Python Installation & Basics

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Software Installation

We will use Python as a primary programming language. We will need the following software installed to your computer:

- Python 2.7
- NumPy and SciPy (MATLAB-like numerical packages)
- matplotlib (MATLAB-like visualization package)
- NetworkX (graph/network package)

- PyCX (complex systems simulation sample code repository)
  http://pycx.sf.net/ (just download and extract; no need to install)
  Also read the following article for some background information:
  http://www.casmodeling.com/content/1/1/2

The easiest way to install Python, NumPy, SciPy and matplotlib is to install *Anaconda* or *Enthought Canopy*, which are pre-packaged Python distributions. They are available free of charge from:
http://continuum.io/downloads
http://www.enthought.com/products/canopy/

Our recommended coding environment is Anaconda's "Spyder".

Python Programming Basics

- **Python Basics**
  - "Hello, world!"
  - Using Python Editor/IDLE
  - Using Python interactively
  - Writing a separate program code
  - How to get help *(i.e., just Google it)*

- **Data Representation**
  - Numbers
    - integer, real (floating point), complex

    - Variables and assignments
    - Numerical and logical operations
        - Arithmetic operators, =, <, >, <=, >=, is, not, and, or, in
    - Lists ("[v1, v2, ...]")
        - Nested lists
        - len, min, max, sum, count, append, pop, sort(ed), reverse, filter, etc.
        - Slice operator (":")
    - Strings
        - Arithmetic operators, find, replace, split, etc.
    - Dictionaries ("{ k1:v1, k2:v2, ...}")
    - Sets ("{ v1, v2, ...}")
    - Tuples ("(v1, v2, ...)")
    - List/dictionary/set comprehension
    - Classes (?)

- **Algorithm Representation**
    - Indent-based syntax
    - Loops (while, for)
    - Flow control (if, else, elif)
    - User-defined functions (def)
    - Local and global scopes of variables

- **Other Topics**
    - Modules
        - import, math, random, etc.
    - File I/O
        - open, close, read, write, etc.
        - reading/writing .csv files
    - Visualization

Online Resources

- The Python Tutorial http://docs.python.org/2/tutorial/
- Library Reference http://docs.python.org/2/library/
- matplotlib Documentation http://matplotlib.org/contents.html
- NetworkX Documentation http://networkx.github.io/documentation/latest/