Lab Report

Title: Lab 0 Lab Report
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Project Repository: https://github.com/MaochuanW/GIS5571/tree/main/Lab0
Google Drive Link: https://drive.google.com/drive/folders/1Kvbiz_28Z5uWRVxW84AI-UhiPCeiIX_o?usp=sharing
Time Spent: 10 hours

Abstract

This lab focuses on using different Esri ecosystem to conduct a buffer analysis, and GitHub setup. For the buffer analysis, I chose to use the Minnesota department of transportation road network shapefile as my road network dataset. I clipped the east bank roads for the buffer analysis because the shapefile comes with all roads in the state of Minnesota, which would be too much analysis to do. The methods for doing a buffer analysis in 3 different Esri software are almost the same, except in ArcGis Pro, I didn't have to manually type in the code whereas, in arcpro and arc online notebook, I had to import the python packages and manually input the parameter code to conduct the buffer analysis. The result from all 3 different Esri software turned out to be identical, and further result verification was provided by comparing the codes between all 3 procedures. For the GitHub setup, I mostly followed the instruction on the GitHub website and some tutorials on the internet to set up my GitHub account and git bash on my local machine. No major problems were encountered during the setup and I was able to create the lab folders in my GitHub repository.

Problem Statement

The Esri ecosystem has many different ways that you can access the same underlying functionality. Your objective is to compare and contrast performing the same simple activity - buffer a network dataset - using three different tools: ArcPro, Jupyter Notebooks in ArcPro, and Jupyter Notebooks in ArcOnline. This way, people would be able to be more efficient and knowledgeable about Esri products. In this lab, a simple road network buffer analysis was conducted using the dataset provided below.

Table 1. Data used for this lab

#	Requirement	Defined As	(Spatial) Data	Attribute Data	Dataset	Preparation
1	Road network	Raw input dataset from MNDOT	Road geometry	Street name, street type, route system, route number…	Mn GeoSpatial Commons	Clipped east bank roads for buffer analysis

Input Data

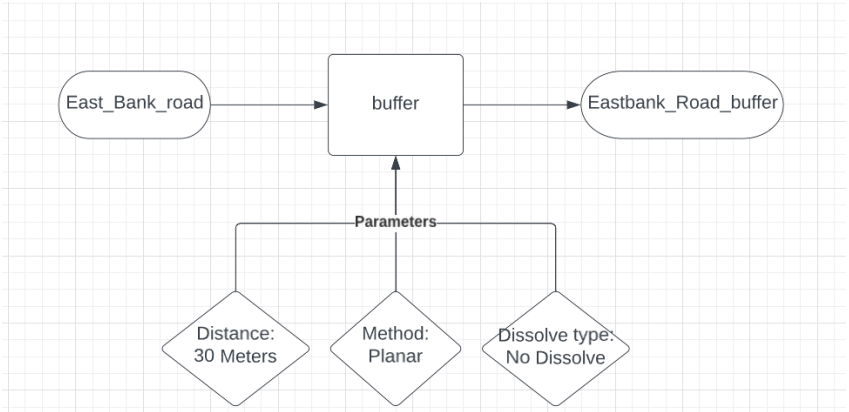
The data used for this lab is a subset of the road network from MNDOT. Specifically the East bank campus roads.

Table 2. Data used for this lab

#	Title	Purpose in Analysis	Link to Source
1	East bank campus roads	Raw input dataset for buffer analysis from MNDOT	Mn GeoSpatial Commons

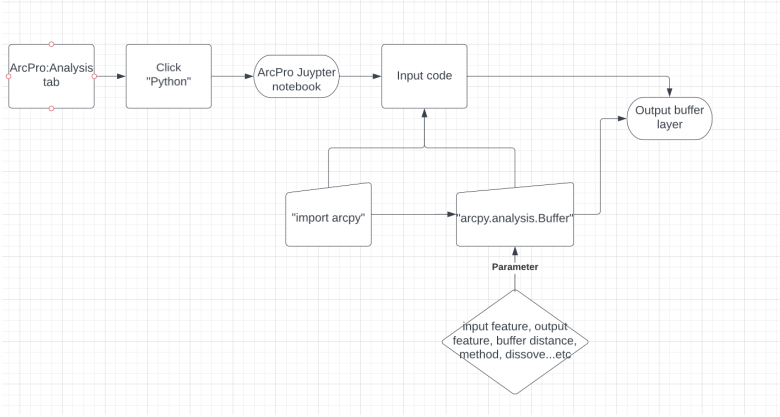
Methods

For arc pro, the buffer process is relatively simple as shown in Figure. 1 below



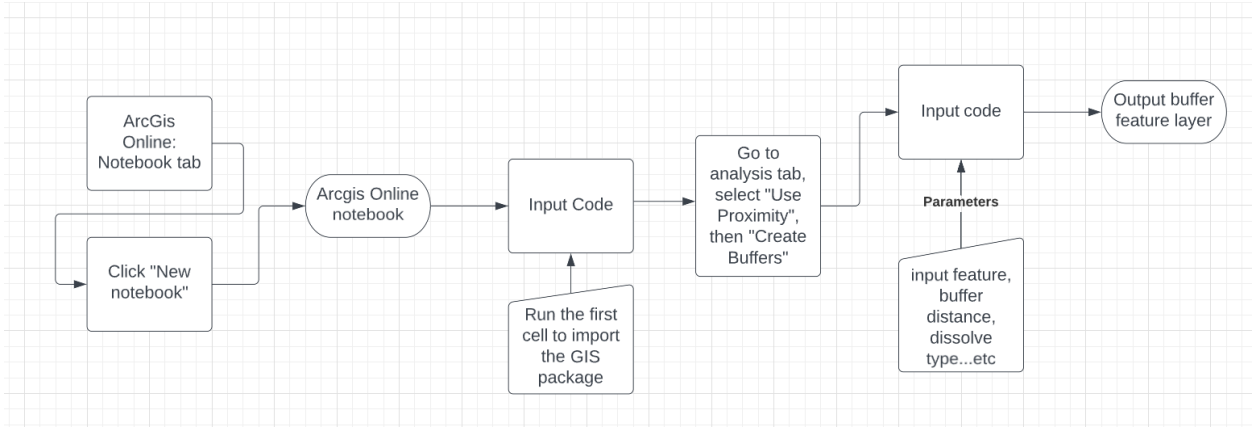
The most important step when using ArcPro to conduct the buffer analysis is to make sure to select the right parameters, such as the buffer distance, buffer method, and dissolve type.

For the Juypter notebook in ArcPro, the process is also very straightforward. See figure. 2 below to see the process.



Basically, open the python notebook tab in arcpro, and then input the code for conducting buffer analysis. First, import the arcpy package, and then use the Buffer function with the correct parameters to create the buffer. The output will be a shapefile base on the name and parameter given in the code.

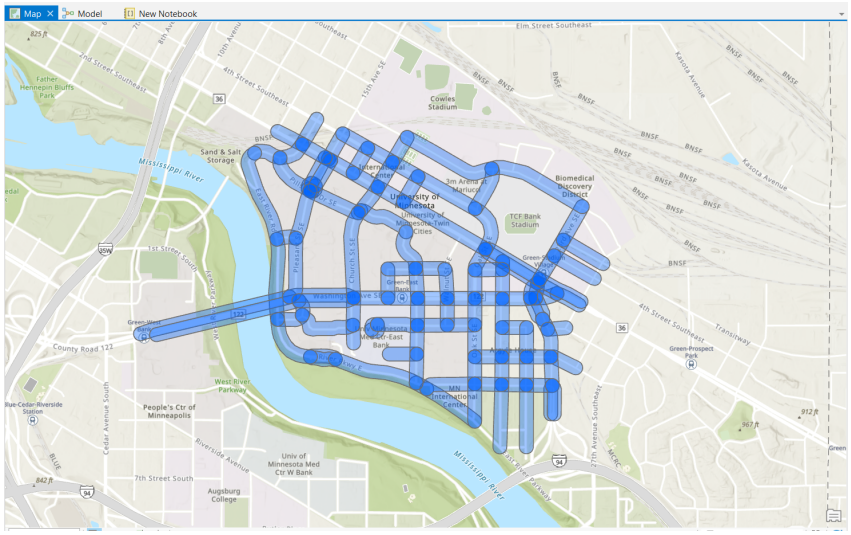
For juypter notebook in ArcGIS Online. The steps are a little more complicated. First, we have to go to our ArcGIS online account and then select “notebook” on the top ribbon. And then click “New Notebook”. This will prompt us to a new untitled notebook in ArcGIS online, and then we can conduct the buffer analysis inside of it. Please see the figure. 3 below for the steps.



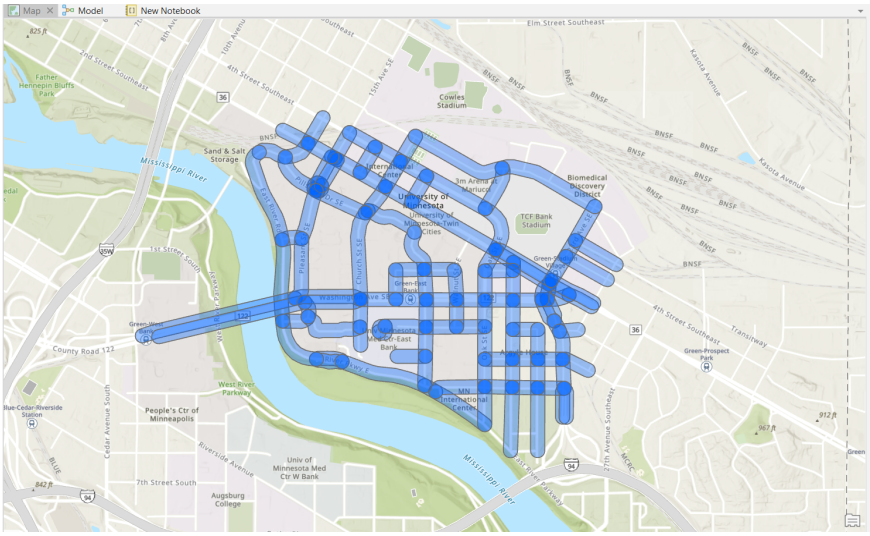
The most important step for doing buffer analysis in arc online notebook is to make sure to select the correct analysis and be very careful of the parameters you select for the buffer analysis because the parameters are very long, and it's easy to make mistakes when you input the parameters.

Results

For arcpro, the buffered street is shown in the screenshot below.

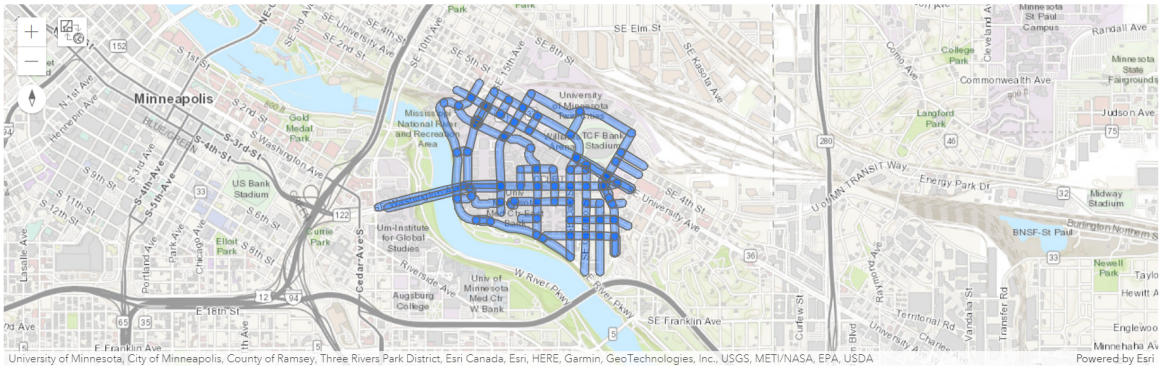


For juypter notebook in arcpro, the buffered street is shown in the screenshot below.



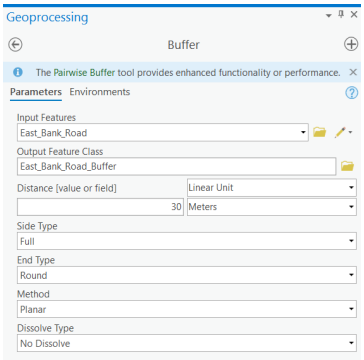
For ArcGis online notebook, the buffered screenshot is shown below.

```
In [17]: m = gis.map('Minnesota')
         m.add_layer(item1)
         m
```



Results Verification

As shown in the screenshots above, the three buffered road network appears to be consistent in color, and shape.
If we compare the code between the steps, which is shown in the screenshots below. We can also see that they all use the same parameters. So, I'm confident that the results of the buffer road network analysis are correct.
For Arc Pro:



For juypter notebook in arcpro:

```
In [1]: import arcpy

In [5]: arcpy.analysis.Buffer("East_Bank", "East_Bank_Buffer_notebook", '30 Meters', 'FULL', 'ROUND', 'NONE','#','PLANAR')
Out[5]:
```

Messages

Start Time: Tuesday, September 20, 2022 9:51:58 PM

Succeeded at Tuesday, September 20, 2022 9:51:58 PM (Elapsed Time: 0.27 seconds)

```
In [6]: help(arcpy.analysis.Buffer)
```

For notebook in ArcGis Online notebook:

```
from arcgis import features
features.use_proximity.create_buffers(item, distances=[30], field=None, units='Meters', dissolve_type='None', ring_type='Disks', side_type='Full', end_type='Round', output_name='buffered_road', context=None, gis=None, estimate=False, future=False)
```

buffered_road

Feature Layer Collection by wang8837_UMN
Last Modified: September 21, 2022
0 comments, 0 views

Discussion and Conclusion

Github: For the GitHub exercise, the process mostly went smoothly, such as creating the account, downloading git bash on my local machine, creating a repository. The tricky part was to create folders inside my repository. First, I tried to create a folder in my git bash, but apparently, you can not create empty folders in git, so that got me stuck for a bit. But after that I tried to manually create a folder in my local machine repository location and put the lab report inside of that lab folder, I was able to git add, commit, and push them to my GitHub account.

Buffer analysis: The buffer analysis exercise mostly went really well. The procedure in arc pro and arc pro notebook was very straightforward. For example, in arc pro, I just had to select the buffer tool and put in the parameters. And in arc pro notebook, import the arcpy package and use the “analysis.buffer” function to conduct the buffer analysis. In the ArcGIS Online notebook, the tricky part for me was finding the notebook in the first place. Because when I searched on google for “ArcGIS Online notebook” there weren’t any links to it. So I had to do some research on how to find the notebook. But once I’m in the notebook, the process was also very straightforward for the most part. I would say the most confusing part would be the parameters for the buffer analysis. Because it requires a very strict format for parameter input. I had to find the ArcGIS API for the python document to be able to input the parameters correctly.

References

undefined [Esri Events]. (2019, August 1). *ArcGIS Notebooks: An Introduction* [Video]. YouTube. Retrieved September 21, 2022, from https://www.youtube.com/watch?v=RUNBSYBLmX0&ab_channel=EsriEvents

arcgis.features.use_proximity module | ArcGIS API for Python. (n.d.). Retrieved September 21, 2022, from https://developers.arcgis.com/python/api-reference/arcgis.features.use_proximity.html#create-buffers

Quickstart. (n.d.). GitHub Docs. Retrieved September 21, 2022, from https://docs.github.com/en/get-started/quickstart

Earth Data Analytics Online Certificate. (2019, September 3). Earth Data Science - Earth Lab. Retrieved September 21, 2022, from https://www.earthdatascience.org/workshops/intro-version-control-git/

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	**24**
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	**28**
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	**100**