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Run Markdown

Build ETLs for datasets

```
In [1]: 1 import requests as r
2 import pandas as pd
3 from urllib.request import urlopen
4 from zipfile import Zipfile

In [3]: 1 #create the ETL to download the risk score shapefile from FEMA.gov
2
3 base = "https://nri-data-downloads.s3.amazonaws.com/"
4
5 countyfile = "NRI_Shapefile_Counties.zip"
6

In [4]: 1 NRI = str(base + countyfile)
2 print(NRI)

https://nri-data-downloads.s3.amazonaws.com/NRI_Shapefile_Counties.zip

In [5]: 1 r.get(NRI)
2

Out[5]: <Response [200]>

In [15]: 1 nriData = r.get(NRI)

In [17]: 1 with open("/Users/celia/Desktop/NRI_Shapefile_Counties.zip", "wb") as zip:
2     zip.write(nriData.content)

In [18]: 1 with zipfile.ZipFile("/Users/celia/Desktop/NRI_Shapefile_Counties.zip","r") as zip_ref:
2     zip_ref.extractall()

In [19]: 1 #create the ETL to download the USGS Renewable Energy Potential shapefile
2 #I couldn't get this ETL to work, and it was starting to become a large chunk of time, so I had to stop
3 #I learned I am still not strong at json-based ETLs and will need to practice with them
4
5 base5 = "https://gds-api.nrel.gov/oc-backend/api/download_proxy/re-atlas/"
6 solar = 'BVFST7_ReAtlas_us_csp_total.zip'
7
8 file:///C:/Users/celia/AppData/Local/Temp/ReAtlas_us_csp_total.zip

In [23]: 1 solarfile = str(base5 + solar)
2 print(solarfile)

file:///C:/Users/celia/AppData/Local/Temp/ReAtlas_us_csp_total.zip

In [ ]: 1 solarFile = r.get(solarfile)
```

Make Suitability Layer

```
In [3]: 1 #making a suitability analysis layer from the High Need Counties shapefile of 636 counties in need of electrical
2 arcpy.ba.MakeSuitabilityAnalysisLayer("High_Need_Counties", "Suit_Analysis3")
<
```

Out[3]: **Output**
a Layer object

Messages

Start Time: Thursday, May 6, 2021 1:55:28 AM

Succeeded at Thursday, May 6, 2021 1:55:31 AM (Elapsed Time: 2.65 seconds)

Run Analysis

```
In [5]: 1 #add variable from Esri demographics
2 arcpy.ba.AddVariableBasedSuitabilityCriteria("Suit_Analysis3", "populationtotals.popgrwcyfy;householdincome.pci")
<
```

Out[5]: **Output**

id	value
0	a Layer object
1	populationtotals.popgrwcyfy;householdincome.pci

Messages

Start Time: Friday, May 7, 2021 2:23:16 AM

Succeeded at Friday, May 7, 2021 2:24:27 AM (Elapsed Time: 1 minutes 10 seconds)

```
In [2]: 1 #convert polygon layers to points
2 arcpy.management.FeatureToPoint("High_Need_counties_solar_Spa", "solar_point")
3 arcpy.management.FeatureToPoint("wind_potential", "wind_point")
4 arcpy.management.FeatureToPoint("geo_potential", "geo_point")
<
```

Out[2]: **Output**
C:\Users\celia\Documents\ArcGIS\Projects\GIS5572_FinalProj\GIS5572_FinalProj.gdb\geo_point

Messages

Start Time: Saturday, May 8, 2021 12:08:59 AM

Succeeded at Saturday, May 8, 2021 12:09:02 AM (Elapsed Time: 3.18 seconds)

```
In [7]: 1 #add the points to the suitability criteria
2 arcpy.ba.AddPointLayerBasedSuitabilityCriteria("Suit_Analysis3", "GISJOIN", "solar_point", "WEIGHT", None, None,
<
```

Out[7]: **Output**

id	value
0	a Layer object
1	PointWeight_MAX0

Messages

Start Time: Saturday, May 8, 2021 12:24:01 AM

Succeeded at Saturday, May 8, 2021 12:24:11 AM (Elapsed Time: 10.23 seconds)

```
In [8]: 1 arcpy.ba.AddPointLayerBasedSuitabilityCriteria("Suit_Analysis3", "GISJOIN", "geo_point", "WEIGHT", None, None,
<
```

Out[8]: **Output**

id	value
0	a Layer object
1	PointWeight_MAX0

Messages

Start Time: Saturday, May 8, 2021 12:28:11 AM

Succeeded at Saturday, May 8, 2021 12:28:17 AM (Elapsed Time: 5.82 seconds)

```
In [9]: 1 arcpy.ba.AddPointLayerBasedSuitabilityCriteria("Suit_Analysis3", "GISJOIN", "wind_point", "WEIGHT", None, None,
<
```

Out[9]: **Output**

id	value
0	a Layer object
1	PointWeight_MAX1

Messages

Start Time: Saturday, May 8, 2021 12:28:40 AM

Succeeded at Saturday, May 8, 2021 12:28:49 AM (Elapsed Time: 8.67 seconds)

```
In [10]: 1 arcpy.ba.AddPointLayerBasedSuitabilityCriteria("Suit_Analysis3", "GISJOIN", "NRI_Point", "WEIGHT", None, None,
<
```

Out[10]: **Output**

id	value
0	a Layer object
1	PointWeight_MAX2

Messages

Start Time: Friday, May 7, 2021 2:09:02 AM

Succeeded at Friday, May 7, 2021 2:09:04 AM (Elapsed Time: 2.41 seconds)

```
In [1]: 1 #I tried to set the criteria properties but it didn't work for any of the variables whether they came from Esri
2 #the error message was vague and I never figured out what wasn't working
3 #a bunch of error messages:
<
```

```
In [6]: 1 #set properties for demographic data
2 arcpy.ba.SetCriteriaProperties("suit_Analysis3", "populationtotals.popgrwcyfy 'Criterion for populationtotals.popgrwcyfy' 'Criterion for householdincome.pci' 'Criterion for policy.white_cy' 'Criterion for policy.black_cy' 'Criterion for policy.amerind_cy' 'Criterion for policy.asian_cy' 'Criterion for policy.pacific_cy' 'Criterion for policy.othrace_cy' 'Criterion for policy.race2up_cy' 'Criterion for policy.race2up_cy variable' 1 # # POSITIVE # true; policy.white_cy variable' 0 # # POSITIVE # true; policy.black_cy variable' 1 # # POSITIVE # true; policy.asian_cy variable' 1 # # POSITIVE # true; policy.pacific_cy variable' 1 # # POSITIVE # true; policy.othrace_cy variable' 1 # # POSITIVE # true; policy.race2up_cy variable' 1 # # POSITIVE # true")
<
```

RuntimeError Traceback (most recent call last)
In [6]:
Line 1: arcpy.ba.SetCriteriaProperties("suit_Analysis3", "populationtotals.popgrwcyfy 'Criterion for populationtotals.popgrwcyfy' 'Criterion for householdincome.pci' 'Criterion for policy.white_cy' 'Criterion for policy.black_cy' 'Criterion for policy.amerind_cy' 'Criterion for policy.asian_cy' 'Criterion for policy.pacific_cy' 'Criterion for policy.othrace_cy' 'Criterion for policy.race2up_cy' 'Criterion for policy.race2up_cy variable' 1 # # POSITIVE # true; policy.white_cy variable' 0 # # POSITIVE # true; policy.black_cy variable' 1 # # POSITIVE # true; policy.asian_cy variable' 1 # # POSITIVE # true; policy.pacific_cy variable' 1 # # POSITIVE # true; policy.othrace_cy variable' 1 # # POSITIVE # true; policy.race2up_cy variable' 1 # # POSITIVE # true)

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 792: raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 789: retval = convertArcObjectToPythonObject(gp.SetCriteriaProperties_ba(*gp_fixargs((in_analysis_layer, cri

teria_properties), True))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing_base.py, in <lambda>
Line 511: return lambda *args: val(*gp_fixargs(args, True))

RuntimeError: Object: Error in executing tool

```
In [14]: 1 #set properties for NRI Risk data
2 arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "PointWeight_Max2 'RISK_SCORE' 2 # # POSITIVE # true")
<
```

RuntimeError Traceback (most recent call last)
In [14]:
Line 2: arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "PointWeight_Max2 'Criterion for PointWeight_MAX2 vari

able' 2 # # POSITIVE # true)

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 792: raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 789: retval = convertArcObjectToPythonObject(gp.SetCriteriaProperties_ba(*gp_fixargs((in_analysis_layer, cri

teria_properties), True))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing_base.py, in <lambda>
Line 511: return lambda *args: val(*gp_fixargs(args, True))

RuntimeError: Object: Error in executing tool

```
In [1]: 1 #set properties for solar data
2 arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "solar_potential 'ave_dni' 1 # # POSITIVE # true")
<
```

RuntimeError Traceback (most recent call last)
In [1]:
Line 2: arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "solar_potential 'ave_dni' 1 # # POSITIVE # true")

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 792: raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 789: retval = convertArcObjectToPythonObject(gp.SetCriteriaProperties_ba(*gp_fixargs((in_analysis_layer, cri

teria_properties), True))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing_base.py, in <lambda>
Line 511: return lambda *args: val(*gp_fixargs(args, True))

RuntimeError: Object: Error in executing tool

```
In [1]: 1 #set properties for geothermal data
2 arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "geo_potential 'class' 1 # # POSITIVE # true")
<
```

RuntimeError Traceback (most recent call last)
In [1]:
Line 2: arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "geo_potential 'class' 1 # # POSITIVE # true")

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 792: raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 789: retval = convertArcObjectToPythonObject(gp.SetCriteriaProperties_ba(*gp_fixargs((in_analysis_layer, cri

teria_properties), True))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing_base.py, in <lambda>
Line 511: return lambda *args: val(*gp_fixargs(args, True))

RuntimeError: Object: Error in executing tool

```
In [1]: 1 #set properties for wind data
2 arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "wind_potential 'a30' 1 # # POSITIVE # true")
<
```

RuntimeError Traceback (most recent call last)
In [1]:
Line 2: arcpy.ba.SetCriteriaProperties("Suit_Analysis3", "wind_potential 'a30' 1 # # POSITIVE # true")

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 792: raise e

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\ba.py, in SetCriteriaProperties
Line 789: retval = convertArcObjectToPythonObject(gp.SetCriteriaProperties_ba(*gp_fixargs((in_analysis_layer, cri

teria_properties), True))

File C:\Program Files\ArcGIS\Pro\Resources\ArcPy\arcpy\geoprocessing_base.py, in <lambda>
Line 511: return lambda *args: val(*gp_fixargs(args, True))

RuntimeError: Object: Error in executing tool

```
In [1]: 1 #however, I was still able to successfully run the final calculation
2 #because the criteria was set at default amounts when I originally set the variables
3 #but this output is definitely wrong, because I was never able to set important stipulations, like setting Incom
4 #so I have even less insight into the weighting than I did in my trial run in the GUI
5 #the final output used in my lab report came from running the data formatted above in the GUI tools
6
7 arcpy.ba.CalculateSuitabilityScore("Suit_Analysis3")
<
```

Out[15]: **Output**
a Layer object

Messages

Start Time: Saturday, May 8, 2021 1:33:45 AM

Succeeded at Saturday, May 8, 2021 1:33:49 AM (Elapsed Time: 4.80 seconds)

Format layout

```
In [18]: 1 #format and export
2 arcpy.mp.ArcGISProject(r"C:\Users\celia\Documents\ArcGIS\Projects\GIS5572_FinalProj\GIS5572_FinalProj.apr
3 lyr = aprx.listLayouts("Final Layout")
4 lyr.exportToPDF(r"C:\Users\celia\Documents\ArcGIS\Projects\GIS5572_FinalProj\Final_Layout.pdf", resolution = 300
<
```

Out[18]: 'C:\Users\celia\Documents\ArcGIS\Projects\GIS5572_FinalProj\Final_Layout.pdf'