More Python:
numpy & argparse

essential modules to master
numpy

• numpy (typically imported as "import numpy as np") is a lot like MATLAB. It has many sub-modules and methods for very fast matrix manipulation. You should always use these methods when you can, instead of using explicit loops in your code, because they are MUCH faster.

• For example, to multiply two large arrays by hand requires a double-nested for-loop. But if they are numpy arrays and you just type array_1*array_2 it will use optimized, compiled C-code to do the job. This is the same approach MATLAB takes.
argparse

• argparse is a handy module that allows you to pass information to a python program from the command line (in linux or in ipython).
• It uses a format that is very similar to that for linux commands
• e.g. in ipython:
  • run my_program -a 7.7 -b 2020.04.28 -f True
• Here I have passed three pieces of information to the program, as flag-value pairs, so for example the number 7.7 is associated with the variable "a" (or a longer, more informative name) inside the program.
• The advantage of using argparse is that then you often do not have to edit your code to get it to do a different version of its job. This allows you to write code that can work both on your laptop and on a remote machine, potentially working on a much larger pile of data in the remote case.
• Even if you are just working on one machine argparse can make one piece of code much more versatile, without editing.
Examples

• Please see the code examples in my class code folder "pmec". I have put this in GitHub so you can clone it to your machine using either:
  • git clone [URL]
  • or File -> Clone Repository -> URL Tab in GitHub Desktop
  • then use git pull to update anytime, or (I think) the Fetch origin button in GitHub Desktop.

• the URL is:
  • https://github.com/parkermac/pmec.git
  • The code for this week is in the folder pmec/ex_numpy.
Resources

• The pages here are a nice tutorial for basic numpy operations