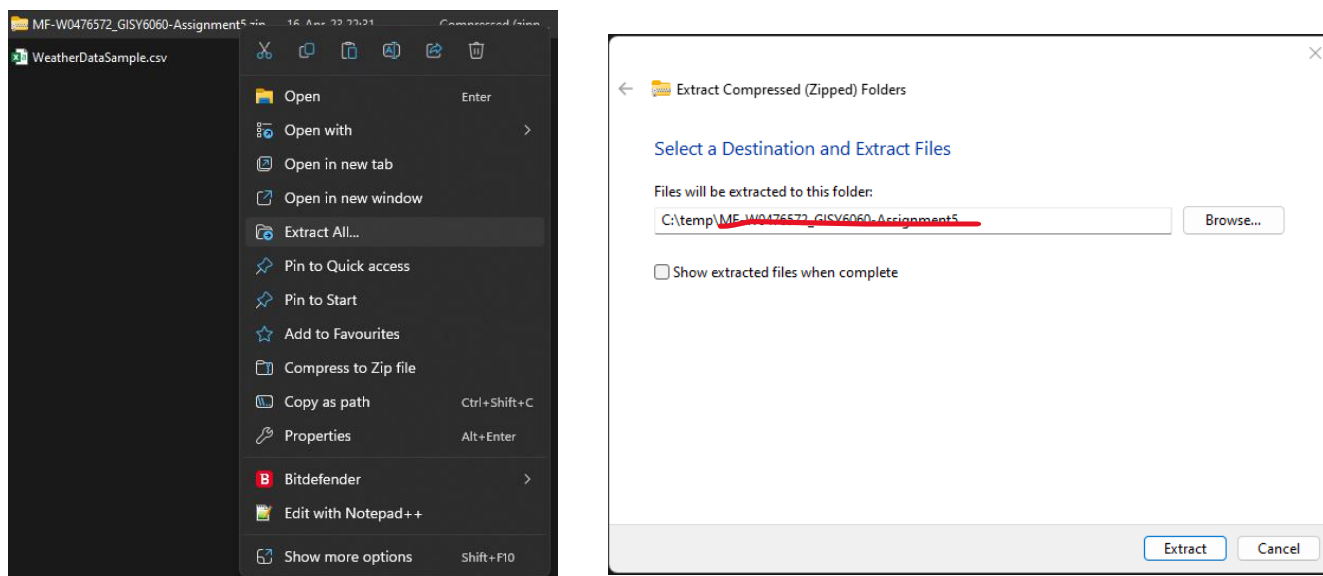

Figure 1: Step 2 represented as a diagram.

Step 3 – Unzipping the Notebook folder to *C:\temp*:
With ArcGIS Pro installed, and the cloned Python environment activated, you are now ready to unzip the folder at the required location. The Notebook has been preconfigured to use a specific file and folder path: **C:\temp**.

1. Download the *MF-W0476572_GISY6060-Assignment5.zip* folder.
2. Copy the zip folder, navigate to the **C:\temp** file path, and paste it inside the **C:\temp** folder. If this folder does not exist, create a folder with the same name (case sensitive) on the C drive.
3. Unzip the folder by **Right-Clicking** the zip folder and clicking **Extract All…**
4. Make sure the destination folder path says **C:\temp** and not **C:\temp\MF-W0476572_GISY6060-Assignment5**. If needed, change the destination to **C:\temp**. Click **Extract** once **C:\temp** has been set as the destination folder.

Figure 2: *Unzip the folder to extract its contents. Make sure the destination folder is C:\temp.*
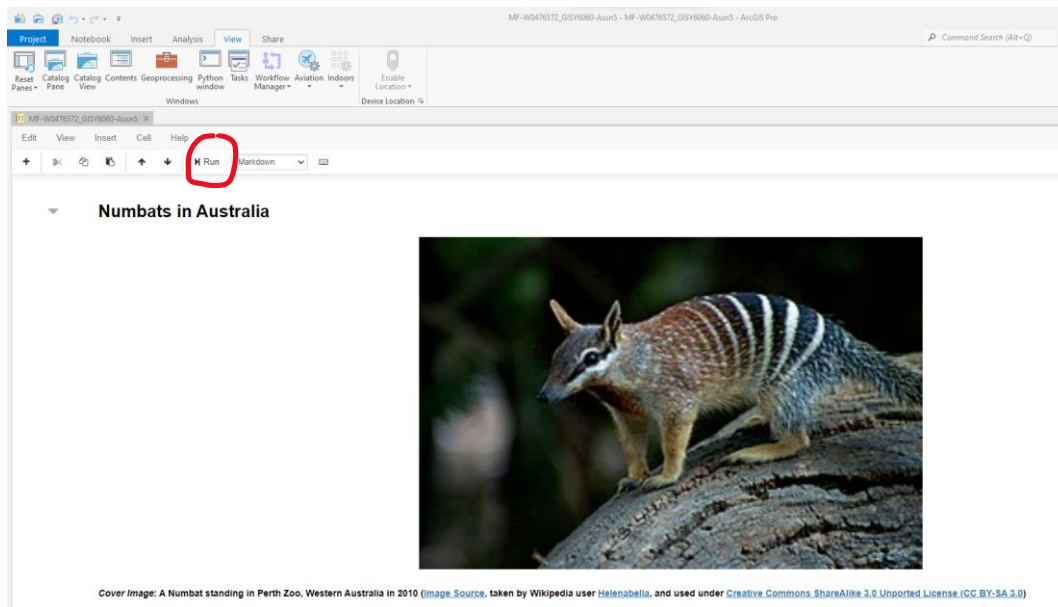
Step 4 – Open the README.txt:
The README.txt contains a description of all the files and folders in the *MF-W0476572_GISY6060-Assignment5*.

1. Open the README.txt file to acquaint yourself with the program and the data.

RUNNING THE NOTEBOOK

Step 1 – Opening the ArcGIS Pro Project and the ArcGIS Notebook:

1. Open the ArcGIS Pro project named *MF-W0476572_GISY6060-Assn5.aprx*. The Notebook will load within the project. You will see a view like the one below.

Figure 3: *The view when the MF-W0476572_GISY6060-Assn5.aprx is first opened. The Notebook will automatically load.*

2. ArcGIS Notebooks consist of Markdown cells, which contain text, images, and videos; and code cells, which contain Python code. To progress through the ArcGIS Notebook, simply **Click** on a cell and hit the **Run** button on the toolbar, next to the **Cell Dropdown menu**. This is circled in red above. (You may also click **Cell ➔ Run All** instead).

3. Progress through the Notebook by hitting the **Run** button but wait for the cell to finish running before progressing to the next task. The figures below show all the possible permutations of a code cell: not executed (***Figure 4***), currently executed (***Figure 5***), successfully executed (***Figure 6***), failed to execute (***Figure 7***).

Figure 4: *A code cell that has not been executed yet, as signified by the empty square brackets to the left.*

Figure 5: *A code cell that is currently executing the code written within the cell, as denoted by the asterix * in the square brackets to the left.*

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```
In [77]:    1  in_features = 'LocalData//CAPAD2020_terrestrial.gdb//CAPAD2020_terrestrial'
            2  out_feature_class = "MF-W0476572_GISY6060-Assn5.gdb//ProtectedAreasFC"
            3
            4  arcpy.management.CopyFeatures(in_features,
            5                                out_feature_class)

Out[77]:
Messages
Start Time: Sunday, April 16, 2023 23:03:17
Succeeded at Sunday, April 16, 2023 23:03:20 (Elapsed Time: 2.53 seconds)
```

Figure 6: A code cell that has successfully finished running, as signified by the number appearing in the square brackets to the left, and the display of the output message below the code cell.


```
In [79]:    1  in_features = 'LocalData//CAPAD2020_terrestrial.gdb//CAPAD2020_terrestrial3'
            2  out_feature_class = "MF-W0476572_GISY6060-Assn5.gdb//ProtectedAreasFC3"
            3
            4  arcpy.management.CopyFeatures(in_features,
            5                                out_feature_class)

-----------------------------------------------------------------------
ExecuteError                          Traceback (most recent call last)
In  [79]:
Line 5:      out_feature_class)

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\management.py, in CopyFeatures:
Line 4223:  raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\management.py, in CopyFeatures:
Line 4220:  retval = convertArcObjectToPythonObject(gp.CopyFeatures_management(*gp_fixargs((in_features, out_feature_class, config_keyword, spatial_grid_1, spatial_grid_2, spatial_grid_3), True)))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing\_base.py, in <lambda>:
Line 512:   return lambda *args: val(*gp_fixargs(args, True))

ExecuteError: Failed to execute. Parameters are not valid.
ERROR 000732: Input Features: Dataset LocalData//CAPAD2020_terrestrial.gdb//CAPAD2020_terrestrial3 does not exist or is not supported
WARNING 000725: Output Feature Class: Dataset MF-W0476572_GISY6060-Assn5.gdb\ProtectedAreasFC3 already exists.
Failed to execute (CopyFeatures).
-----------------------------------------------------------------------
```

Figure 7: A code cell that has failed to execute the code, as signified by the number appearing in the square brackets, and the display of the error message below the code cell.

4. The code cells in the section containing the web-scraping scripts may fail. This is because the because the web-scraping script will be making too many requests to the target website. In this event, skip the web-scraping section, as the images are saved locally.

▼   **Acquire Other Items of Interest via Web Scraping**

Figure 8: The web-scraping section of my Notebook, where the code cells may fail.

5. There are Markdown cells containing images, sources, and YouTube videos. The YouTube videos appear as static hyperlinked images, which can be clicked. All external hyperlinks will open within the web browser in ArcGIS Pro.
6. The Table of Contents is hyperlinked to other sections in the Notebook.
7. In the event of corrupted files, please copy the contents of either/both the *LocalImages_backup* or the *LocalData_backup* folder into their respective parent folders.
8. Enjoy!