The Rest of the Semester

November 20, 2023

Administrative notes

Project 2

HW6 - matplotlib - worth 40 points

- The majors' HW6 was recursion; we're not going to do that
- Ours will be released next Monday, November 27, and due the following Monday, December 4
    - Yes, it overlaps Project 3 but it's related

Project 3 - Jupyter notebooks

The Schedule

November 20 - today -overview of the rest of the class & Project 3 released

November 22: no class; it’s the day before Thanksgiving - video on complexity analysis

November 27 - Homework 6 assigned; Python graphics

November 29 - .csv and .tsv files; other Project 3-related topics

December 4- Homework 6 due; data analysis & other Project 3-related topics

December 6 - Advanced Python topics

December 11: last class; review for final exam; Project 3 due

December 18, 3:30 - 5:30 pm: final exam

Jupyter

Project 3 is completely different from the first two projects. You will use a free tool called Jupyter Notebooks to essentially prepare a research report with live Python code running to perform data analysis and provide graphics showing your results

This is most definitely NOT something the majors' sections are doing.

So why do we do it in this section?

- It shows how to incorporate the computer science skills you have picked up in this course into any research you do in many different fields

Jupyter Notebooks

See https://jupyter.org/

A tool that incorporates Python cells and Markdown cells to create a unified presentation.

Note: "Jupyter" is an amalgam of "Julia, Python and R" You can run Jupyter Notebooks in any of those three languages. We'll only be using Python, of course

Note: Jupyter Notebooks presume you have a high-quality graphical user interface (GUI) to present results. gl.umbc.edu does not have such a user interface. So you will need to run Jupyter on your own laptop, and submit it when you're done. If you do not have access to a laptop that can run Jupyter, let me know immediately.

Let’s get started

Go to https://jupyter.org

Scroll about a third of the way down the page, until you see

> Jupyter Notebook: The Classic Notebook Interface

For simplicity, click “try it in your browser” first. Note for the demos in this lecture I”m using Chrome, but it’s very similar in Firefox, Edge or Safari.

A demo of Jupyter in a browser

Things to pay attention to:

- Creating a new Notebook
- Adding cells
- Code cells vs. Markdown cells
- Running selected cells
- How output is handled
- Running all cells in a notebook

Markdown

“Markdown” is a pun based on “markup”

- which is what you do to a draft document
  - you mark it up with editor’s notes indicating changes you want made
- Here you “markdown” a notebook
  - You insert text and graphics that describe what your code is doing
- Markdown is not unique to Jupyter; it is used with many other tools

A good “cheat sheet” showing common Markdown instructions:

https://www.markdownguide.org/cheat-sheet/

Now, installing Jupyter on your system

Go back to https://jupyter.org

Scroll down to “Jupyter Notebook”

Click “Install the Notebook”

- Follow the instructions for Jupyter Notebook, NOT Jupyter Lab
  - Jupyter Lab is a different tool that contains WAY more than we need for this class

Matplotlib

- We will use the matplotlib library to generate graphics that show the results of our data analysis
- It is a powerful library, but the user interface can be awkward when you're just starting out
    - Not to worry; we'll walk through this

Today's material is taken from the online tutorial at https://matplotlib.org/stable/tutorials/pyplot.html