**Lab Report**

Title: Apples And Oranges: Comparing and Contrasting Esri Tools For Lab 0

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**Project Repository:**https://github.com/CeceliaAi/GIS5572/tree/master

**Abstract**

This lab’s objective is to use three separate ESRI tools to create the same output. We will then compare and contrast the process using models. The data will be obtained through the Minnesota Geospatial Commons. We will use the Rail Lines, Minnesota network data from MnDOT, Office of Freight and Commercial Vehicle Operations (OFCVO), Freight, Railroads, and Waterways Section. The three tools we will use are: ArcPro, Jupyter Notebooks in ArcPro, and Jupyter Notebooks in ArcOnline. The process for each of these tools will be recorded in the Methods section. A rose by any other name should smell as sweet, so the results should be the same, though they may look different in the various environments. In the conclusion, we will discuss what we learned throughout the process and from the outputs. Additionally, the conclusion will discuss part one of the lab, getting set up in GitHub.

**Problem Statement**

Esri tools allow for more than one way to skin a cat. This lab will use three of them to perform the same task, buffering a network dataset. Each environment will require the same basic steps (data entry, visualizing, and buffering), but the details of each will be different and will require some small changes to certain steps. In ArcPro, we will have to properly set the conditions of the buffer tool. In ArcPy, we will have to set the environment to use the buffer function. In ArcGIS Online Notebooks, we will have to bring the tools into the coding environment. There is not much context for this lab, so we will buffer at a range of 10 nautical miles.

*Table 1. Analysis Requirements*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Defined As** | **Spatial Data** | **Attribute Data** | **Dataset** | **Preparation** |
| 1 | Rail network | Raw input dataset from MNDOT | Rail road geometry |  | https://gisdata.mn.gov/dataset/trans-rail-lines |  |
| 2 | Buffer tool or code | Tool in ArcPro or Python code |  | Distance of buffer |  |  |
| 3 | Model Builder | Lucidchart |  |  |  |  |
| 4 |  |  |  |  |  |  |

**Input Data**

This dataset was put together by the MnDOT Office of Freight and Commercial Vehicle Operations, Freight, Railroads, and Waterways Section. It is a current dataset that is continuously updated. The features were originally digitized from 1990 to 1995, and the data has been edited for accuracy. The data does have some gaps, and so it is best viewed at a smaller scale. These gaps in the polylines will not affect our work in this lab. We will download a zip file of the shapefile.

The attributes in this dataset include such columns as route number, railroad operator, railroad section and subdivision, and comments. For this lab, we will not use the attribute data in our analysis.

Table 2. Data

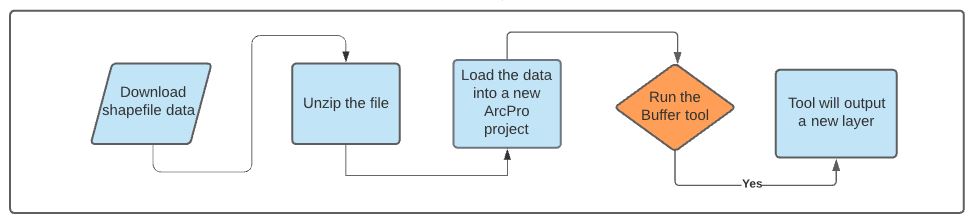
|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Title** | **Purpose in Analysis** | **Link to Source** |
| 1 | Rail Lines, Minnesota | Raw input dataset for network analysis from MNDOT | https://gisdata.mn.gov/dataset/trans-rail-lines |
| 2 |  |  |  |
| 3 |  |  |  |
|  |  |  |  |

**Methods**

*Include a data flow diagram or screenshot from model builder. Do references in line (Rammankutty, 2033). Document any and all steps that you did to the input data in the data flow diagram. Provide natural language description of the most important steps, giving a narrative arc and provide well formatting screenshots with a boarder and centered throughout.*

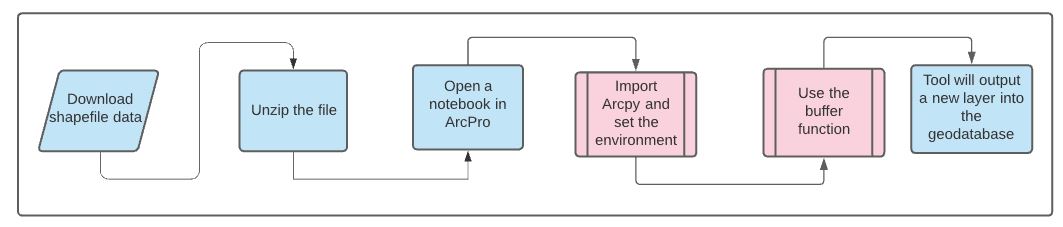
*ArcPro*

*Figure 1. Data flow diagram.*

**

*Jupyter Notebooks in ArcPro*

*Figure 2. Data flow diagram*

**

*Jupyter Notebooks in ArcOnline*

*Figure 3. Data flow diagram*

**Results**

*Show the results in figures and maps. Describe how they address the problem statement.*

*Follow best practice for map design, coloring, etc.*

*TABLE*

**Results Verification**

*How do you know your results are correct? This can be a qualitative or quantitative verification.*

No errors, and can see the output in ArcPro / verification and some standard

. For results verification, you may consider comparing the final output across all methods.

**Discussion and Conclusion**

*What did you learn? How does it relate to the main problem?*

We learned the processes for spatial data analysis in three different formats.

GitHub

1. In your lab report Discussion and Conclusion section, create a subset titled “GitHub” and describe what went well and what was tricky about getting set up with github.

Add further reflection on how this went for you and the different approaches to accessing the Esri ecosystem.

**References**

Esri. *Buffer (Analysis)* [Documentation]. Retrieved February 4, 2021, from <https://pro.arcgis.com/en/pro-app/latest/tool-reference/analysis/buffer.htm>

Esri. *Get Started With Notebooks* [Documentation]. Retrieved February 4, 2021, from <https://doc.arcgis.com/en/arcgis-online/get-started/components-of-the-notebook-editor.htm>

Esri. *Notebooks in ArcGIS Pro* [Documentation]. Retrieved February 4, 2021, from <https://pro.arcgis.com/en/pro-app/latest/arcpy/get-started/pro-notebooks.htm>

MnDOT. *Rail Lines, Minnesota* [Shapefile]. Minnesota Geospatial Commons. Retrieved February 4, 2021, from <https://gisdata.mn.gov/dataset/trans-rail-lines>

**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** |