**Lab Report**

Title: *<Delete this text in light grey throughout>*

Notice: Dr. Bryan Runck

Author: Greg Kohler

Date: 9/12/23

**Project Repository:****https://github.com/kohle147/GIS5571/**

**Google Drive Link:** *<if applicable with data, notebooks, etc.>*

**Time Spent:** *20*

**Abstract**

*<Delete this text in light grey throughout>*

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

**Problem Statement**

*Describe the specific problem and the context. Provide an illustrative figure and/or context map here. In the table, translate the qualitative problem statement elements into specific requirements for the analysis.*

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, Jupyter Notebooks in ArcOnline.

***Table 1.Elements Needed for Buffering***

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| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Defined As** | **(Spatial) Data** | **Attribute Data** | **Dataset** | **Preparation** |
| 1 | Road network | Raw data from MnDOT | Road geometry |  | <https://gisdata.mn.gov/dataset/trans-memorial-routes> | Added folder connection to ArcGIS Pro. |
| 2 | ArcPro Toolbox | Creating a buffer around road geometry with ArcPro toolbox. | Road geometry | Buffer distance |  | Found tool in ArcGIS Pro toolbox. |
| 3 | ArcPro Notebook | Creating buffer around road geometry with ArcPy. | Road geometry | Buffer distance |  | Opened up new notebook in ArcGIS Pro. |
| 4 | ArcOnline Notebooks | Creating buffer around road geometry with ArcGIS API for Python. | Road geometry | Buffer distance |  | Created new notebook in ArcGIS online. |

**Input Data**

*Describe the data in two paragraphs max. Fill out the table.*

The road geometry data is of Memorial Routes in Minnesota. The data is the centerlines for all public roads in Minnesota designated as memorial routes through a state statute. The data is updated with construction timelines. The projected coordinate system is NAD 1983 UTM Zone 15N.

*Table 2. <insert caption>*

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Title** | **Purpose in Analysis** | **Link to Source** |
| 1 | **Memorial Roads** | Raw dataset for road centerlines. | <https://gisdata.mn.gov/dataset/trans-memorial-routes> |

**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.*

*Resources on Data Flow Diagrams:*

* *<https://www.visual-paradigm.com/tutorials/data-flow-diagram-dfd.jsp>*
* *<https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd>*

*Figure 1. Data flow diagram.*

*If appropriate, add in pseudo-code describing model algorithms and/or objects. If using mathematical equations, create a clear mapping between the reference equation, pseudo-code, and actual implementation in a programming language.*

**Results**

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

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

**Results Verification**

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

**Discussion and Conclusion**

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

**GitHub**

The GitHub section of the lab came with some challenges, but it also had elements I felt confident and familiar with. Using my computer’s terminal was something I had not done in a while, but it came back to me fairly quickly. One of my first struggles was accessing my GitHub account through my computers terminal. While the online tutorial discussed using your GitHub password, I soon found out this was an outdated step. GitHub had updated their security and now required a access token to be used instead of the account password. This led me to doing my own research to figure out how to create the access key and utilize it. After I figured this out, I had another challenge pushing my changes to GitHub. First, the after attempting to commit my changed to the README.md, my terminal would freeze up and ask me to write a commit message. However, there was no way to enter anything in. I realized I needed to type the commit message with the commit command for it to work. After committing the changes, I attempted to push my changes to GitHub. I kept getting an error message about my repository not matching the folder on my local disk. After searching, I realized I had accidentally created a new folder in my repository that was not cloned onto my local drive. Once I deleted this, the changes were easily sent to my GitHub repository.

Despite these struggles, I found GitHub to be a powerful tool. Cloning the repository files to my local disk was simple and has a lot of potential. I appreciated being able to make changes on my local drive (i.e adding a few folders for each lab) and being able to push those to GitHub. It allows users to make edits in multiple ways. This exercise showed me that there are several ways to undo changes. While I was confused at first why there are so many ways to undo changes, I can appreciate that at any stage of adding or committing changes, they can be undone. One of my favorite parts of this exercise was exploring the pull requests. I like the idea of being able to make changes and suggest edits to someone else’s work. I appreciate the ability to compare what has been changed and use it to collaborate.

**References**

*Use a common format*

*https://developers.arcgis.com/python/api-reference/arcgis.features.use\_proximity.html#create-buffers*

**Self-score**

*Fill out this rubric for yourself and include it in your lab report. The same rubric will be used to generate a grade in proportion to the points assigned in the syllabus to the assignment.*

|  |  |  |  |
| --- | --- | --- | --- |
| **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 |  |
| **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 |  |
| **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 |  |
| **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 |  |
|  |  | 100 |  |