Lab Report

Title: GIS 5572 Lab 0 – Technology Ecosystem
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Project Repository: https://github.com/Tuletara/GIS5572

Abstract

Set up and learn Github with a GIS5572 repo to include folders and a lab report form for each lab. Walk through the tutorials to learn how to clone, commit, push, and pull repos at the command line at GUI. Working in ArcPro, ArcOnline, and Jupyter Notebook with data acquired from MN GeoSpatial Commons create a buffer layer to compare the process between the different platforms.

Problem Statement

There are many tools in GIS that a professional must be familiar with in order to operate effectively and efficiently. Three of these tool are GitHub, Jupyter Notebook in ArcPro, and Jupyter Notebook with ArcOnline. The intention of this lab is explore these tools and compare the process and results among them.

Table 1. Data Needs

#	Requirement	Defined As	Spatial Data	Dataset	Preparation
1	Any Network Dataset	Can be roads or streams, etc.	Polyline	Mn GeoSpatial Commons	Download

Input Data

The data utilized for this report is a shapefile of road centerlines for Lake County Minnesota. The dataset is current as of November 2020.

Table 2. Data Inputs

#	Title	Purpose in Analysis	Link to Source
1	Road network	Network data to perform buffer analysis	MN Geospatial Commons

Methods

Using the GUI built into Pro, perform a buffer analysis on the road data. Then write code using ArcPy and Jupyter Notebook to repeat the buffer process. Compare the previous two processes with Arc Online by running a buffer analysis in Jupyter Notebook on this platform. (Figure 1)

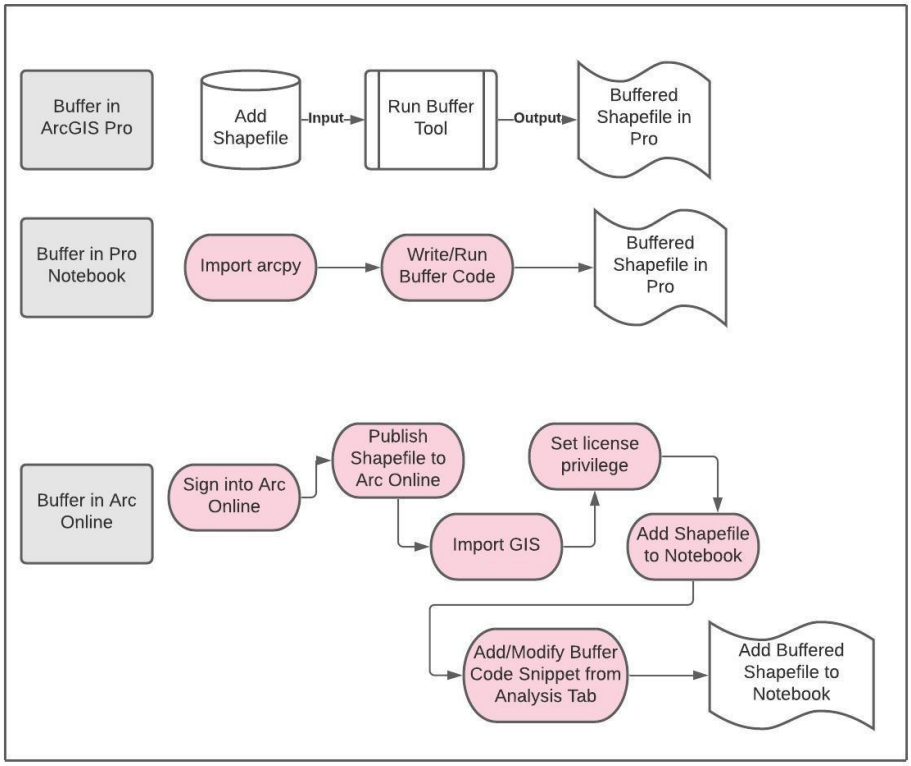

Figure 1. Data/Process Flow Diagram.

Results

All three applications produced a roads buffer layer. Arc Pro automatically added and displayed the new layer on the map for both processes in Pro and Jupyter Notebook (Figures 2 and 3). Arc Online differed here by publishing the buffer shapefile directly to the Content page of my Online account (Figure 4). From here it can be viewed in the Map Viewer or called into the Notebook for display and further processing.

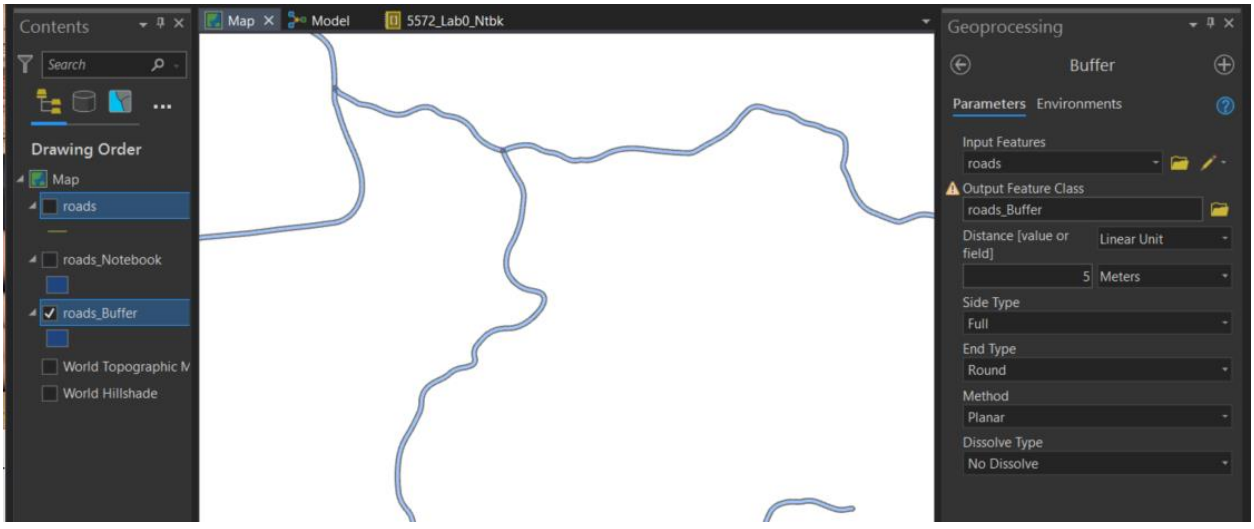

Figure 2. ArcGIS Pro Buffered Roads Shapefile and Geoprocessing Tool.

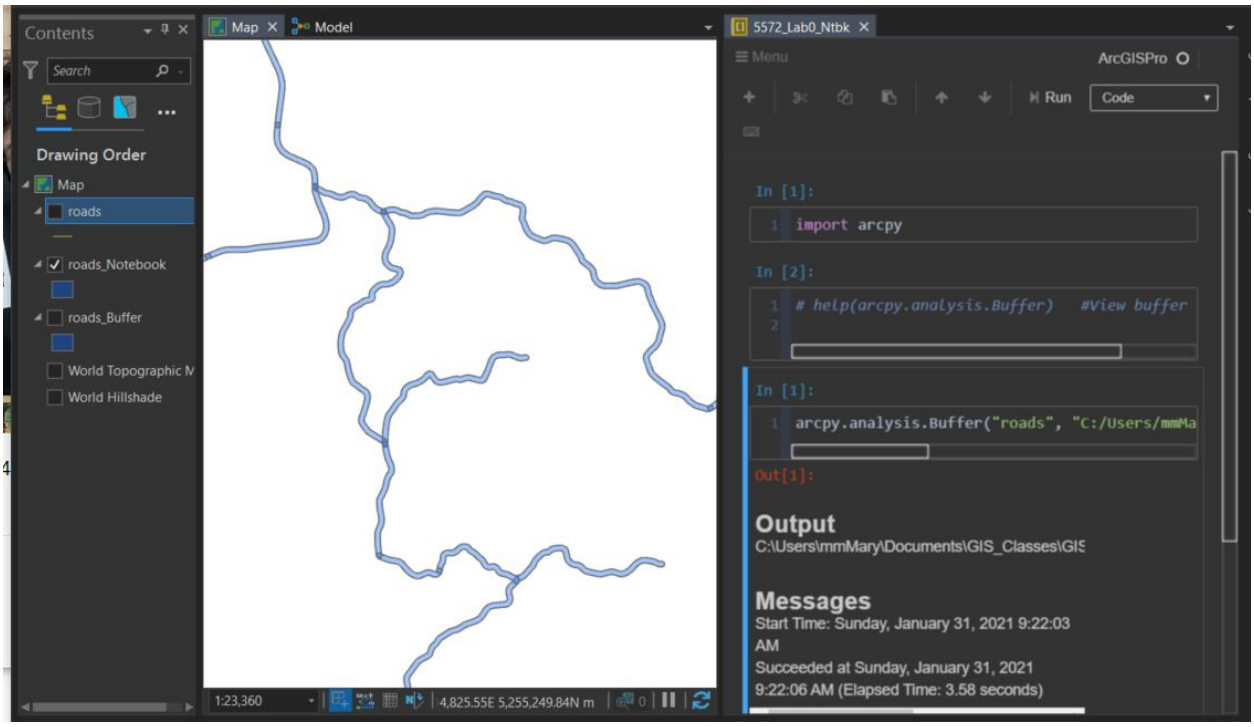

Figure 3. ArcGIS Pro Buffered Roads Shapefile and Jupyter Notebook.

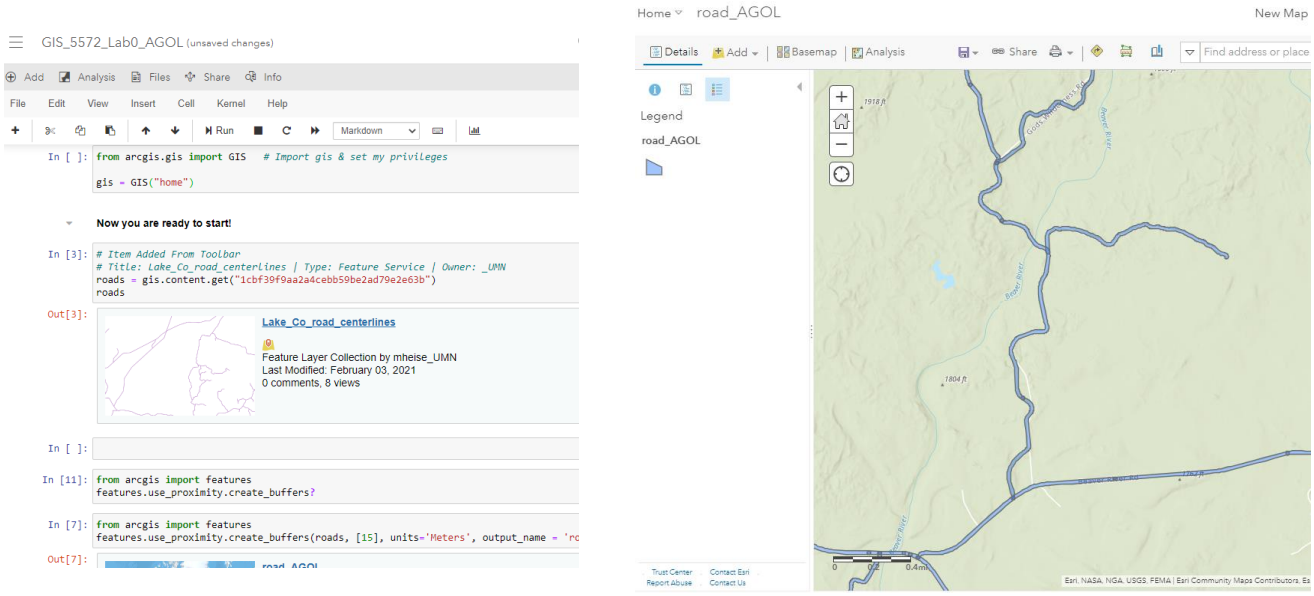

Figure 4. Arc Online Buffered Roads Code (left) and Shapefile.

Results Verification

The desired result was to obtain a buffered roads layer using all three methods. Each instance generated a correctly buffered layer which was verified by viewing the shapefile in Pro and the Feature Layer in Arc Online's Map.

Discussion and Conclusion

GitHub:
I am now acquainted with GitHub and Git Bash. The tutorials were helpful but I still needed to fill in some gaps with videos and help documentation (freeCodeCamp.org, 2020; GitHub Docs, 2021; SyntaxByte, 2017). The installation of Git Bash created concerns about what exactly I was putting on my computer and if I was choosing the correct settings. There were several options to go through and not much explanation of what the choices do. It also seems like there can be security issues to be aware of when using Git. I attempted to link an SSH key to Bash but that appeared to have failed or I need to go through more steps to make sure I'm actually connecting to Git's server. I also learned how to keep my email address anonymous for privacy and security reasons (GitHub Docs, 2021).

Arc Pro was fast and easy to use and the process felt highly functional. The ease of processing here is likely due to the comfort level I have with the application and the simplicity of the task. ArcPy and Arc Online presented several complications and felt very un-functional. This is because they are both still relatively new to me. I'm not that experienced with coding yet and both applications are different enough to make a lot of extra research necessary. While the help documentation is very informative for ArcPy, Arc Online was less so. Although, it may just be more integrated into the app. The efficiency from this setup will come as I learn how to access the information and shortcuts; such as adding code snippets and showing the parameters, and gain a better understanding of Python code.

One more consideration with Arc Online is the dependence on connectivity. The connection to my account had timed out several times and any unsaved changes are lost if this happens. This could be a big issue when working on larger projects. The first notebook I opened was an Advanced level which I discovered costs three credits per hour. I was surprised by this, especially if it times out and you lose your work. I was happy to see the Standard level doesn't have an hourly rate.

This lab was a challenge because GitHub and Arc Online are very new to me and I'm only somewhat familiar with ArcPy. I did learn a lot but working through the three different applications was overwhelming, especially with the little nuances in code for ArcPy and Arc Online. However, the capabilities are apparent and once I get comfortable with the platforms and code I can see how these tools are a gamechanger.

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Self-score

Category	Description	Points Possible	Score
Structural Elements	All elements of a lab report are included **(2 points each)**: Title, Notice: Dr. Bryan Runck, Author, Project Repository, Date, Abstract, Problem Statement, Input Data w/ tables, Methods w/ Data, Flow Diagrams, Results, Results Verification, Discussion and Conclusion, References in common format, Self-score	28	28
Clarity of Content	Each element above is executed at a professional level so that someone can understand the goal, data, methods, results, and their validity and implications in a 5 minute reading at a cursory-level, and in a 30 minute meeting at a deep level **(12 points)**. There is a clear connection from data to results to discussion and conclusion **(12 points)**.	24	20
Reproducibility	Results are completely reproducible by someone with basic GIS training. There is no ambiguity in data flow or rationale for data operations. Every step is documented and justified.	28	25
Verification	Results are correct in that they have been verified in comparison to some standard. The standard is clearly stated **(10 points)**, the method of comparison is clearly stated **(5 points)**, and the result of verification is clearly stated **(5 points)**.	20	20
		100	93