Python for Geographers

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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. Demystifying Python
3. Python Open Source packages
4. GIS and Data Analysis in Python
5. Learning Resources

So, what is Python?

- Object-oriented, free scripting language
- Syntax that is easy to learn and understand

Benefits:

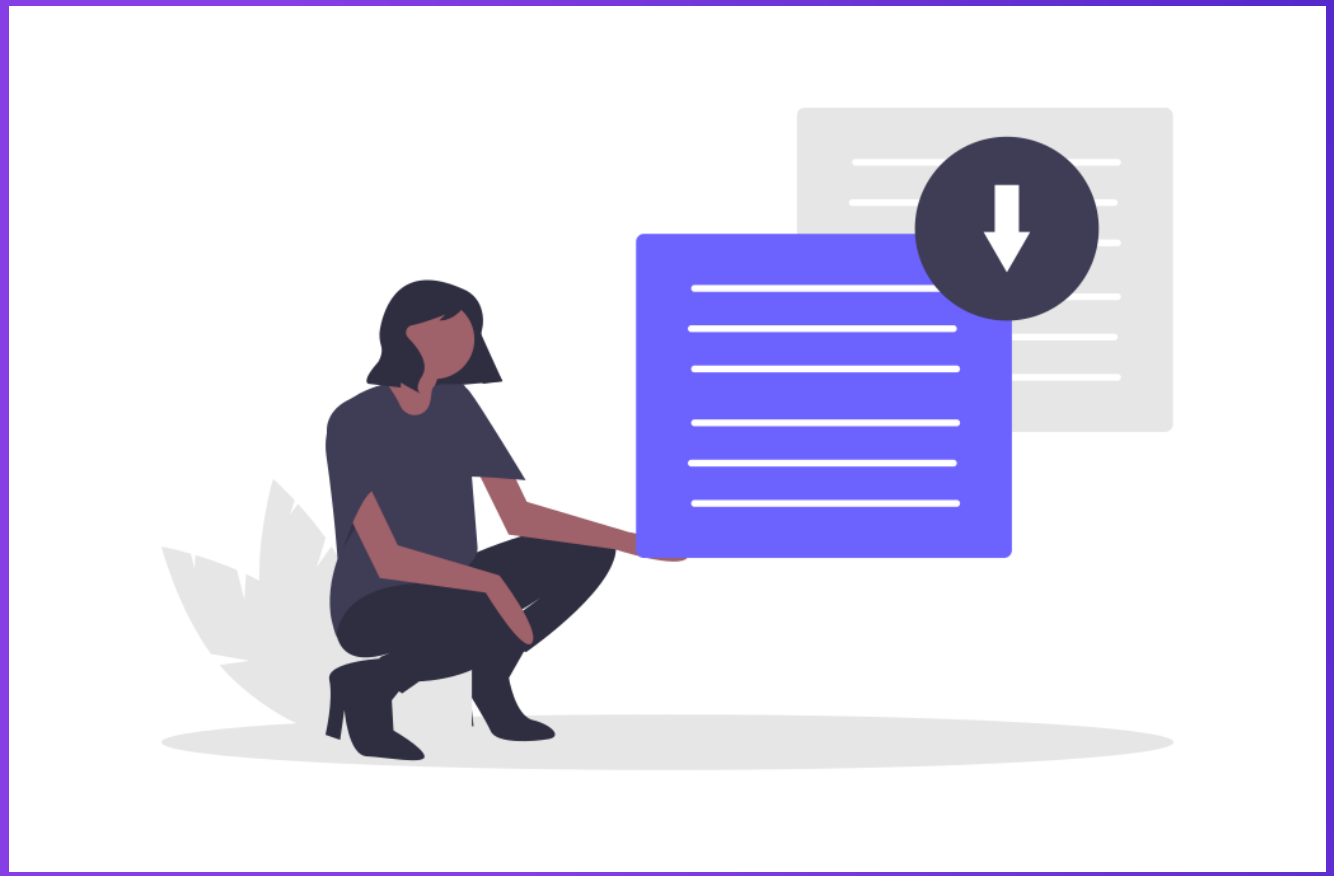
1. Scalability
2. Integrated packages
3. Open source and community development

How do I get 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/**

Where do I write my Python scripts?

- Terminal, Notepad, Sublime, Idle, Visual Studio, PyCharm, Python window in Pro, Jupyter notebooks
- Notepad / Sublime / Idle – Stand alone script
- Visual Studio / PyCharm – Projects in Python
- Jupyter Notebooks – Stand alone scripts, Projects, Tutorials



Demo – Getting started

Scripting in Python 1 – Data Types

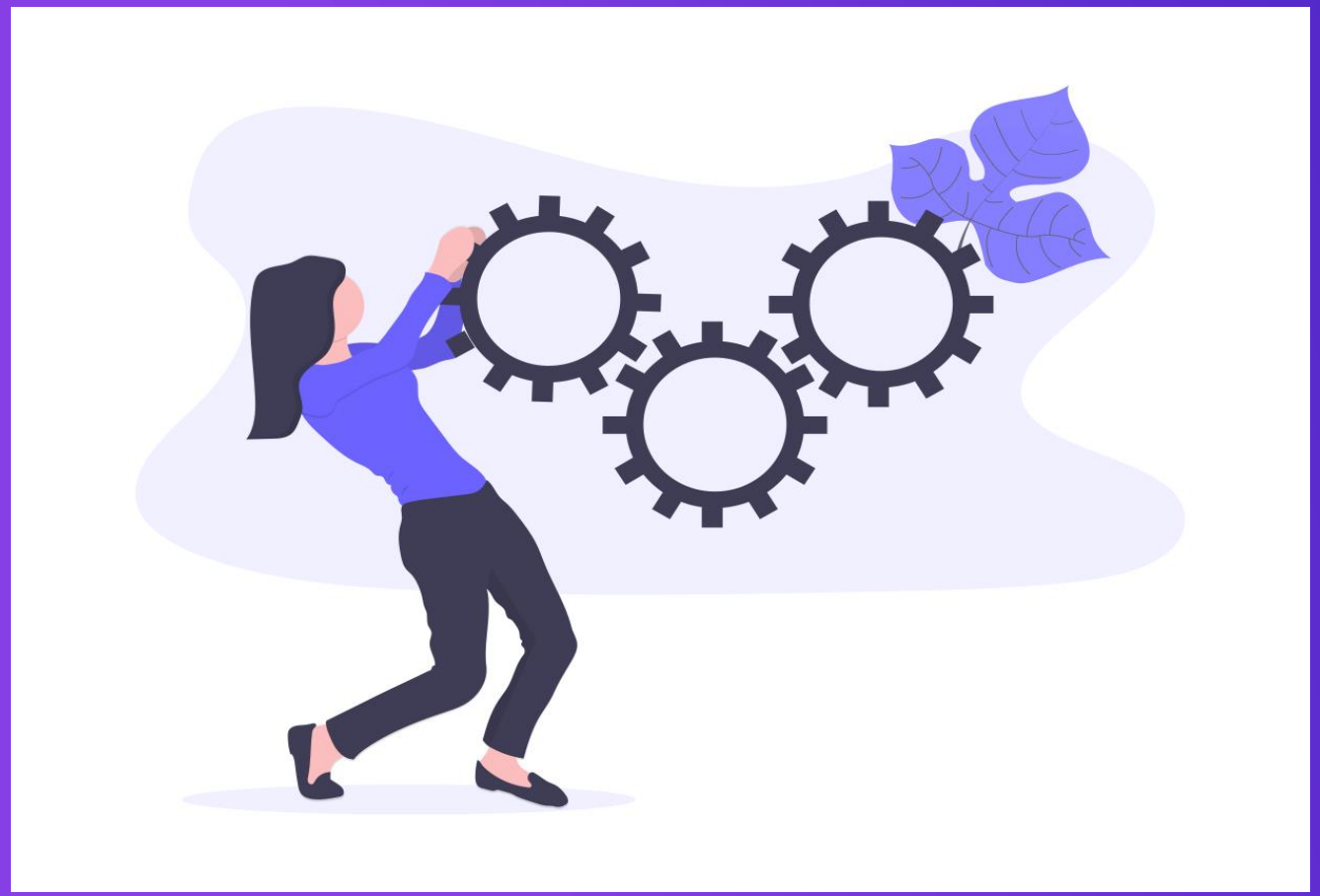
- **int:** 5, -72
- **float:** 5.6, -95.234
- **str:** “Python”, “I am a String”
- **bool:** True, False
- **list:** [4, 26, 11], [‘Hello’, 42, ‘World’, 9.9]
- **tuple:** (5,3), (‘a’, 2.8, 7)
- **dict:** {“name”:”Anne”, “age”:20}

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.**



Demo – Introduction to Python

Popular Open Source Python packages

- **Pandas – 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**

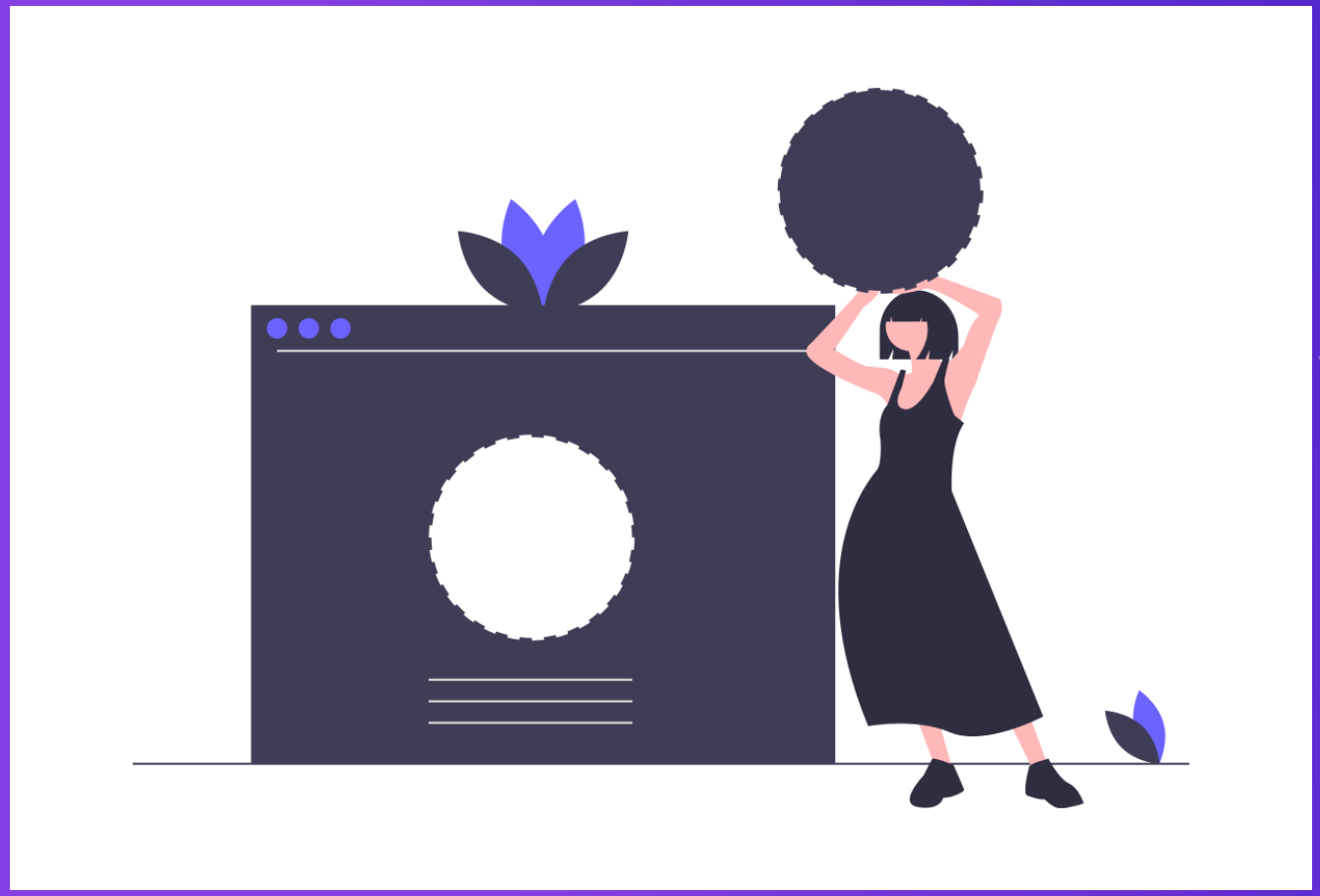
- **Scipy – https://www.tutorialspoint.com/scipy**
- **Scikit-learn - https://scikit-learn.org/stable/tutorial/index.html**

Popular Open Source Python packages for GIS

- Geopandas – https://geopandas.readthedocs.io/en/latest/reference.html
- Shapely – https://shapely.readthedocs.io/en/stable/manual.html

- Rasterio – https://rasterio.readthedocs.io/en/latest/
- GDAL - https://gdal.org/

- Pyshp – https://pypi.org/project/pyshp/
- PYSAL - https://pysal.org/



Demo – GIS and Data Analysis in Python

https://github.com/ManushiM/esri-devsummit/blob/master/PythonForGeographers_2020/PythonForGeographers_API.ipynb

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
- Decide the kind of script you need to write and choose environment
- Script = Data Types + Instructions
- Leverage Open Source libraries for your needs
- ArcGIS Python API (WebGIS), arcpy (DesktopGIS) for your GIS needs
- Slides + demos - https://github.com/ManushiM/esri-devsummit/tree/master/PythonForGeographers_2020
- Python is Fun!