ENVI Py for ArcGIS Documentation

Release 1.0

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Contents

ENVI Py for ArcGIS provides a Python client library named envipyarc to run ENVI analytics through ArcMap™ and ArcGIS Pro.

CHAPTER 1

System Requirements

- ENVI 5.3 Service Pack 2 or later
- ArcMap 10.4 or later and/or ArcGIS Pro 1.3 or later

To use ENVI for ArcGIS full interoperability, ENVI 5.4 is required.

CHAPTER 2

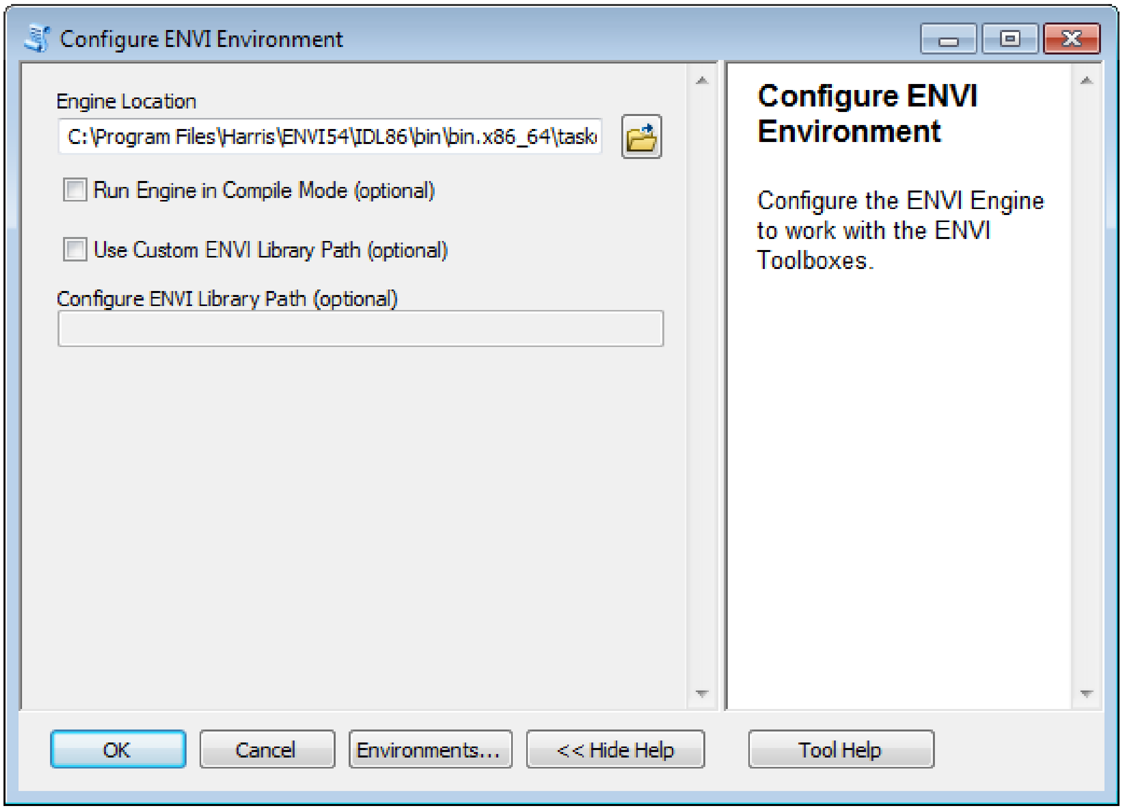
Installation and Configuration

ArcMap

1. Start a Windows command prompt in administrator mode.
2. Issue the following commands:

```
$ cd c:\Python27\ArcGIS10.5\Scripts
$ pip install envipyarc
```

3. Close the windows command prompt.
4. Start ArcMap.
5. In the Catalog window, select **Toolboxes > System Toolboxes > ENVI Management Tools.pyt > Configure ENVI Environment**. If this file does not appear in System Toolboxes, connect to the folder located at C:\Python27\ArcGIS10.x\Lib\site-packages\envipyarc\esri\toolboxes\ and run it from there.
6. Double-click **Configure ENVI Environment**.



Engine Location

C:\Program Files\Harris\ENVI54\IDL86\bin\bin.x86_64\task

□ Run Engine in Compile Mode (optional)

□ Use Custom ENVI Library Path (optional)

Configure ENVI Library Path (optional)

Configure ENVI Environment

Configure the ENVI Engine to work with the ENVI Toolboxes.

7. In the required **Engine Location** field, enter the full path of the 'taskengine.exe' in your ENVI distribution. The default path is <ENVI_INSTALL_DIR>\IDLXX\bin\bin.x86_64\taskengine.exe
8. Enable the **Run Engine in Compile Mode** option if you want to compile .pro files. This depends on what your ENVI license allows. If you disable this option, the ENVI code you want to run must be packaged as IDL SAVE files (.sav).
9. Enable the **Use Custom ENVI Library Path** option to specify one or more directories that contain custom ENVI code. Then enter the path to the directories in the **Configure ENVI Library Path** field. Use a semicolon to separate individual directory paths.
10. Click **OK** to run the tool and save the environment.

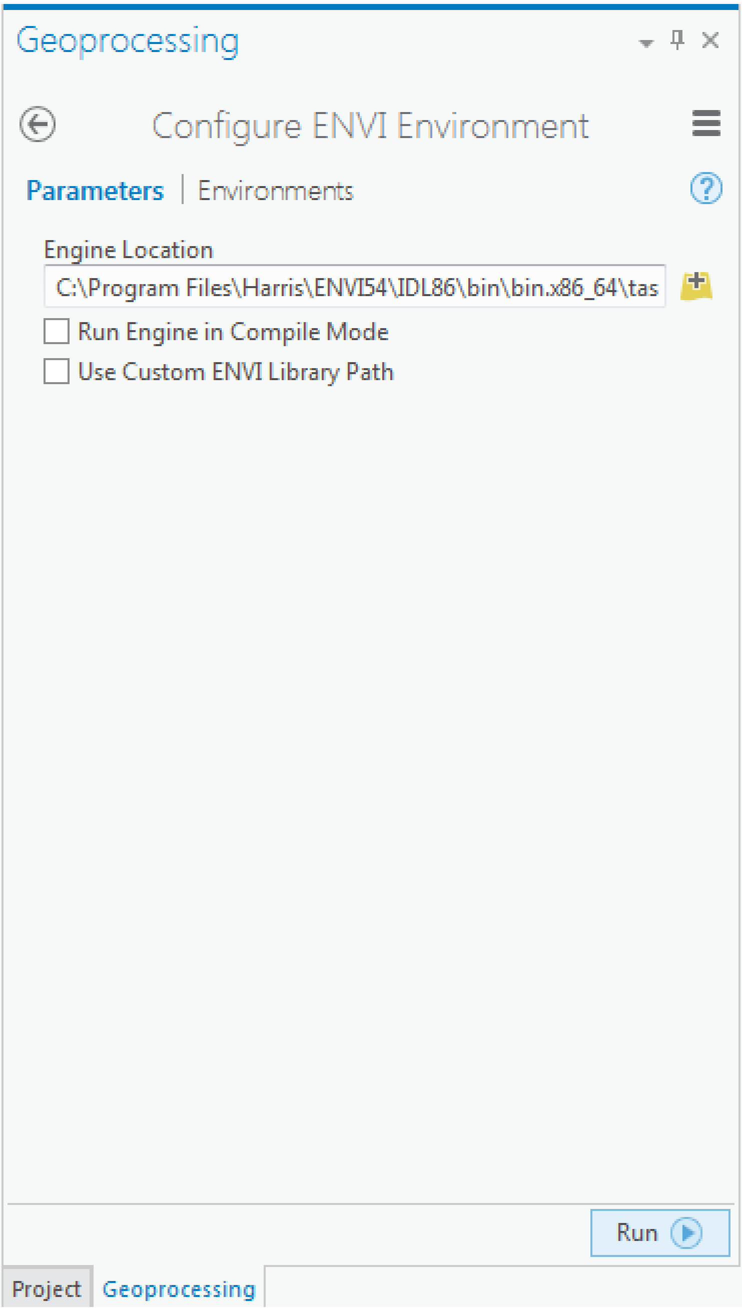
ArcGIS Pro

1. From the Windows start menu, select **ArcGIS > ArcGIS Pro > Python Command Prompt**. Be sure to run this as an administrator.
2. Issue following command:

```
$ pip install envipyarc
```

3. Close the **Python Command Prompt**.
4. Start ArcGIS Pro.
5. Click **Select another project template**.
6. Select **New > Computer** and click the **Browse** button.

7. Navigate to C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\lib\site-packages\envipyarc\esri\projecttemplates\.
8. Select ENVIPyManagement.aptx.
9. Enter a name for your project and click **OK**.
10. In the Project pane, select **Toolboxes > ENVI Management Tools.pyt**.
11. Expand the **ENVI Management Tools** toolbox, and double-click the **Configure ENVI Environment** tool.


Geoprocessing

Configure ENVI Environment

Parameters | Environments

Engine Location

C:\Program Files\Harris\ENVI54\IDL86\bin\bin.x86_64\tas

□ Run Engine in Compile Mode

□ Use Custom ENVI Library Path

11. In the required **Engine Location** field, enter the full path of the 'taskengine.exe' in your ENVI distribution. The default path is <ENVI_INSTALL_DIR>\IDLXX\bin\bin.x86_64\taskengine.exe.
12. Enable the **Run Engine in Compile Mode** option if you want to compile .pro files. This depends on what your

ENVI license allows. If you disable this option, the ENVI code you want to run must be packaged as IDL SAVE files (.sav).

13. Enable the **Use Custom ENVI Library Path** option to specify one or more directories that contain custom ENVI code. Then enter the path to the directories in the **Configure ENVI Library Path** field. Use a semicolon to separate individual directory paths.
14. Click **OK** to run the tool and save the environment.

CHAPTER 3

Usage

ENVI Py for ArcGIS lets you generate an ArcGIS Python Toolbox that contains geoprocessing tools (GPTools). These tools are associated with tasks provided by ENVI. You can create an ArcGIS Python Toolbox in the following ways:

- An ENVI Management Tools toolbox provided as a system toolbox for ArcMap.
- An ENVI Py Management project template containing the ENVI Management Tools toolbox for ArcGIS Pro.
- A command-line tool, named createenvitoolbox, provided in the Python scripts directory.
- A Python package named envipyarc.

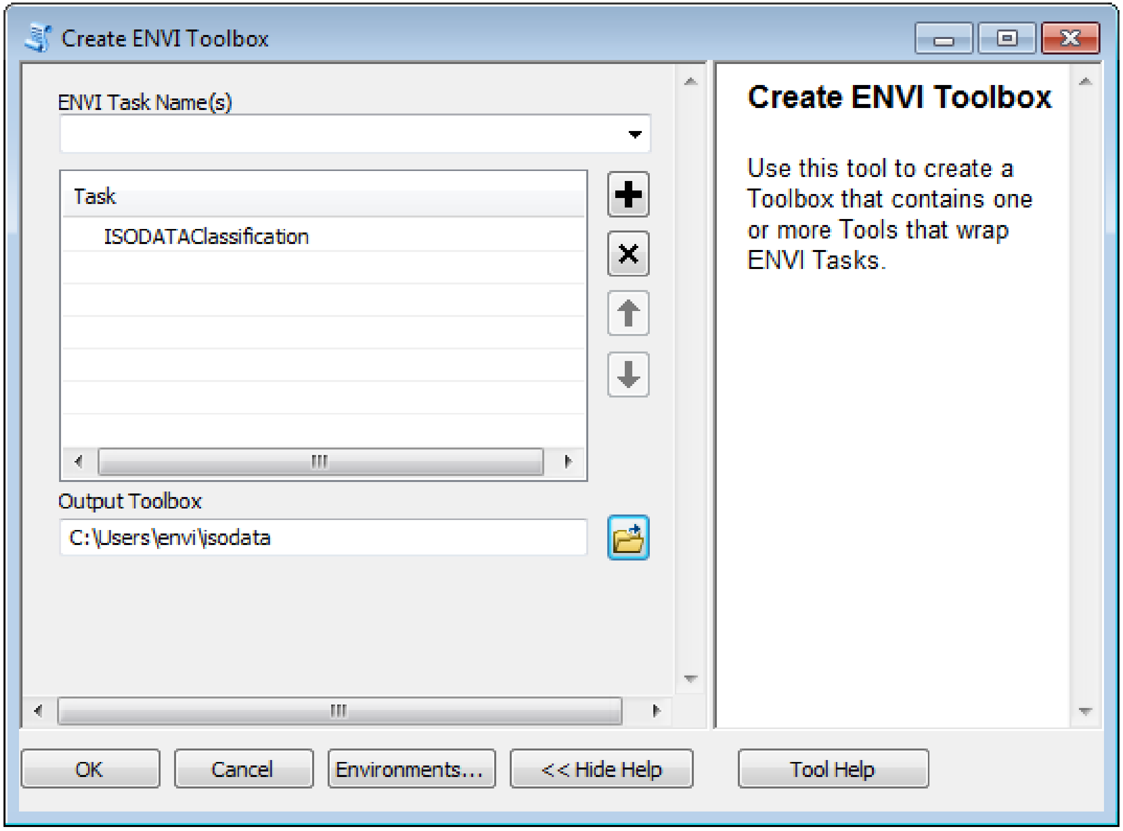
The options are described next.

CHAPTER 4

Create ENVI Toolbox

ArcMap

1. Start ArcMap.
2. In the Catalog window, select **Toolboxes > System Toolboxes > ENVI Management Tools.pyt > Create ENVI Toolbox**.
3. Double-click **Create ENVI Toolbox**.
4. In the required **ENVI Task Name(s)** field, enter one or more ENVI tasks to be wrapped into a GPTool.
5. Click the + button to add the tasks to the Task list.
6. In the required **Output Toolbox** field, specify a location to create the toolbox.



Create ENVI Toolbox

ENVI Task Name(s)

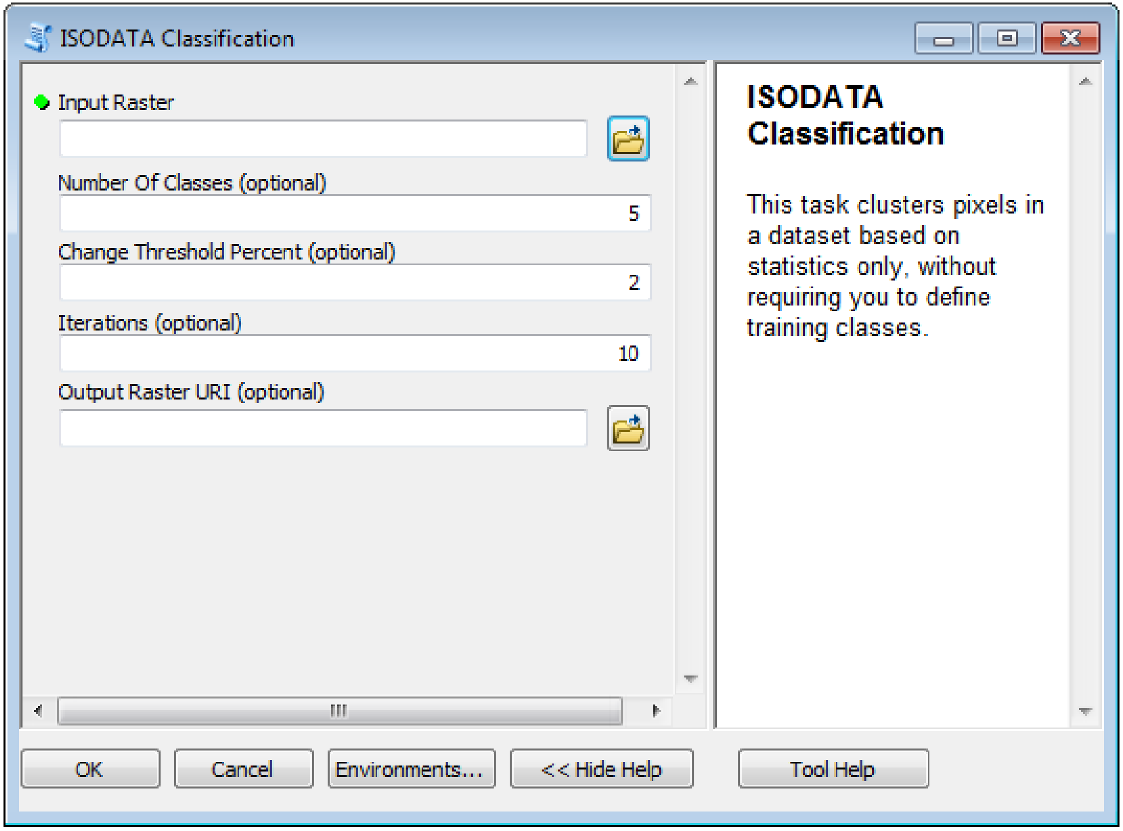
Task
ISODATAClassification

Output Toolbox: C:\Users\envi\isodata

Create ENVI Toolbox

Use this tool to create a Toolbox that contains one or more Tools that wrap ENVI Tasks.

5. Click **OK**. After the toolbox is created, navigate to the location specified in **Output Toolbox**.
6. Double-click **ISODATAClassification**. The ISODATA Classification tool appears.



ISODATA Classification

Input Raster

Number Of Classes (optional): 5

Change Threshold Percent (optional): 2

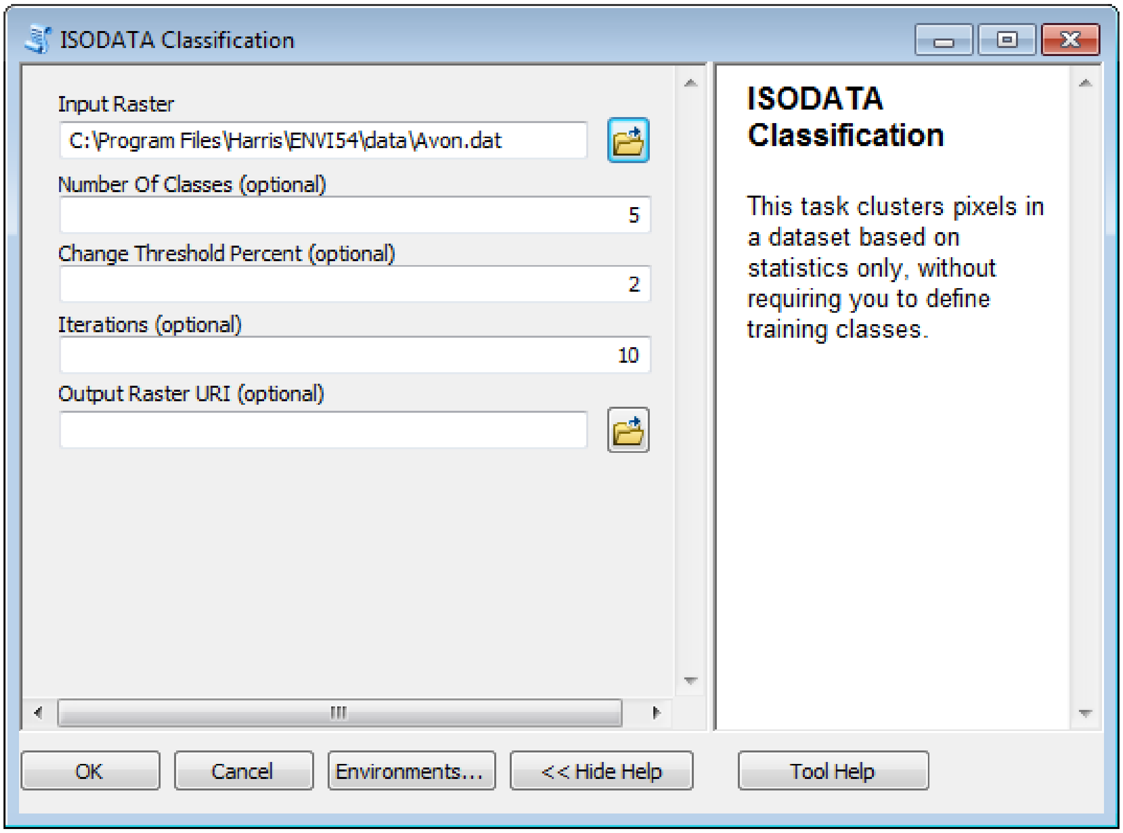
Iterations (optional): 10

Output Raster URI (optional)

ISODATA Classification

This task clusters pixels in a dataset based on statistics only, without requiring you to define training classes.

7. In the required **Input Raster** field, select an input raster dataset.



ISODATA Classification

Input Raster: C:\Program Files\Harris\ENVI54\data\Avon.dat

Number Of Classes (optional): 5

Change Threshold Percent (optional): 2

Iterations (optional): 10

Output Raster URI (optional):

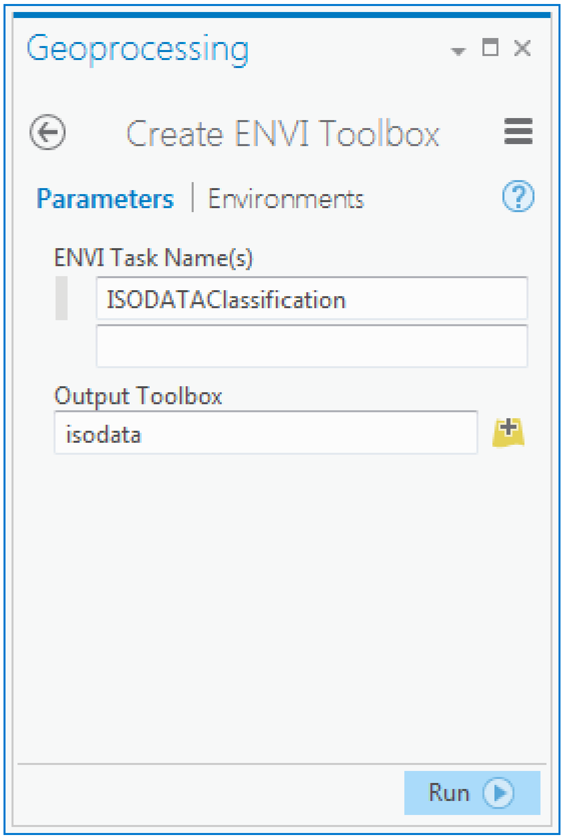
ISODATA Classification

This task clusters pixels in a dataset based on statistics only, without requiring you to define training classes.

8. Click **OK**. When processing is complete, the result will display in ArcMap.

ArcGIS Pro

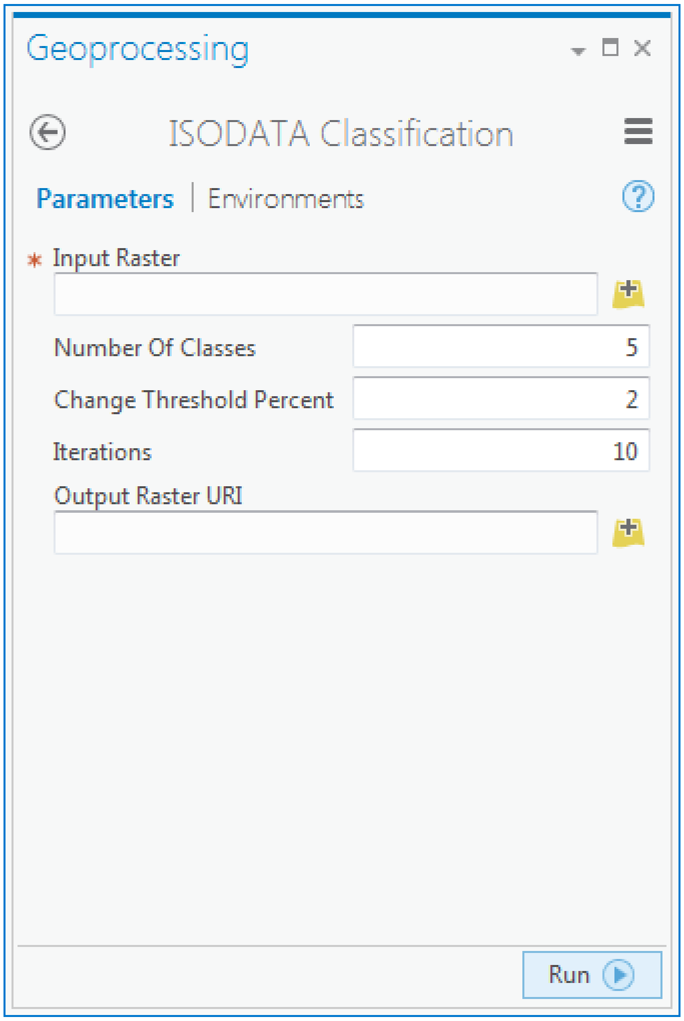
1. Start ArcGIS Pro.
2. Open the project you created earlier in the Installation section.
3. In the **Project** pane, select **Toolboxes > ENVI Management Tools.pyt > Create ENVI Toolbox**.
4. Double-click **Create ENVI Toolbox**.
5. In the required **ENVI Task Name(s)** field, enter one or more ENVI tasks to be wrapped into a GPTool.
6. Click the + button to add the tasks to the Task list.
7. In the required **Output Toolbox** field, specify a location to create the toolbox.



ENVI Task Name(s): ISODATAClassification

Output Toolbox: isodata

6. Click **Run**. When processing is complete, use the **Project** tab to navigate to the **Output Toolbox** field.
7. Double-click **ISODATAClassification**. The ISODATA Classification tool appears.



* Input Raster

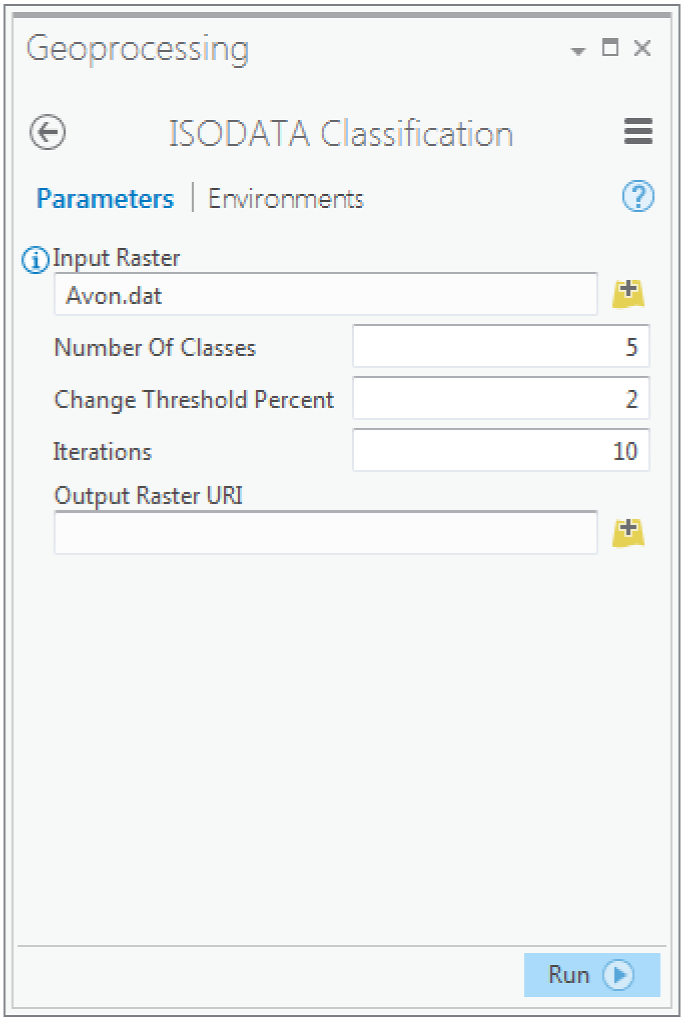
Number Of Classes 5

Change Threshold Percent 2

Iterations 10

Output Raster URI

8. In the required **Input Raster** field, select an input raster dataset.



Input Raster: Avon.dat

Number Of Classes: 5

Change Threshold Percent: 2

Iterations: 10

Output Raster URI:

9. Click **Run**. When processing is complete, the result will display in ArcGIS Pro.

Command Line

The envipyarc package contains a command-line tool named createenvitoolbox.py. This tool can create a Python toolbox that wraps ENVI tasks. The location of this file differs by product:

- ArcMap: C:\Python27\ArcGIS10.x\scripts
- ArcGIS Pro: C:\Program Files\ArcGIS\Pro\bin\Python\envs\arcgispro-py3\Scripts

To run the script, go to the Windows Start menu and select **ArcGIS > Python Command Prompt**.

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

```
$ python createenvitoolbox.py --help
```

- To create a Python toolbox with the ENVI Tasks SpectralIndex and ISODATAClassification, run the following command:

```
$ python createenvitoolbox.py SpectralIndex ISODATAClassification --output C:\\ENVITasks.pyt
```

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

Python

1. Use the create_toolbox member method to create a toolbox from a Python module:

```
>>> from envipyengine import Engine
>>> engine = Engine('ENVI')
```

2. Construct a list of tasks to add to the toolbox:

```
>>> task_list = [engine.task('SpectralIndex'), engine.task('ISODATAClassification')]
```

3. Instantiate a GPToolbox class for creating a toolbox:

```
>>> from envipyarc import GPToolbox
>>> envi_toolbox = GPToolbox(task_list)
>>> toolbox_file = envi_toolbox.create_toolbox('c:\\my_envi_tools')
```

4. 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)
```

5. Run the toolbox:

```
>>> input_raster = 'C:/Program Files/Harris/ENVI54/data/qb_boulder_msi'
>>> index = 'Normalized Difference Vegetation Index'
>>> result = arcpy.SpectralIndex_envi(input_raster,index)
>>> print(result)
```

CHAPTER 5

API Documentation

ENVI GPToolbox

The ENVI GPToolbox class is used to create python toolboxes capable of running ENVI/IDL analytics inside of ArcMap and ArcGIS Pro. Each generated toolbox contains one or more GPTools that are lightweight wrappers to running ENVI/IDL tasks through the taskengine. For more api documentation on GPToolbox you can view the envipyarclib `GPToolbox` class.

class `envipyarc.gptoolbox.`**`GPToolbox`**(*tasks=None*, *alias='envi'*)

Implementation of the envipyarclib `GPToolbox` class for ENVI/IDL.

CHAPTER 6

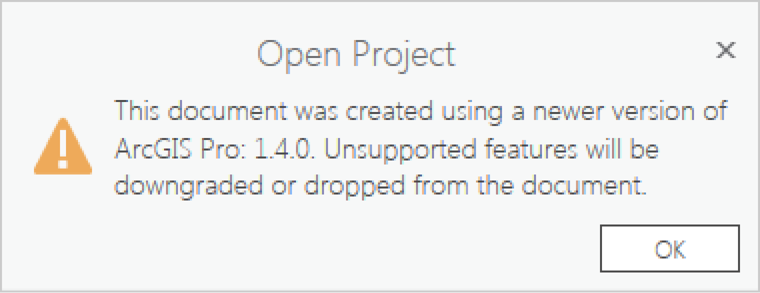
Troubleshooting

No option engine in section: envipyengine

This error means the ENVI Py installation has not been configured to point to your ENVI/IDL taskengine executable. Before running any task or GPTool, make sure you have completed the steps in the *Installation and Configuration* section which sets the path to the ENVI taskengine.

This document was created using a newer version of ArcGIS Pro

when opening the project template in ArcGIS Pro version 1.3 or earlier, you will get this warning message about dropping unsupported features.



This document was created using a newer version of ArcGIS Pro: 1.4.0. Unsupported features will be downgraded or dropped from the document.

The project templates provided are built with ArcGIS Pro 1.4 and package the python toolboxes so they are easily accessible. The templates are supported for ArcGIS 1.2 or newer and no features will be downgraded or dropped.

Python Module Index

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