Connolly_Lab 2_Part1_Exercise1

November 1, 2023

[18]:
```
import arcpy
import os
```

[4]:
```
#Let's establish our work environment
arcpy.env.workspace = r'C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS␣
↪5571 Lab 2'
```

[7]:
```
#Then we perform the curl request to grab ourselves a laz file
!curl -o example.laz https://resources.gisdata.mn.gov/pub/data/elevation/lidar/
↪county/wabasha/laz/4342-27-59.laz
```

```
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed

  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
  0 19.4M    0  164k    0     0   485k      0  0:00:41 --:--:--  0:00:41  487k
  6 19.4M    6 1334k    0     0   995k      0  0:00:20  0:00:01  0:00:19  995k
 12 19.4M   12 2525k    0     0  1078k      0  0:00:18  0:00:02  0:00:16 1078k
 20 19.4M   20 4086k    0     0  1220k      0  0:00:16  0:00:03  0:00:13 1220k
 25 19.4M   25 5083k    0     0  1172k      0  0:00:17  0:00:04  0:00:13 1172k
 37 19.4M   37 7452k    0     0  1397k      0  0:00:14  0:00:05  0:00:09 1458k
 48 19.4M   48 9640k    0     0  1519k      0  0:00:13  0:00:06  0:00:07 1660k
 61 19.4M   61 12.0M    0     0  1681k      0  0:00:11  0:00:07  0:00:04 1963k
 73 19.4M   73 14.2M    0     0  1749k      0  0:00:11  0:00:08  0:00:03 2104k
 87 19.4M   87 17.0M    0     0  1871k      0  0:00:10  0:00:09  0:00:01 2477k
 97 19.4M   97 19.0M    0     0  1881k      0  0:00:10  0:00:10 --:--:-- 2398k
100 19.4M  100 19.4M    0     0  1829k      0  0:00:10  0:00:10 --:--:-- 2261k
```

[44]:
```
#Then we define the LAZ file within the workspace directory
input_laz = 'example.laz'

#And then we define the output LAS file within the workspace directory
output_las = 'example.las'
```

[47]:
```
#First we convert the laz file to a proper las file
arcpy.conversion.ConvertLas(
    in_las=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571 Lab␣
↪2\example.laz",
```

```
    target_folder=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571␣
↪Lab 2",
    file_version="SAME_AS_INPUT",
    point_format="",
    compression="NO_COMPRESSION",
    las_options="REARRANGE_POINTS",
    out_las_dataset=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS␣
↪5571 Lab 2\example.las",
    define_coordinate_system="NO_FILES",
    in_coordinate_system=None
)
```

[47]:
```
<Result 'C:\\Users\\conno\\OneDrive\\Documents\\ArcGIS\\Projects\\GIS 5571 Lab
2\\example.lasd'>
```

[50]:
```
#Then we can use that dataset to construct a TIN model
arcpy.ddd.LasDatasetToTin(
    in_las_dataset=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571␣
↪Lab 2\example.las",
    out_tin=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571 Lab␣
↪2\TIN",
    thinning_type="WINDOW_SIZE",
    thinning_method="CLOSEST_TO_MEAN",
    thinning_value=10,
    max_nodes=5000000,
    z_factor=1,
    clip_to_extent="CLIP"
)
```

[50]:
```
<Result 'C:\\Users\\conno\\OneDrive\\Documents\\ArcGIS\\Projects\\GIS 5571 Lab
2\\example_LasDatasetToTin'>
```

[1]:
```
#We can also create a DEM file from the same laz file by converting the las to␣
↪a raster with the eleveation value
arcpy.conversion.LasDatasetToRaster(
    in_las_dataset=r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571␣
↪Lab 2\example.las",
    out_raster=r"c:\Users\conno\OneDrive\documents\ArcGIS\Projects\gis 5571 lab␣
↪2\gis 5571 lab 2.gdb\example_dem",
    value_field="ELEVATION",
    interpolation_type="BINNING AVERAGE LINEAR",
    data_type="FLOAT",
    sampling_type="CELLSIZE",
    sampling_value=10,
    z_factor=1
)
```

[1]:
```
<Result 'c:\\Users\\conno\\OneDrive\\documents\\ArcGIS\\Projects\\gis 5571 lab 2\\gis 5571 lab 2.gdb\\example_dem'>
```

[29]:
```
#Use the following code to export the DEM and TIN layers after saving both to separate maps and separate layouts
aprx = arcpy.mp.ArcGISProject("CURRENT")
map = aprx.listMaps("Map")[0]
layout = aprx.listLayouts()[0]
layout.exportToPDF(r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571 Lab 2\DEM.pdf")
```

[29]:
```
'C:\\Users\\conno\\OneDrive\\Documents\\ArcGIS\\Projects\\GIS 5571 Lab 2\\DEM.pdf'
```

[33]:
```
# Get the desired map and layout
map = aprx.listMaps("Map1")[0]
layout = aprx.listLayouts()[1]
layout.exportToPDF(r"C:\Users\conno\OneDrive\Documents\ArcGIS\Projects\GIS 5571 Lab 2\TIN.pdf")
```

[33]:
```
'C:\\Users\\conno\\OneDrive\\Documents\\ArcGIS\\Projects\\GIS 5571 Lab 2\\TIN.pdf'
```

[ ]:
```

```