



# Python For Geographers

Manushi Majumdar, [mmajumdar@esri.com](mailto:mmajumdar@esri.com), [@Manushi\\_M](https://twitter.com/Manushi_M)

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DEVELOPER SUMMIT

# Goals

1. Understanding how to read Python
2. Environment setup essentials
3. Ways to teach yourself Python

# Agenda

1. Bare basics for getting started
2. Basics of Python programming
3. Python Open Source packages
4. GIS and Data Analysis in Python
5. Learning Resources

# What is Python?

- Object-oriented, free scripting language
- Syntax that is easy to learn and understand
- Flexible language for building prototypes

## Benefits:



1. **Scalability**
2. **Integrated packages**
3. **Open source and community development**










# Getting started with Python











- Get Python - <https://www.anaconda.com/distribution/>
- Install Python - <https://docs.anaconda.com/anaconda/install/>
- Verify install - <https://docs.anaconda.com/anaconda/install/verify-install/>
- Virtual Environments - <https://uoa-eresearch.github.io/eresearch-cookbook/recipe/2014/11/20/conda/>
- Scripting environments - Terminal, Sublime, Idle, Visual Studio, PyCharm, Python window in Pro, **Jupyter (ArcGIS) notebooks**


# ArcGIS Notebooks



 Untitled Notebook (unsaved changes) 


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 **Welcome to your notebook.**

 **Run this cell to connect to your GIS and get started:**

In [ ]: 

```
from arcgis.gis import GIS
gis = GIS("home")
```

 **Now you are ready to start!**

In [ ]:

# Scripting in Python 1 – Data types

- **int:** 5, -72
- **float:** 5.6, -95.234
- **str:** “Python”, “I am a String”
- **bool:** True, False
- **list:** [4, 26, 11], [‘Hello’, 42, ‘World’, 9.9]
- **tuple:** (5,3), (‘a’, 2.8, 7)
- **dict:** {“name”:”Anne”, “age”:20}

# Scripting in Python 2 – Instructions

- Statements:
- **print, import, del, if-else, for, try-except**
- Built in functions:
- **len(), max(), min(), type(), sum()**
- <https://docs.python.org/3/library/functions.html>
- Methods:
- Functions that are associated with a specific data type or object.



Python for Geographers - Introduction to Scripting (unsaved changes)

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Integers

```
In [1]: #define
integer1 = 5
integer2 = -2
```

```
In [2]: #multiply
integer1 * integer2
```

```
Out[2]: -10
```

```
In [3]: #checking type
type(integer1)
```

```
Out[3]: int
```

# Introduction to Python Scripting

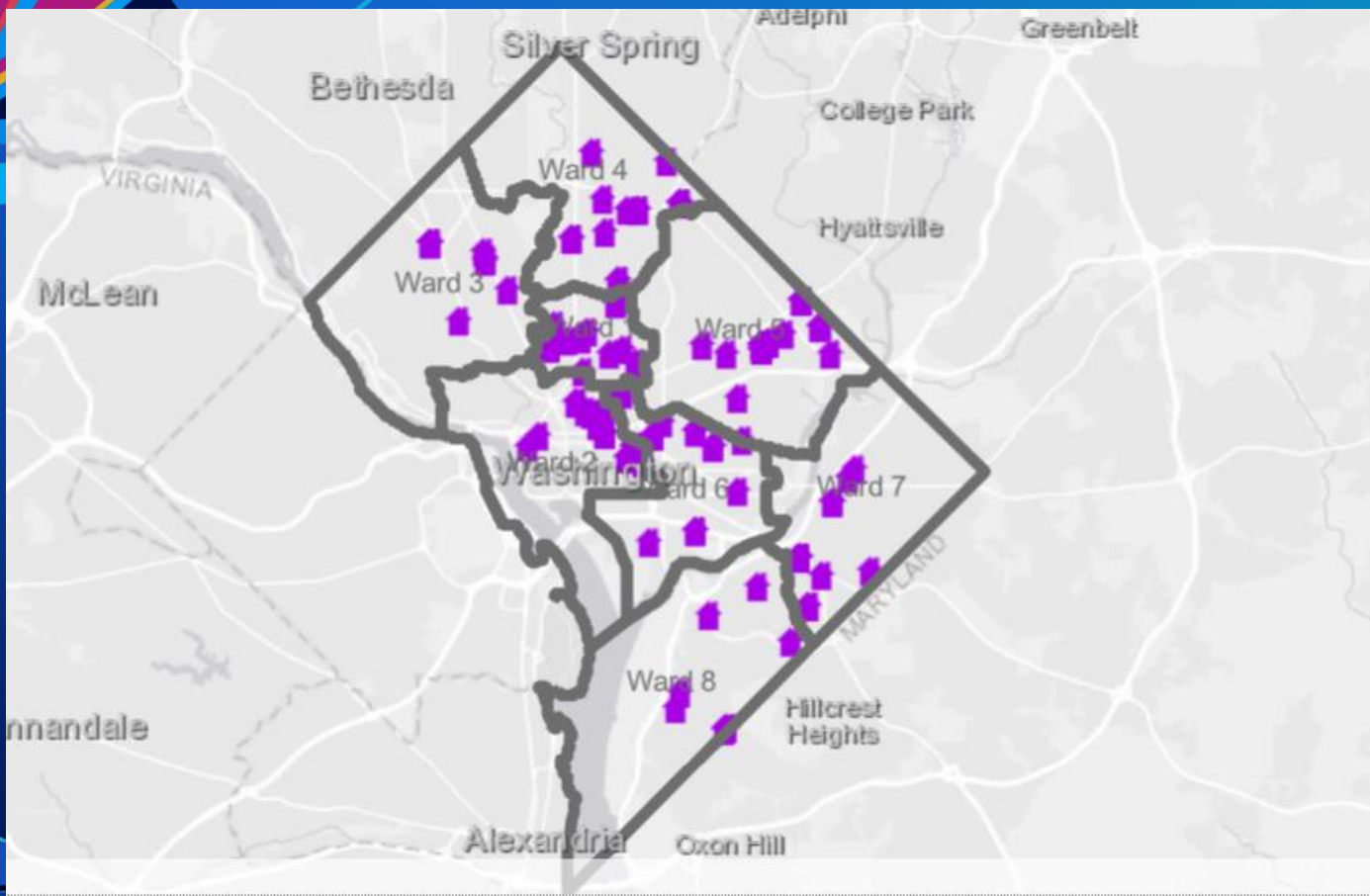
Presenter(s)

# Popular Open Source Python packages

- Pandas – [https://pandas.pydata.org/pandas-docs/stable/getting\\_started/10min.html#min](https://pandas.pydata.org/pandas-docs/stable/getting_started/10min.html#min)
- Numpy – <https://docs.scipy.org/doc/numpy/user/quickstart.html>
- Matplotlib – <https://matplotlib.org/tutorials/index.html>
- Seaborn - <https://seaborn.pydata.org/introduction.html>
- Scipy – <https://www.tutorialspoint.com/scipy>
- Scikit-learn - <https://scikit-learn.org/stable/tutorial/index.html>

# Popular Open Source Python packages

- Geopandas – <https://geopandas.readthedocs.io/en/latest/reference.html>
- Shapely – <https://shapely.readthedocs.io/en/stable/manual.html>
- RSGISLib – <https://www.rsgislib.org/>
- GDAL - <https://gdal.org/>
- Pyshp – <https://pypi.org/project/pyshp/>
- PYSAL - <https://pysal.org/>



# Demo Title

Presenter(s)

## Learning Resources

- **W3Schools** - <https://www.w3schools.com/python/>
- **Python Tutorial** - <https://docs.python.org/3/tutorial/>
- **Books**
  - Head First Python (O'Reilly)
  - Think Python: How to think like a Computer Scientist (O'Reilly)
- **Arcpy**
  - <https://www.esri.com/training/>
  - Python Scripting for ArcGIS (Esri Press)
- **ArcGIS Python API** - <https://developers.arcgis.com/python/>
- **Exercises for practice** - <https://www.practicepython.org/>



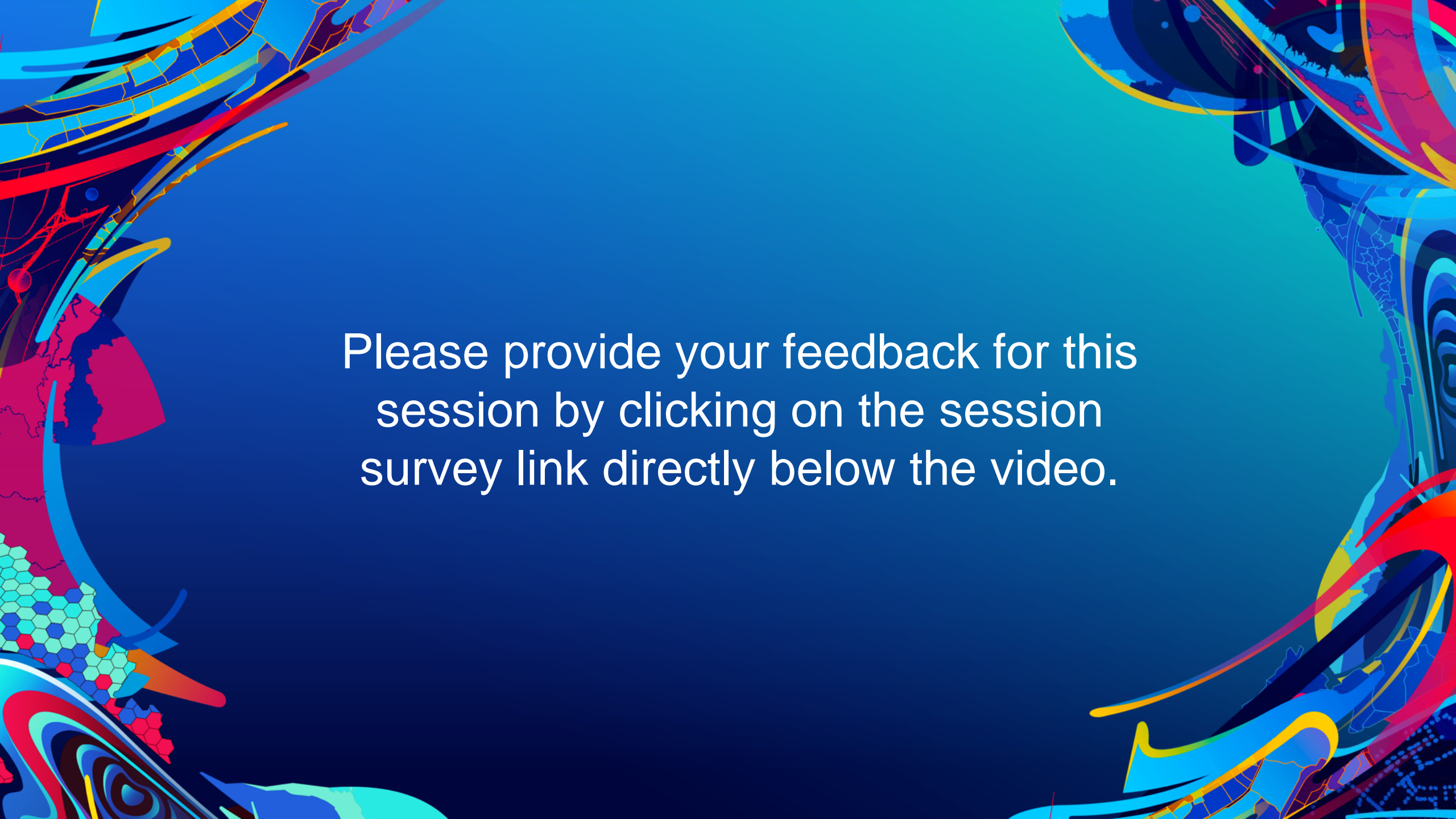
## Recap

- Get Python with Anaconda
- Script = Data Types + Instructions
- Leverage Open Source libraries for your needs
- GIS analysis using ArcGIS Python API
- Slides + demos - [https://github.com/ManushiM/esri-devsummit/tree/master/PythonForGeographers\\_2021](https://github.com/ManushiM/esri-devsummit/tree/master/PythonForGeographers_2021)
- Python is Fun!



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The background is a vibrant, abstract composition. It features a central area of solid blue and teal. The left and right sides are framed by complex, colorful patterns. On the left, there are swirling shapes in red, yellow, and blue, along with a section of a hexagonal grid in shades of green and blue. On the right, there are more swirling, organic shapes in blue, red, and yellow, with some areas resembling a cellular or molecular structure. The overall effect is dynamic and modern.

Please provide your feedback for this session by clicking on the session survey link directly below the video.