GSF Py for ArcGIS

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Contents

GSF Py for ArcGIS provides a Python client library, named gsfarc, to run IDL and ENVI analytics provided by Geospatial Services Framework through ArcMap, ArcGIS Pro, and ArcGIS Server.

See http://www.harrisgeospatial.com/ for more details on product offerings.

CHAPTER 1

Usage

GSF Py for ArcGIS allows users to generate an ArcGIS Python Toolbox containing geoprocessing tools (GPTools) associated with tasks provided by GSF.

There are three ways to create an ArcGIS Python Toolbox:

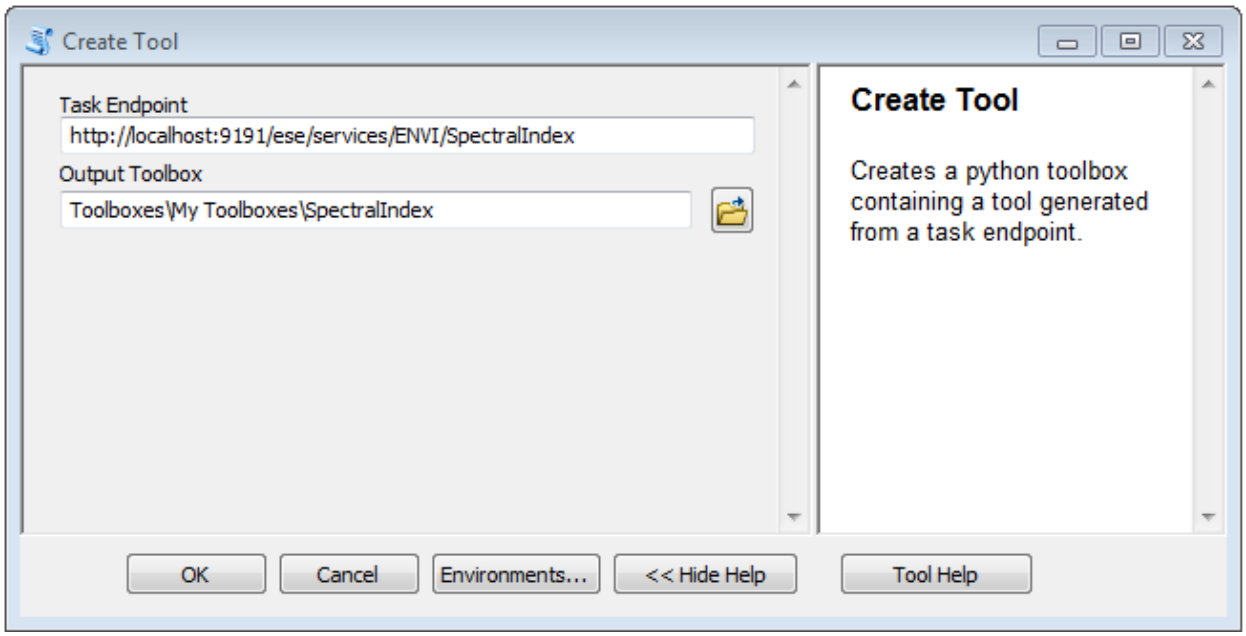
- Through a GSF Python Toolbox provided as a system toolbox from ArcMap or ArcGIS Pro.
- Through a command-line tool, named creategptoolbox, provided in the Python scripts directory.
- Through Python using the Python package, gsfarc.

GSF Python Toolbox

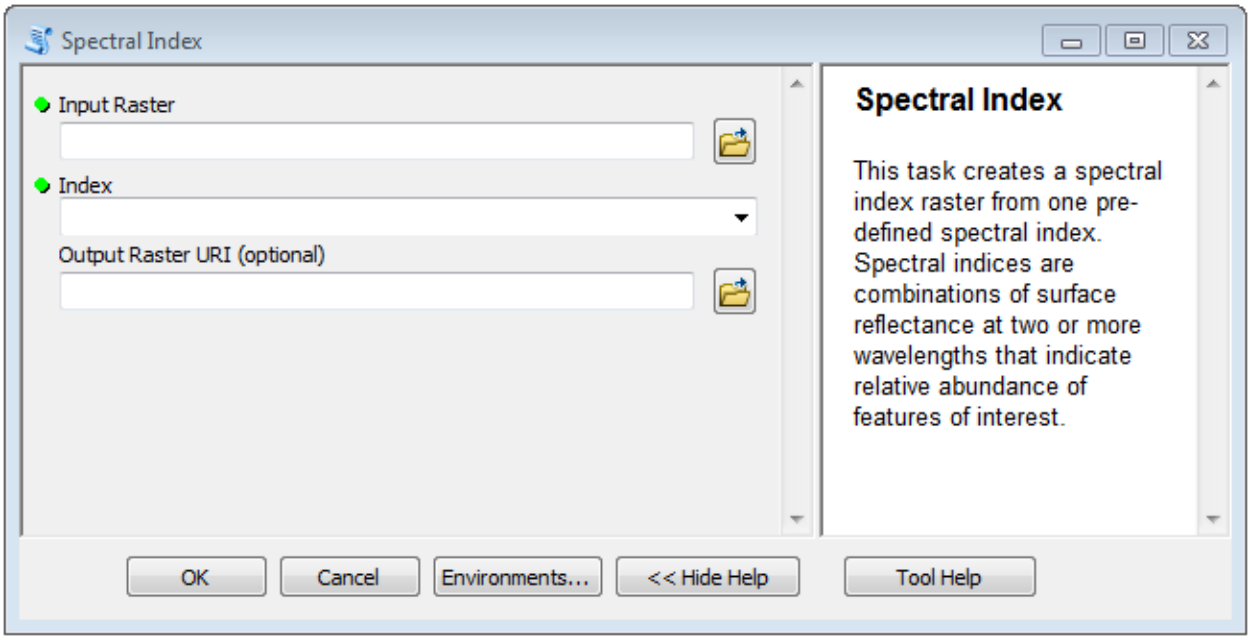
From ArcMap

Once the Python package is installed, the GSF Python toolbox becomes available as a system toolbox.

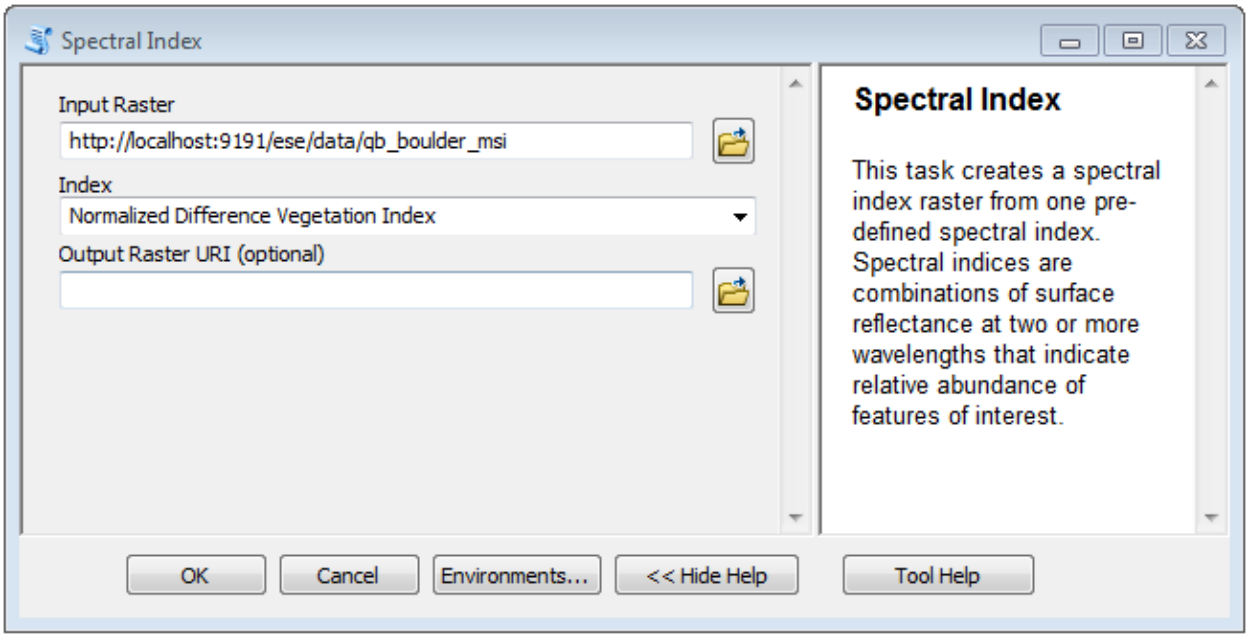
- Launch ArcMap
- Navigate in the Catalog window to Toolboxes → System Toolboxes → GSF.pyt → Create Tool. Note: If GSF.pyt does not appear in System Toolboxes, connect to the folder located at C:\Python27\ArcGIS10.x\Lib\site-packages\gsfarc\esri\toolboxes\ and GSF.pyt can be run from there.
- Double-click on Create Tool, and the tool appears with two required input parameters.
- The first parameter specifies the REST URL endpoint to the GSF task to be wrapped in a GPTool. The second parameter is the location where the toolbox is created. Note: If not running ArcMap on same system as the GSF server, replace *localhost* with the GSF server name.



- Click OK, and when the tool finishes generating the new toolbox, navigate to the location specified in Output Toolbox.
- Double-click on Spectral Index, and the tool appears with two required input parameters and one optional parameter.



- There are two options available for selecting data for the Input Raster. The first option is to select a raster from a directory. For this option to succeed, the data must be accessible by the GSF Server as well - either on the server itself, or on a shared network drive that can be accessed by GSF. The second option is to input an http data source that GSF can handle. By default, a GSF server has sample data available at the http://localhost:9191/ese/data location. To test the tool generation, choose the http option.

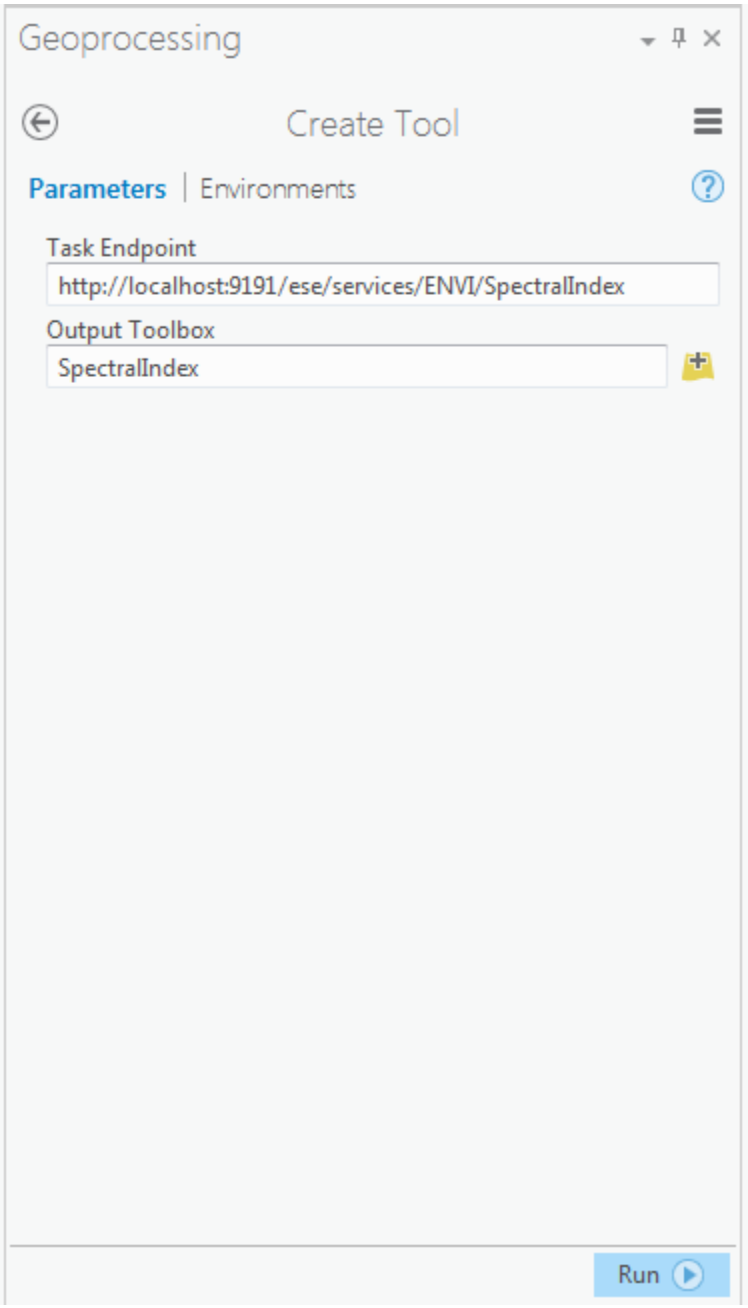


- Click OK, and when the tool finishes processing, the result appears in ArcGIS. Debug Tip: To see if GSF server received the job and to check the job status, go to http://localhost:9191/job-console/

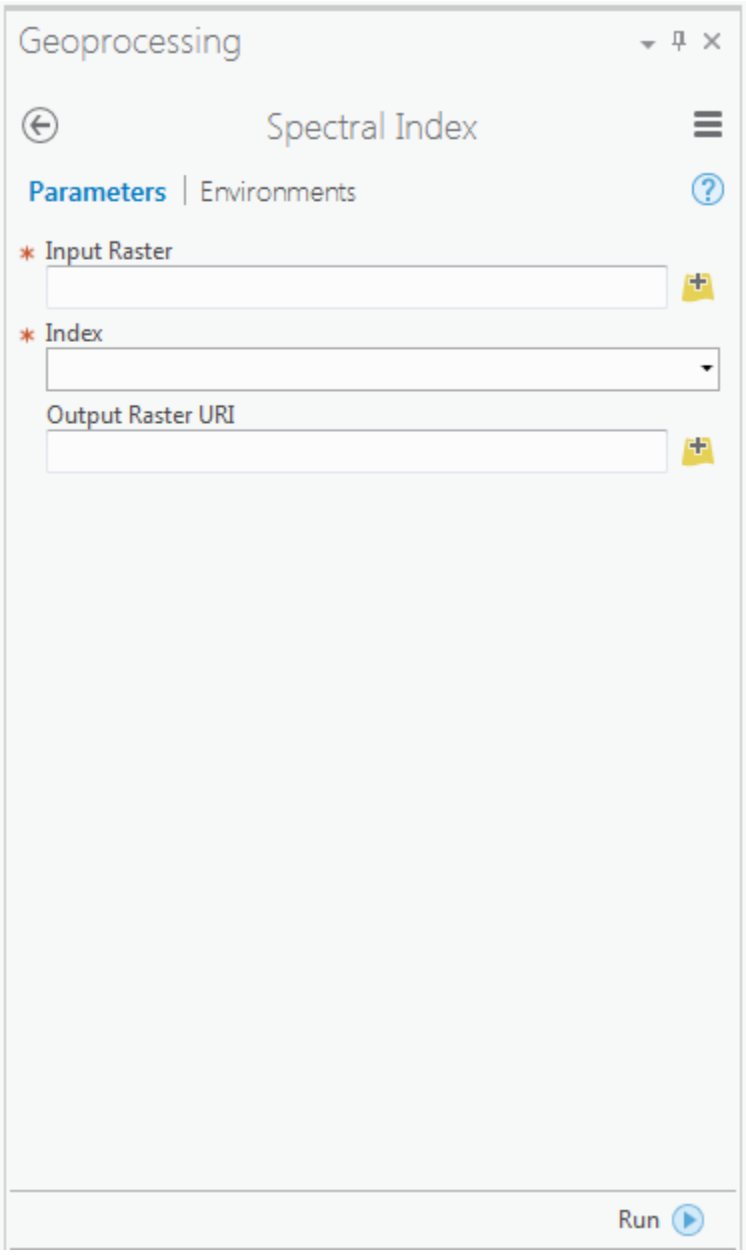
From ArcGIS Pro

Once the Python package is installed, the GSF Python toolbox can be added to a project in ArcGIS Pro.

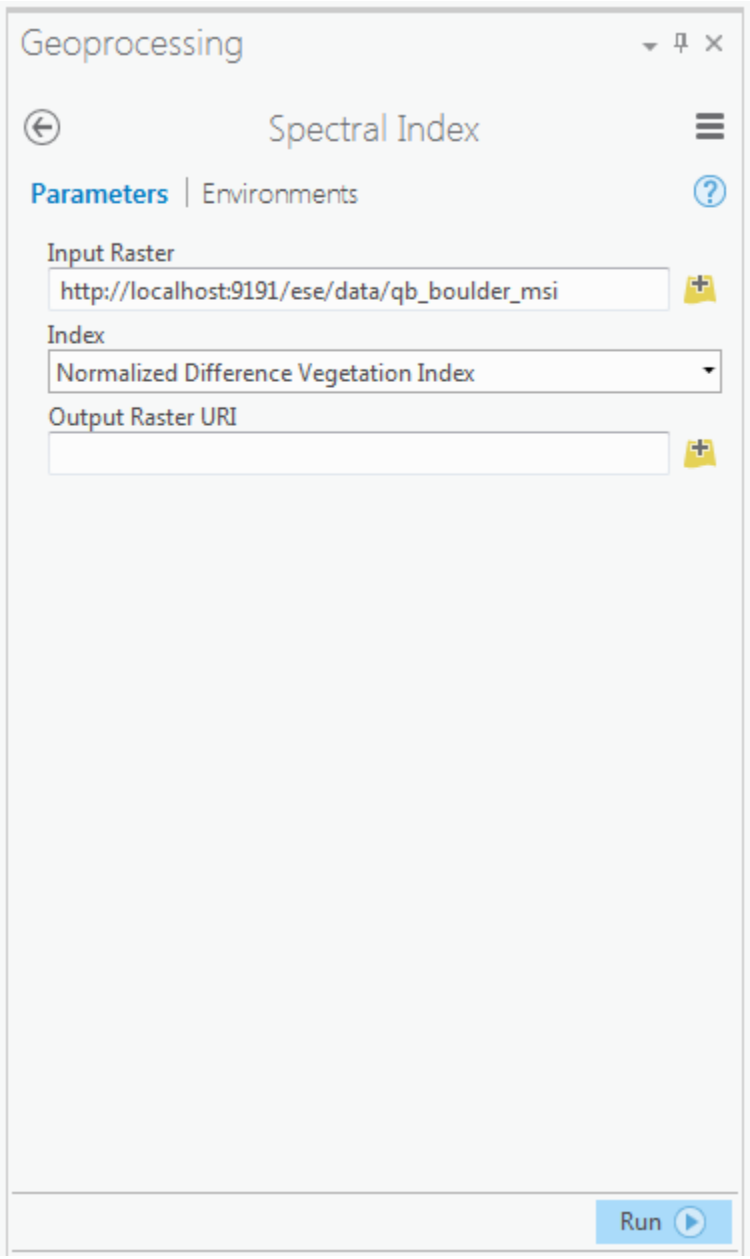
- Launch ArcGIS Pro
- Select or create new project to work with GSF Tasks
- To setup for the display of results, select the Insert tab and click on New Map
- In Project pane, select Toolboxes, right-click and select Add Toolbox
- Navigate to C:\Python34\Lib\site-packages\gsfarc\esri\toolboxes, and select GSF.pyt
- Expand the GSF toolbox, and double-click on Create Tool.
- The tool appears with two required input parameters. The first parameter specifies the REST URL endpoint to the GSF task to be wrapped in a GPTool. The second parameter is the location where the toolbox is created. Note: If not running ArcGIS Pro on same system as the GSF server, replace *localhost* with the GSF server name.



- Click run and when the tool finishes generating a new toolbox, navigate in the Project tab to the location specified in Output Toolbox.
- Double-click on Spectral Index. The tool will appear with two required parameters, and one optional parameter.



- There are two options available for selecting an image for Input Raster. The first option is to select a raster from a directory. For this option to succeed, the data must be also accessible by the GSF Server - either on the server itself, or on a shared network drive that can be accessed by GSF. The second option is to use an http data source that GSF can handle. By default, a GSF server has sample data available at the http://localhost:9191/ese/data location. To test the tool generation, choose the http option.



- Click OK, and when the tool finishes processing, the result will appear in ArcPro. Debug Tip: To see if GSF server received the job and to check the job status, go to http://localhost:9191/job-console/

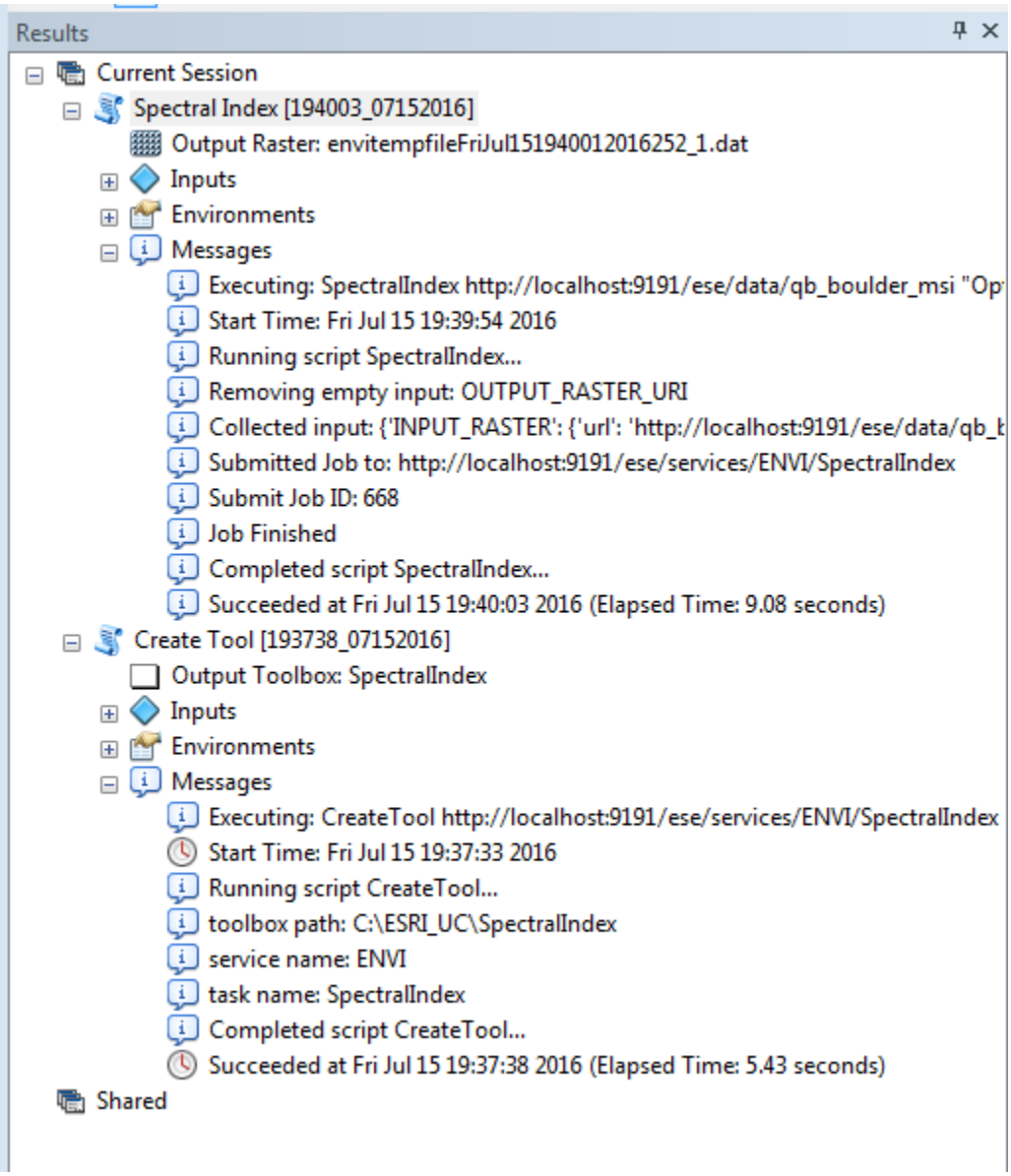
Publish to ArcGIS Server

To publish a GPTool to ArcGIS Server, install GSF Py on ArcGIS Server, selecting the GSF Py 64-bit option. After the installation of GSF Py on the ArcGIS Server, restart the ArcGIS Server to make GSF Py client Python libraries available to GPServices. Note: The ArcGIS Server publishing tools are only available in ArcMap.

If the ArcGIS Server is not on the same host as the GSF Server, enter the GSF server name instead of localhost when creating the tool. See instructions above to generate and run a tool.

- After a GPTool has completed execution, select Geoprocessing → Results.

- In the Current Session there are two results, one for Create Tool, and the other for Spectral Index.



- Right-click on the Spectral Index result, and select Share As → Geoprocessing Service.
- Follow ESRI instructions on how to publish a service.

CHAPTER 3

From Command-line

createsftoolbox.py is a command-line tool in the gsfarc package used to create a Python toolbox that wraps GSF tasks.

For ArcMap the script is located at C:\Python27\ArcGIS10.x\scripts.

For ArcGIS Pro the script is located at C:\Python34\scripts.

To display the help, navigate to the scripts directory and run the –help option:

```
$ createsftoolbox.py --help
```

To create a Python toolbox with the ENVI Tasks SpectralIndex and ISODATAClassification, run this command. If not running on the same system as the server, replace localhost with server name.:

```
$ createsftoolbox.py http://localhost:9191/ese/services/ENVI SpectralIndex ISODATAClassification --o
```

The toolbox name is the same as the service name if no option is provided. The output directory defaults to the current directory if no option is provided.

CHAPTER 4

From Python

The create_toolbox member method is the first way to create a toolbox from a Python module. Connect to the GSF server the toolbox is intended to use. If not running on the same system as the server, replace localhost with server name.:

```
>>> from gsf import Server
>>> server = Server('localhost','9191')
```

Now, construct a list of tasks to add to the toolbox:

```
>>> service = server.service('ENVI')
>>> task_list = [service.task('SpectralIndex'), service.task('ISODATAClassification')]
```

Next, instantiate a GPToolbox class for creating a toolbox:

```
>>> from gsfarc.gptoolbox import GPToolbox
>>> gsf_toolbox = GPToolbox(task_list)
>>> toolbox_file = gsf_toolbox.create_toolbox('c:\\my_gsf_tools')
```

The create_toolbox method returns the filename of the toolbox, which can then be used by arcpy to import the toolbox:

```
>>> import arcpy
>>> arcpy.ImportToolbox(toolbox_file)
```

Run the toolbox.

```
>>> input_raster = 'http://localhost:9191/ese/data/qb_boulder_msi'
>>> index = 'Normalized Difference Vegetation Index'
>>> result = arcpy.GSF.SpectralIndex(input_raster,index)
>>> print(result)
```

CHAPTER 5

API Documentation

GPToolbox

GPTool Parameter Builder

The GPTool Parameter Builder is responsible for creating code blocks to be placed into the main GPTool template. Each create method corresponds to a GPTool method that must be defined in order for it to be a valid tool. These methods implement the GetParameterInfo, UpdateParameter, and Execute methods of the GPTool Python class.

For example, to define a GPTool in a Python toolbox, start out with a class definition and implement the methods arcpy expects:

```
class myTool(Object):
    def __init__(self):
        self.label = "My Tool"
        self.description = "Tool description"
        self.canRunInBackground = True

    def getParameterInfo(self):
        # builder.create_param_info() goes here

    def is Licensed(self):
        return True

    def updateParameters(self, parameters):
        # builder.create_update_parameter goes here

    def updateMessages(self, parameters):
        return

    def execute(self, parameters, messages):
        # builder.create_pre_execute goes here
        # submit job
        # builder.create_post_execute goes here
```

exception gsfarc.gptool.parameter.builder.**UnknownDataTypeError**
Error class for raising unknown datatypes

gsfarc.gptool.parameter.builder.**convert_list**(*in_list*)
Converts a list of strings to a printable list of object names

gsfarc.gptool.parameter.builder.**create_param_info**(*task_params*)
Builds the code block for the GPTool GetParameterInfo method based on the input task_params.

Parameters **task_params** – A list of task parameters to map to GPTool parameters.

Returns A string representing the code block to the GPTool GetParameterInfo method.

gsfarc.gptool.parameter.builder.**create_post_execute**(*task_params*)
Builds the code block for the GPTool Execute method after the GSF job is submitted based on the input task_params.

Parameters **task_params** – A list of task parameters from the task info structure.

Returns A string representing the code block to the GPTool Execute method.

gsfarc.gptool.parameter.builder.**create_pre_execute**(*task_params*)
Builds the code block for the GPTool Execute method before the GSF job is submitted based on the input task_params.

Parameters **task_params** – A list of task parameters from the task info structure.

Returns A string representing the code block to the GPTool Execute method.

gsfarc.gptool.parameter.builder.**create_update_parameter**(*task_params*)
Builds the code block for the GPTool UpdateParameter method based on the input task_params.

Parameters **task_params** – A list of task parameters from the task info structure.

Returns A string representing the code block to the GPTool UpdateParameter method.

GPTool Parameter Template

class gsfarc.gptool.parameter.template.**Template**(*data_type*)
Interface class for mapping ESE parameters to ArcGIS GPTool parameters.

default_value()
Defines the code block for this parameter data type in the GPTool GetParameterInfo if a default value exists.

Returns Returns the string.Template object.

get_parameter(*task_param*)
Defines the code block for this parameter data type in the GPTool GetParameterInfo method. All code returned must begin with 2 indents. The template is substituted against the GP parameter dictionary.

Parameters **task_param** – The ESE task parameter information.

Returns Returns the string.Template object.

parameter_names(*task_param*)
Defines the code block for the parameter variable names in the GPTool GetParameterInfo method.

Parameters **task_param** – The ESE task parameter

Returns A list of string.Template objects representing the parameter variable names defined in get_parameter.

post_execute()
Defines the code block for this parameter data type in the GPTool Execute method after the job is submitted to GSF

Returns Returns the the string.Template object

pre_execute()
Defines the code block for this parameter data type in the GPTool Execute method before the job is submitted to GSF

Returns Returns the string.Template object

update_parameter()
Defines the code block for this parameter data type in the GPTool UpdateParameter method.

Returns Returns the string.Template object.

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