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Introduction to python and obspy

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Overview of covered topics

1. Intro. Object oriented programming, history etc
2. Python modules
    a. Importing py modules and your own modules

3. file I/O:
        i. np.savetxt,
        ii. scipy.io.savemat,
        iii. file_obj = open('w'),
        iv. csv files etc .. pickels etc ..
    b. lFiles = glob.glob(*.txt)
    c. if os.path.isfile path.isdir

4. Data handling:
    a. vectors, strings etc.: - float, scalar, string, list, array, dictionary (compare to mat structure)
    b. Vectors, matrices
    c. Indices
    d. Compare to Matlab, matlab cheat-sheet
        i. Differences in indices between matlab and python

5. Some useful commands
    a. Find statement find = vector == 0
    b. for, while, etc
    c. if isinstance( )
    d. track code performance
    e. anticipate errors and help resolve

6. Python objects

Textbook:

Think Python, 2nd Edition
By: Allen B. Downey
Publisher: O'Reilly Media, Inc.
Pub. Date: December 9, 2015
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Resources:

1. http://matplotlib.org/gallery.html (a lot of nice plots)
2. http://pandas.pydata.org/pandas-docs/stable/tutorials.html (database analysis, creation)
3. http://docs.python-guide.org/en/latest/writing/style/

Python for matlab users:

4. http://mathesaurus.sourceforge.net/matlab-numpy.html

5. http://www.cert.org/flocon/2011/matlab-python-xref.pdf
6. http://bastibe.de/2013-01-20-a-python-primer-for-matlab-users.html

Seismo tools for python:

1. https://github.com/iwbailey/pythMT (moment tensor analysis)
2. www.obspy.org (a little bit of everything)
3. http://matplotlib.org/basemap/ (georeferenced plotting)

Obspy

1. Download and analyze earthquake catalogs
2. Phase data
3. Waveform access, basic viusalization
4. Filtering
5. Cross-correlations
6. Envelopes
7. Spectral analysis – frequency content, etc.
8. Periodogram

Mode advanced stuff:

7. Using python as integration tool with other codes, command line input, bash scripts, fortran, C etc.
    a. Python and matlab
    b. Py – and bash scripting (sed, awk, file I/O etc.)
        i. Find replace with sed (e.g. , to .)
        ii. Data manipulation switch columns if first entry is a float (use try, except)
    c. Python and C and fortran modules