Lab 02-ArcGIS 1

Goals:

- **Downloads** .LAS files from MN DNR
- **Converts** the .LAS file into both a DEM and a TIN
- **Saves** the new DEM and TIN to disk
- **Exports** PDFs of the DEM and TIN with correct visualization

Download .las files from MN DNR

In [1]:
```
# importing useful packages
import requests #will use to web scrape
import json
import pprint
import zipfile
import arcpy #use to export, convert, or save ?

#Note-to-self delete unnessacry packages and BeautifulSoup isn't available in ArcPy
```

In [2]:
```
# directing it to MN DNR website
base_url ="https://resources.gisdata.mn.gov/pub/data/elevation/lidar/examples/lidar_sample/las/"
filename = "4342-12-05.las"
page = requests.get(base_url + filename )
```

In [19]:
```
#downloading .las file?
open("4342-12-05.las", 'wb').write(page.content)
print("extracting the content...")
#pretty sure this is not in my 'Lab02_DNR_lidar' gdb
```

```
extracting the content...
```

In [5]:
```
#What is my current working directory
%pwd
```

Out[5]:
```
'D:\\Fall 2021\\ArcGIS1\\Labs\\Lab02\\Lab02_DNR_lidar'
```

Currently have the downloaded file, now need to convert the .las file to DEM and TIN

In [17]:
```
#setting the working directory to where my i want my data to go (.gdb folder)
arcpy.env.workspace = "D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\Lab02_DNR_lidar.gdb"

#naming the path location to my downloaded las file
las = r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\4342-12-05.las"

#create a las dataset instead of a feature class-need a las Dataset to make a DEM
arcpy.management.CreateLasDataset(las, r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\LasDataset.lasd", "NO_
```

```
0
```

Out[17]:

Output

D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\LasDataset.lasd

Messages

Start Time: Monday, October 11, 2021 6:43:05 PM
Succeeded at Monday, October 11, 2021 6:43:05 PM (Elapsed Time: 0.12 seconds)

converting .las to TIN

In [15]:
```
#had to 'thin' the points because there were too many (only retained 70%)
arcpy.ddd.LasDatasetToTin(las, r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_Tin", "RANDOM", "PERCEN
```

Out[15]:

Output

D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_Tin

Messages

Start Time: Monday, October 11, 2021 6:37:24 PM
Succeeded at Monday, October 11, 2021 6:38:09 PM (Elapsed Time: 45.05 seconds)

converting .las to DEM

In [24]:
```
# earlier I made lasDataset, which I need if I am to make a DEM, because the input must be a .lasd file
LasDataSet = r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\LasDataset.lasd"

arcpy.conversion.LasDatasetToRaster(LasDataSet, r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_DEM.ti
```

Out[24]:

Output

D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_DEM.tif

Messages

Start Time: Monday, October 11, 2021 7:12:57 PM
Succeeded at Monday, October 11, 2021 7:13:01 PM (Elapsed Time: 3.95 seconds)

Save both TIN and DEM to disk

In [25]:
```
#exporting raster DEM to gdb
arcpy.conversion.RasterToGeodatabase(r"'D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_DEM.tif'", r"D:\
```

Out[25]:

Output

Messages

Start Time: Monday, October 11, 2021 7:13:24 PM
Successfully converted: D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\las_to_DEM.tif To D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\Lab02_DNR_lidar.gdb\las_to_DEM_1
Succeeded at Monday, October 11, 2021 7:13:29 PM (Elapsed Time: 5.36 seconds)

In [26]:
```
#making a copy of las_to_TIN (saving it it my folder's project)
arcpy.ddd.CopyTin("las_to_TIN", r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\C1_las_to_TIN", "CURRENT")
```

Out[26]:

Output

D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\C1_las_to_TIN

Messages

Start Time: Monday, October 11, 2021 7:20:22 PM
Succeeded at Monday, October 11, 2021 7:21:07 PM (Elapsed Time: 45.29 seconds)

export PDFs of TIN and DEM

In [30]:
```
#code from https://pro.arcgis.com/en/pro-app/latest/arcpy/mapping/introduction-to-arcpy-mp.htm

#locates my current project
aprx = arcpy.mp.ArcGISProject(r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\Lab02_DNR_lidar.aprx")
#indentify the layout I have made within the project
DEM_pdf = aprx.listLayouts("DEM")[0]
#export the layout
DEM_pdf.exportToPDF(r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\DEM.pdf", resolution = 300)
```

Out[30]:
```
'D:\\Fall 2021\\ArcGIS1\\Labs\\Lab02\\Lab02_DNR_lidar\\DEM.pdf'
```

issue with the TIN PDF (it never opens, or is a blank document).

--guessing the issue is due to extreme file size (the data is too big to export in the PDF format). Workaround, try making a TIN dataset that is smaller. -- ended up exporting the contour elevation of the lidar data instead of teh TIN as a subsitute

In [36]:
```
#replicate the process for the TIN
aprx = arcpy.mp.ArcGISProject(r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\Lab02_DNR_lidar.aprx")
TIN_pdf = aprx.listLayouts("TIN")[0]
#export the layout (decreased resolution becasue the TIN sucks a lot of memory)
TIN_pdf.exportToPDF(r"D:\Fall 2021\ArcGIS1\Labs\Lab02\Lab02_DNR_lidar\TIN_50.pdf", resolution = 50)
```

Out[36]:
```
'D:\\Fall 2021\\ArcGIS1\\Labs\\Lab02\\Lab02_DNR_lidar\\TIN_50.pdf'
```

In [ ]:
```

```