**Part 2 Goals**

1. Create an ETL for data to go into a cost surface model
2. Create a cost surface model and justify how you created your cost surface
3. Map the optimal path from two points over the constructed cost surface

**Part 2 Deliverables**

Submit a separate lab report from part 1 on Canvas as a PDF (see [report form](https://docs.google.com/document/u/0/d/1gOGBtTe3dQzrXCEMl644QIVdJgMp8ahN/?rtpof=true&usp=drive_fs)). Include all your code on GitHub as both .ipynb files and PDFs of the notebooks. Your lab report should be written to answer the question: what is the optimal route for Dory to take to get to her fly fishing spot near Whitewater State Park in SE Minnesota?

**Part 2 Specifics**

In class, we went through suitability modeling. Specifically, two types of suitability modeling called Boolean suitability analysis and weighted linear combinations. In both cases, Map Algebra drives the model.

Here, your objective is to use map algebra and cost modeling to create a travel model for an imagery person named Dory.

Dory lives just outside of Whitewater State Park at a farm site. She moved to the area because she loves fly fishing, which she does every day in the spring. Dory enjoys hiking to and from her house to fly fish in the park. Your goal is to identify the optimal route for her given her preferences.

*Start point:* Her farm can be found on google maps at 44.127985, -92.148796

*End point:* North Picnic area

*Specific preferences:* Dory prefers to not walk through any farm fields because they can be muddy in the spring. She also doesn’t like crossing water bodies if there isn’t a bridge. Other than that, she just wants to take the path that is the most gradual in terms of slope. Create a cost surface that represents these preferences using map algebra and find the best path for her to follow.

**Lab Report**

Title: Lab 2

Notice: Dr. Bryan Runck

Author: Cole Anderson

Date: 3/4/21

**Project Repository:** *<weblink to public repository>*

**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.*

*Table 1. <insert caption>*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Requirement** | **Defined As** | **Spatial Data** | **Attribute Data** | **Dataset** | **Preparation** |
| 1 | Create ETL for data to go into a cost surface model | Raw input dataset from MNDOT | Road geometry |  | [Mn GeoSpatial Commons](https://gisdata.mn.gov/dataset/trans-roads-mndot-tis) |  |
| 2 | Create a cost surface model and justify how you created your cost surface | > 100 cars per hour |  | Volume | AADT Data |  |
| 3 | Map the optimal path from two points over the constructed cost surface | Criteria:  -not cross farmland  -not cross water if bridge  -least steep |  |  |  |  |
| 4 |  |  |  |  |  |  |

**Input Data**

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

*Table 2. <insert caption>*

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Title** | **Purpose in Analysis** | **Link to Source** |
| 1 | Minnesota Roads | Raw input dataset for routing analysis from MNDOT | [Mn GeoSpatial Commons](https://gisdata.mn.gov/dataset/trans-roads-mndot-tis) |
| 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.*

*Resources on Data Flow Diagrams:*

* [*https://www.visual-paradigm.com/tutorials/data-flow-diagram-dfd.jsp*](https://www.visual-paradigm.com/tutorials/data-flow-diagram-dfd.jsp)
* [*https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd*](https://www.lucidchart.com/pages/data-flow-diagram/how-to-make-a-dfd)

*Figure 1. 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.*

**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?*

**References**

*Use a common format*

**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 |  |