ENVI Py for ArcGIS Documentation

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


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.

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.
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.
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.
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.

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

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

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

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

3. Instantiate a `GPToolbox` class for creating a toolbox:

   ```python
   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:

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

5. Run the toolbox:

   ```python
   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)
   ```
**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 envipyarc GPToolbox class.

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

Implementation of the envipyarc 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.

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.
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