Lab 0 Report

Title: Buffering a network dataset using ArcPro, Jupyter Notebooks in ArcPro and Jupyter Notebooks in ArcOnline
Notice: Dr. Bryan Runck
Author: Zain Ul Abdin Siyal
Date: 09/21/2022

Project Repository: *https://github.com/Zain1443/GIS5571*
Google Drive Link:
Time Spent: 18 hours (mostly to learn about background stuff)

Abstract
250 words max. Clearly summarize the following major sections. Each gets one or two sentences.

Creating buffers around an existing geographic feature such as road is essential for many reasons. There are different ways buffers can be created using tools available on ESRI ecosystem. This lab discusses three different tools namely ArcPro, Jupyter Notebooks in ArcPro, Jupyter Notebooks in ArcGIS Online. The input data used is from Minnesota Department of Transportation. To create a buffer using ArcGIS Pro and ArcGIS online, ModelBuilder and Notebook was used. The buffers created were compared and contrasted visually and the final results were verified using the built-in measuring tool in the ArcGIS pro.

Problem Statement

The Esri ecosystem has many different ways that can be accessed to do the same underlying functionality. The objective is to compare and contrast performing the same simple activity - buffer a network dataset - using three different tools: ArcPro, Jupyter Notebooks in ArcPro, Jupyter Notebooks in ArcOnline.

Table 1. Required Data

#	Requirement	Defined As	(Spatial) Data	Attribute Data	Dataset	Preparation
1	5000 meters buffer around the road highway network in Minnesota	Raw input dataset from MNDOT	Road geometry	Metadata: Roads, Minnesota, 2012 (mn.gov)	Mn GeoSpatial Commons	No

Input Data

The input data for this lab was downloaded from Minnesota Geospatial Commons website. The dataset depicts centerlines of all public roadways in the state of Minnesota are depicted in the year 2012.

Table 2. Input data used to create buffers.

#	Title	Purpose in Analysis	Link to Source
1	Road highway network in Minnesota	Raw input dataset for creating 5000 meters buffer from Minnesota Department of Transportation	Mn GeoSpatial Commons

Methods

In order to create a buffer to the road data from Minnesota Geospatial Commons, three different tools were used. The methodology to perform the said task is summarized in the data flow diagram, as shown in Figure 1.

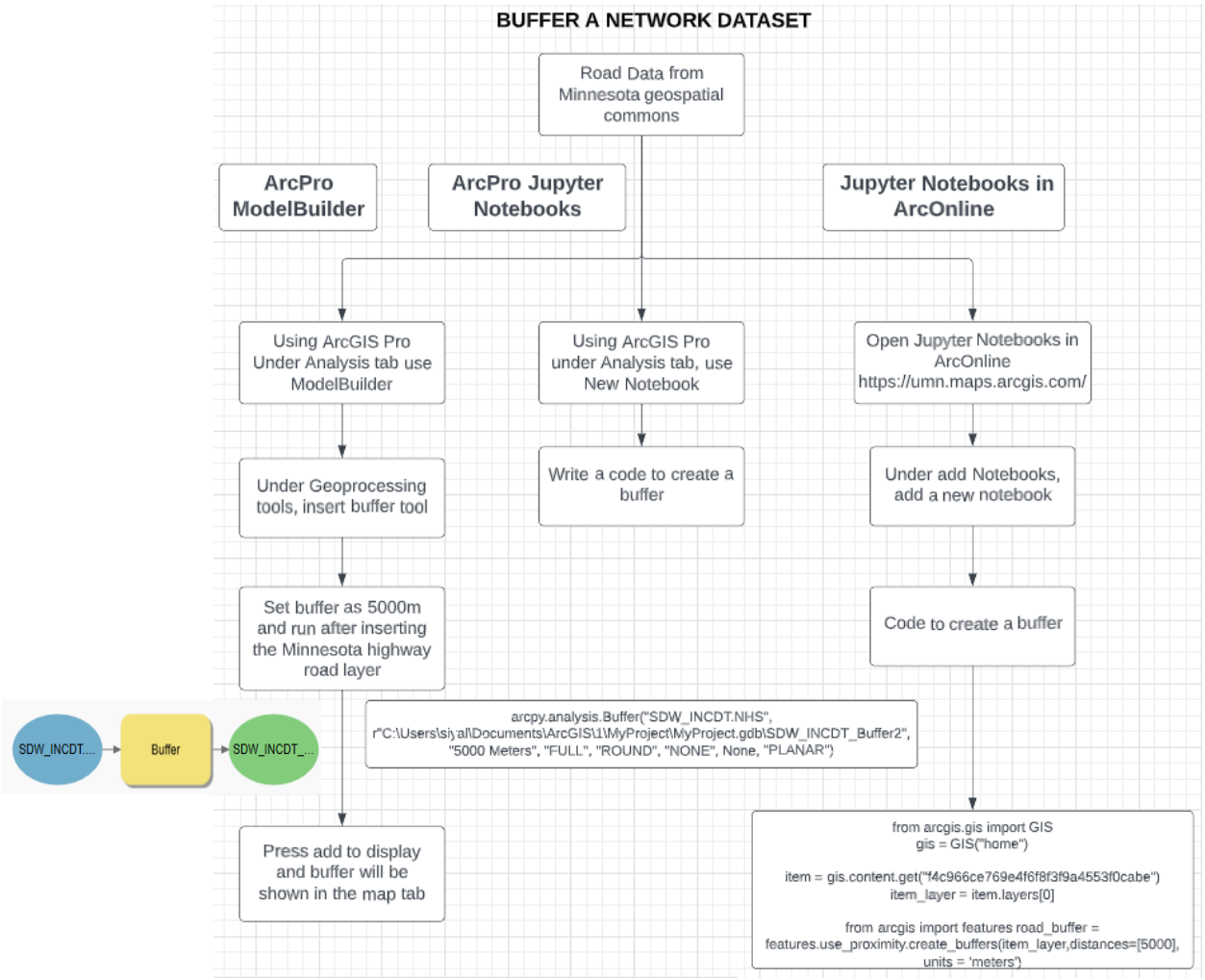

Fig. 1: Data Flow Diagram.

To create a buffer using ArcGIS Pro, ModelBuilder is used. It can be accessed using Analysis tab and then buffer tool is inserted through geoprocessing tools. The model is run after setting up a buffer of 5000 meters across the Minnesota highway road layer. The created buffer can be visualized using add to display tab.

The same task was done through python codes using ArcPro Jupyter notebook and Jupyter Notebooks in ArcOnline. The codes shown in the data flow diagram were run and buffers were created.

Results

The final created buffers through different platforms are shown in following figures. The ultimate aim was to create buffer and compare and contrast outputs. The methodology of creating buffers was different but the end result was same. For ModelBuilder, python code wasn't required; however, the builder itself did all the coding in the background. For Jupyter Notebooks, whether in ArcPro or ArcGIS online, required a complete code to execute the buffer.

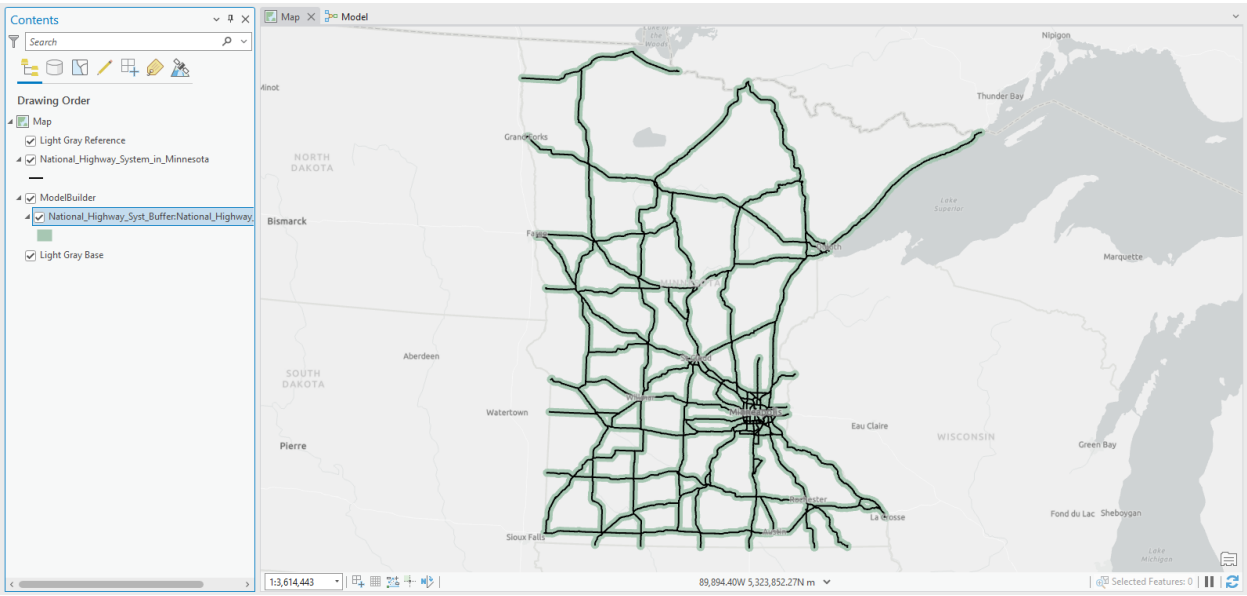

Fig. 2: Created buffer using ModelBuilder in ArcGIS Pro.

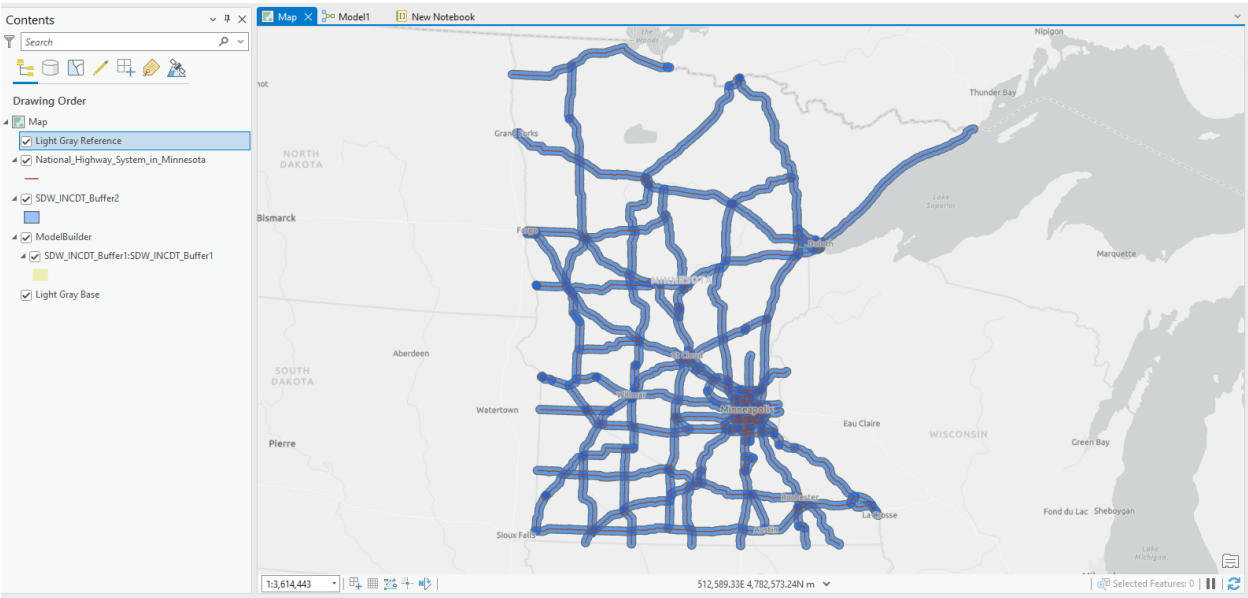

Fig. 3: Created buffer using ArcPro Jupyter notebook.

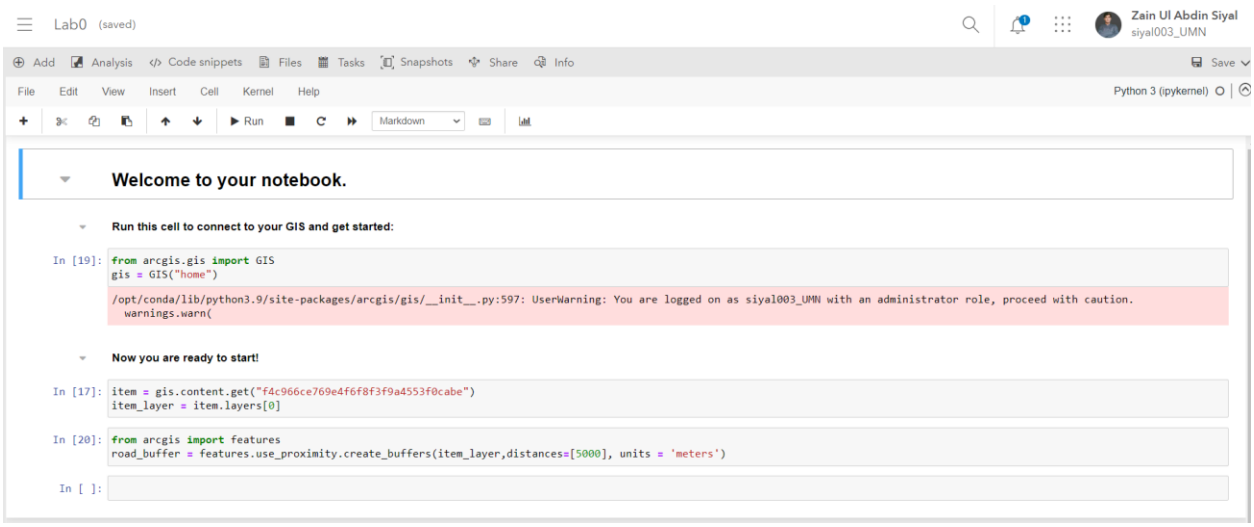

Fig. 4: Python code for a buffer using Jupyter Notebooks in ArcGIS Online.

Results Verification

All the results were verified through comparison and visually looking at the buffers. Moreover, the widths of the created buffers were measured using the built-in measuring tool in ArcGIS pro. Additionally, the system didn't return any error, which in a way was indication that all codes were correct.

Discussion and Conclusion

The primary aim of the lab was to create a buffer using three different tools: ArcPro, Jupyter Notebooks in ArcPro, Jupyter Notebooks in ArcOnline. Through this lab, I learned about how a simple task such as buffer a network dataset can be done through various ways. I got an opportunity to familiarize myself with the basic python data types, syntax, interfaces of Jupyter Notebooks in ArcPro and Jupyter Notebooks in ArcOnline.

GitHub

I initially struggled comprehend the process but after following the instructions for the GitHub QuickStart docs, I was able to set up a new repository. I also reached out to a fellow student to make sure I was doing it correctly.

References

1. *https://gisdata.mn.gov/dataset/trans-roads-mndot-tis*
2. *Metadata: Roads, Minnesota, 2012 (mn.gov)*

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	26
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	22
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	96