Workng with Vectors in arcpy

Working with Vectors in arcpy

Overview

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4. Selecting Data
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Using More Toolbox Tools

Using More Toolbox Tools

- Online documentation of all tools is geared toward arcpy
  - See the Tool Reference

Layers and Views in arcpy

Layers and Views in arcpy

- When a dataset is opened in ArcMap it becomes a Layer
- A table is opened as a View
- Layers and Views allow some non-destructive operations
  - Selection
  - Symbolization
- Layers do not persist after a session is closed unless explicitly saved

Layers and Views in arcpy

- Many types of layers/views:
    - Feature Layer
    - Image Server Layer
    - LAS Dataset Layer
    - Mosaic Layer
    - Query Layer
    - Query Table
    - Raster Catalog Layer
    - Raster Layer
    - Table View
    - WCS Layer
    - XY Event Layer

Layers and Views in arcpy

- Create a feature layer in ArcMap by adding feature class to map document
- How to create in arcpy?

```
>>> import arcpy

# an point feature class
>>> featureclass = r"C:\GIS\Data\NatlForests.gdb\Trees"

>>> featurelayer = arcpy.MakeFeatureLayer_management(featureclass,
                                                     "TreesLayer")

>>> featurelayer
(Result 'TreesLayer')

# the layer is a Layer object from the arcpy.mapping module
>>> featurelayer[0]
(map layer u'TreesLayer')
```

Layers and Views in arcpy

- Most tools will accept a layer/view or a path
    - In a tool GUI, when you click a drop-down to select a dataset, that is one of the open layers in the map document
    - Can also browse for a dataset, which supplies a path
- Some tools work explicitly with layers

SQL Queries

SQL Queries

- ArcGIS uses SQL as its query language, with some rather variable syntax:
  - A field name in a file geodatabase is wrapped in `""`
  - Fields names in personal geodatabase are wrapped with `[]`
  - SDE doesn't have field name delimiters
  - In SDE, table names are of the format `<database_name>.<schema>.<table_name>`
  - Joined field names are similarly difficult: `<orig_tbl>.<field_name>`

SQL Queries

- Field name delimiters are easily dealt with:

```
>>> import arcpy

>>> data = r"C:\Data.gdb\Marshes"

>>> query = "{statefld} = '{val1}' AND {areafld} >= {size}"\
                .format(arcpy.AddFieldDelimiters(data, "STATE"),
                        "OR",
                        arcpy.AddFireldDelimiters(data, "SHAPE_AREA"),
                        10000)

>>> query
'"STATE" = \'OR\' AND "SHAPE_AREA" >= 10000'
```

SQL Queries

- SDE table names and joined fields are not dealt with easily
- Three ideas:
  - The code is specific to a given application, so hard code the table name: `datastore.DBO.CoffeeShops`
  - Use the listing functions:
    `field_name = arcpy.ListFields(table, "*" + search_field_name)`
  - Maybe enough information can be gathered to reconstruct the field name: `field_name = table_name + "." + search_field_name)`

Selecting Data

Selecting Data

- Four ways to select data:
  - Definition Query when making a feature layer/table view
  - By Attributes
  - By Location
  - Using `arcpy.Select_analysis()`
    (Not to be confused with `arcpy.SelectData_management()`)

Selecting Data

- Remember: definition queries, select by attributes, select by location do not create a permanent selection
    - Use `arcpy.CopyFeatures_management()` to create a new feature class from the selected features
    - Use `arcpy.DeleteFeatures_management()` to delete selected features from the original data
        - Caution: this IS permanent -- it does not make a copy
        - Not to be confused with `arcpy.Delete_management()`
- Use `arcpy.GetCount_management()` to check if any features were selected

An Example Vector Workflow

An Example Vector Workflow

Scenario

You work for a regional water provider which has a file geodatabase with data representing the water system. Your supervisor has asked you to create a dataset representing the area within 100 feet of any active main segment that has experienced a shear break leak.

An Example Vector Workflow

```
import arcpy

mains = r"C:\Data\Water.gdb\Mains"
leaks = r"C:\Data\Water.gdb\Leaks"
output = r"C:\Data\Analysis.gdb\Leak_areas"

# def query to get active mains
lyr_mains = arcpy.MakeFeatureLayer_management(mains,
                                              "lyr_mains",
                                              "\"Status\" = 'ACTIVE'")

# def query to get shear breaks
lyr_leaks = arcpy.MakeFeatureLayer_management(leaks,
                                              "lyr_leaks",
                                              "\"Type\" = 'SHEAR_BREAK'")

# select by location to get leaky mains
leaky_mains = arcpy.SelectLayerByLocation_management(lyr_mains,
                                                     "INTERSECT",
                                                     lyr_leaks)

# if leaky mains, buffer and dissolve all buffers
if int(arcpy.GetCount_management(leaky_mains).getOutput(0)):

    # "#" in an arcpy function means use default
    arcpy.Buffer_analysis(leaky_mains, output, "100 FEET", "#", "#", "ALL")
```