GIS 5572 Lab 2

**Due**: 3 weeks from the date assigned

**Part 1 Goals (Part 2 will be added after next week’s lab)**

1. Stitch together basic skills in API queries with raster, cube, TIN, and Terrain data transformation steps to create an extract, transfer, and load system for LiDAR data from the Minnesota DNR’s FTP server.
2. Use ArcPro to perform side-by-side exploratory spatial data analysis using 2D and Scene views.
3. Use ArcPy to export to a PDF a visualization of LiDAR data

**Part 1 Deliverables**

Submit a lab report 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.

**Part 1 Specifics**

For this lab, write a lab report and create code that accomplishes the following:

1. Describe and build an ETL in ArcPro Jupyter Notebooks that
   1. Downloads .LAS files from MN DNR [1]
   2. Converts the .LAS file into both a DEM and a TIN
   3. Saves the new DEM and TIN to disk
   4. Exports PDFs of the DEM and TIN with correct visualization
2. Do side-by-side exploratory data analysis with a 2D map of the .las file on one pane and a 3D Scene of the .las file on another pane. This will be very computationally intensive, so use a small .las file. In your writeup, describe the features provided by ArcGIS for working with 2D and 3D visualization of .las files.
3. Describe and build an ETL in ArcPro Jupyter Notebooks that
   1. Downloads the annual 30-Year Normals .bil files for precipitation from PRISM [2]
   2. Converts the data into a spacetime cube and exports it to disk (see here for [example](https://pro.arcgis.com/en/pro-app/latest/tool-reference/space-time-pattern-mining/createcubefrommdrasterlayer.htm) of final conversion step; to get to this point, you will need to go through other transform steps likely) [3]
   3. Exports an animation of the timeseries

**[1]** DNR FTP server: <https://resources.gisdata.mn.gov/pub/data/elevation/lidar/> -- I recommend using their example .las datasets as they’re more reasonably sized.

**[2]** PRISM website: <https://prism.oregonstate.edu/normals/>

**[3]** This blog post will give you some inspiration as to why we are emphasizing spacetime cubes: <https://www.esri.com/arcgis-blog/products/arcgis-pro/analytics/explore-your-raster-data-with-space-time-pattern-mining/>