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Course Name

Python for Geospatial Analytics

Duration

5 Days/40 Hours

Pre-requisites

- Participants need to have hands-on comfort with the basics of Python
- Partcipants should be conversant in development with at least one other programming language.
- (Optional) Participants should be conversant with some development tools - either command line or IDE

Lab Setup

- Anaconda installation with Python 3.7+
- Exceptions in firewall to allow https://pypi.org, https://pythonhosted.org, https://repo.anaconda.com, https://repo.continuum.io
- Packages: pandas, jupyter, matplotlib, seaborn
- Any IDE: PyCharm/VSCode/Eclipse/..

Course Contents

Introduction and Expectation Setting *[.5 hr]*

Python Basics *[8 hrs]*

- Data Types
- List, tuples, sets
- Mutable vs immutable
- Dictionaries
- Combined data structures
- Looping
- String manipulation

Functions *[1 hrs]*

- def keyword

- Positional and keyword arguments
- *args and **kwargs
- Returning more than one values

Regular Expression *[3 hrs]*

- Pattern matching
- Glob patterns
- ‘re’ module
- Basics of Regular Expressions
- Match objects
- Submatches
- .findall()
- .subs()
- Flags

File I/O *[2 hrs]*

- Open function
- File objects and supported methods
- Working with text files
- Reading with for loop
- Explicit reading with read(), readline(), readlines()
- outfile.write()
- Flushing output file handles
- Binary file use-cases

File Formats *[3 hrs]*

- CSV
- JSON
- XLS
- XML
- Data dimensionality and file types

Modules and Packages *[1.5 hrs]*

- Standard modules
- Third party packages
- Pip and conda
- Packages and dependencies
- Install, upgrade and remove

Class basics *[2 hr]*

- OO Concepts
- __init__
- self
- object creation
- type of objects
- private vs public convention
- magic functions
- inheritance, multiple inheritance

Errors & exceptions *[2 hr]*

- Try and except
- Standard exception hierarchy
- Default except block
- Exception payloads
- Defining new exceptions
- Traceback objects
- Raising exceptions
- Assertions

Data Ecosystem in Python *[1 hrs]*

- Scipy
- Numpy
- Pandas
- Matplotlib
- Ipython
- Jupyter

Numpy *[2 hrs]*

- Why numpy?
- Multi-dim arrays
- Vectorized operation
- Filtering
- Common vectorized functions
- Integration with other modules

Pandas Basics *[2 hrs]*

- from_csv/json/excel methods
- DataFrames
- Series
- Inherited operations from numpy arrays
- Selection and filtering

Pandas grouping and restructuring *[2 hrs]*

- value_counts()
- group_by() and aggregation functions
- sort_values() and sort_index()
- pivoting/unstacking
- Merging dataframes
- Appending

Indexes *[1 hr]*

- Indexes and MultiIndexes
- .loc[] and .iloc[] based lookup
- Datetime Indexes

Relational Database Interaction *[2 hrs]*

- CRUD operations
- SQL
- Python DB API 2.0
- Postgres and the psycopg2 module

Qt and pyqt *[2 hrs]*

- QApplication
- QWidget
- .show()
- QPushButton
- .clicked, .pressed, .released
- @pyqtslot
- QMessageBox
- Other widgets
    - TextBox
    - Tables
    - Tabs
    - ProgressBars

Summary, wrap-up, Q&A *[.5 hrs]*