PROGRAMMING WITH PYTHON

GO.GWU.EDU/LIBWORKSHOPS

Objectives

- Gain familiarity with one environment for using Python (Google Colab), and awareness of others
- Learn Python language basics
- Learn how to look things up, how to interpret errors
- Gain confidence to try things we didn't learn today!

What about AI?!

Claude

Gemini

CURSOR

Feb
12

Workshop

Thu 12PM - 2PM

[Using A.I. for Quantitative Data Analysis: Tools, Ethics, and Effective Practices]

Explore how A.I. can support quantitative data analysis, from data cleaning and visualization to drawing inferences and generating insights.

What about AI?!

Two things you will want to eventually learn how to do:

1. Use AI effectively as a companion to help you write code

2. Write **code that <u>uses</u> AI models** to accomplish things

Why Python?

- Free
- General purpose
- Easy to learn
- Readable*
- Community-developed / Open Source
- Widely used and documented
- Good built-in and contributed **libraries**

Different ways to use Python

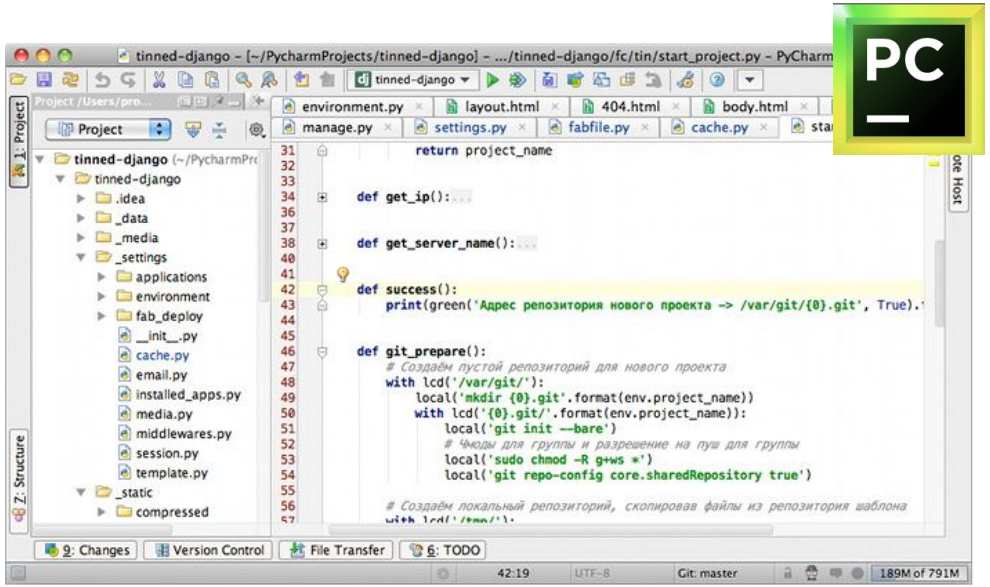
- Command line/REPL

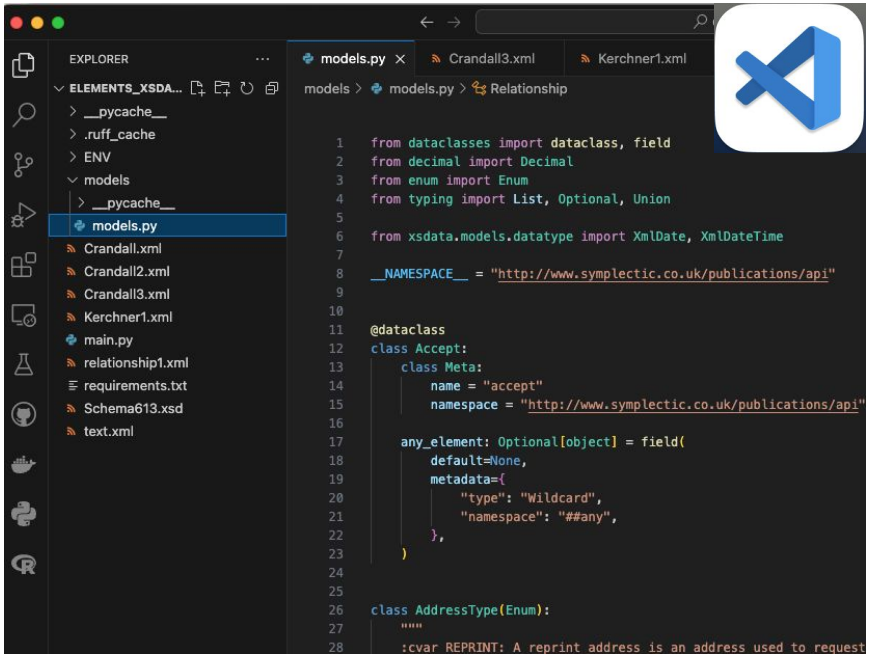
```
Python 3.11.2 (v3.11.2:878ead1ac1, Feb  7 2023, 10:02:41) [Clang 13.0.0 (clang-1300.0.29.30)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>>
>>> opinion = "This workshop is awful!"
>>> opinion == True
False
>>>
```

Different ways to use Python

Integrated Development Environment (IDE)

[pyCharm](), [VSCode](), ...





Different ways to use Python (continued)

"Python Notebooks"

Jupyter/JupyterLab

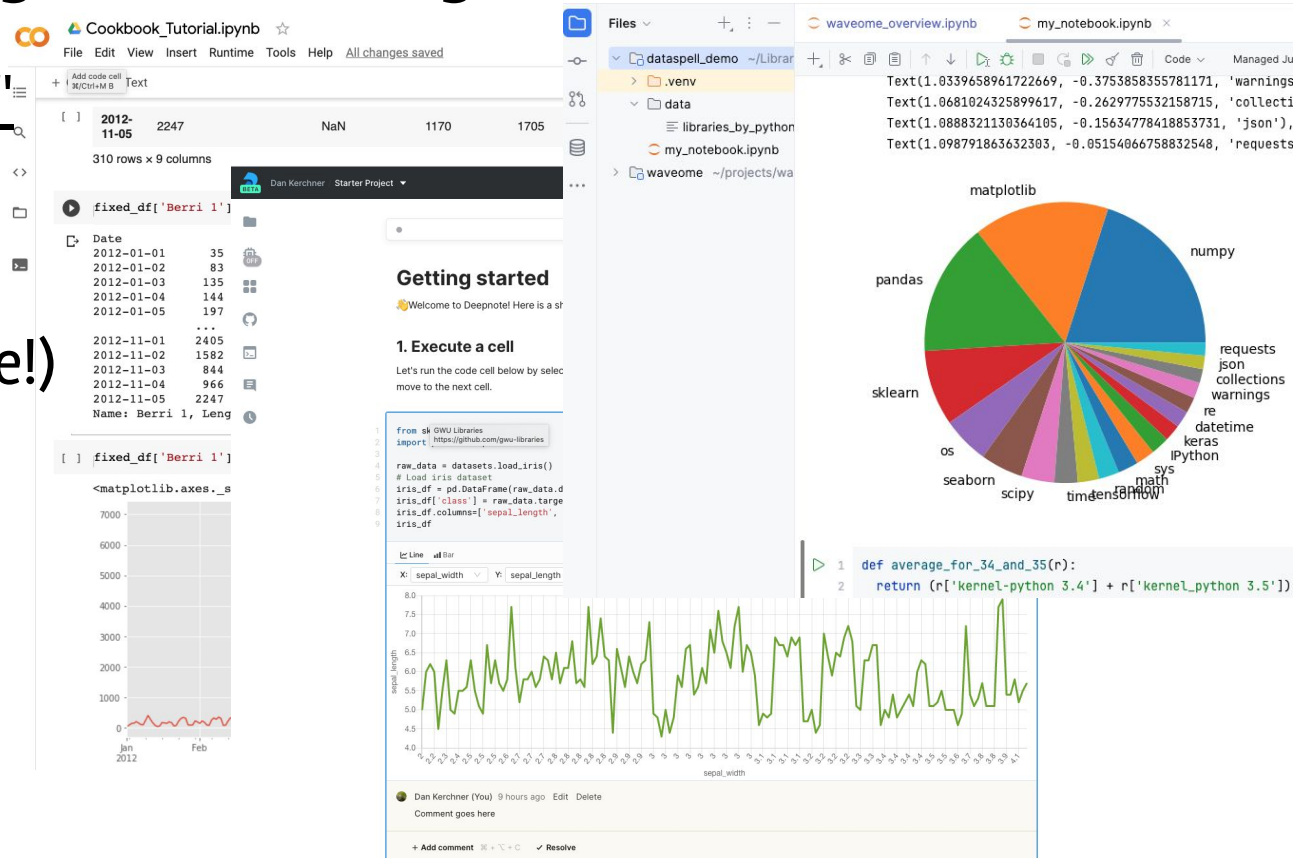
Google Colab

(in your Google Drive!)

DataSpell

Kaggle

Deepnote

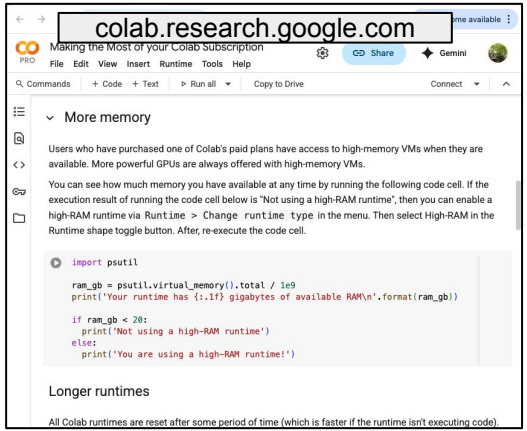


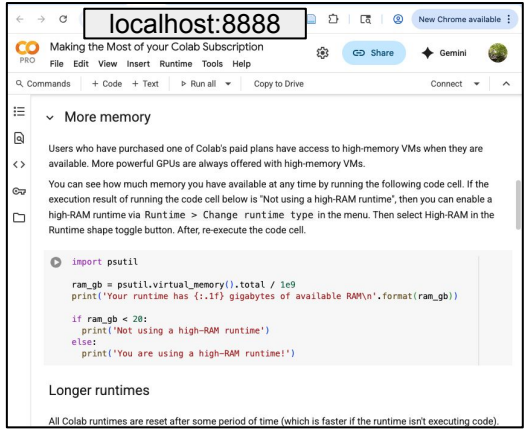
Even more ways to use Python

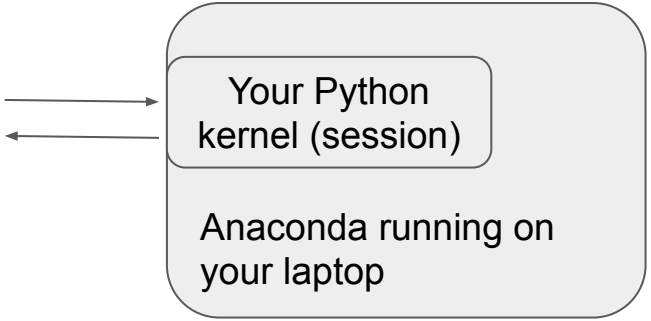
Anaconda = Python (and R) plus:

- **Jupyter notebooks**
- lots of libraries
  - data science
  - analytics
  - scientific computing
  - including:
    Polars and **Panda**
  - (for working with data frames)

When you use a Python notebook...

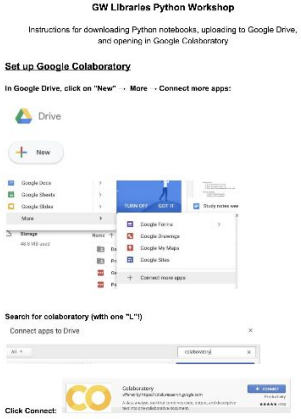






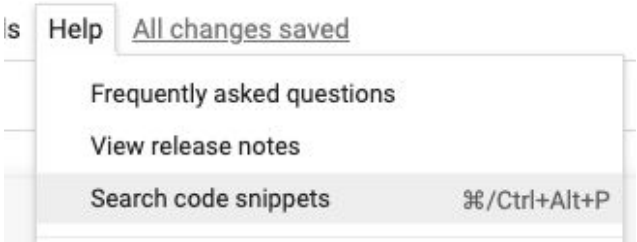
Setup

- Google Colaboratory
  colab.research.google.com

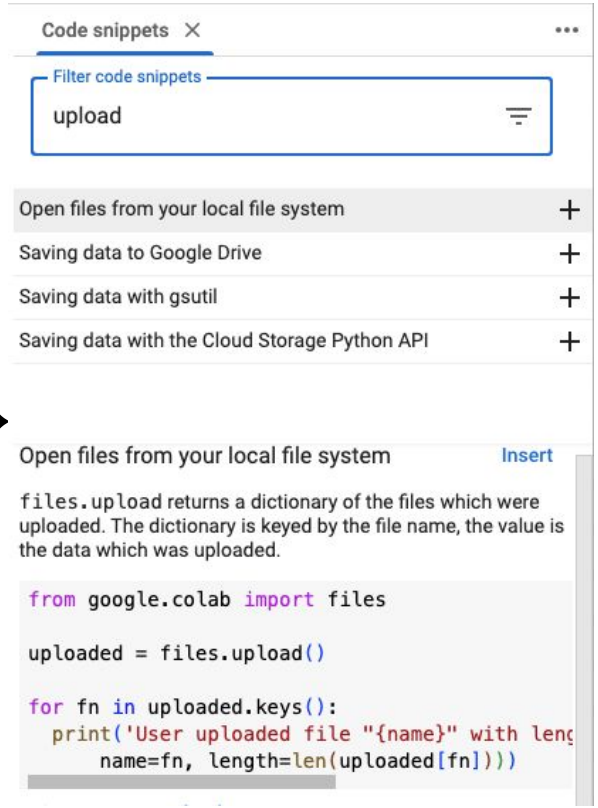


* *To do later:* If you aren't already seeing this CO PRO, then sign up for [free] Google Colab Pro for Education!
colab.research.google.com/signup

Uploading Data (and doing other things) in Google Colab



Use "Code Snippets" (searchable!) →



Some recommendations

- Write assuming your code will be read (incl. by Future You)
- Version your code 

- Learn to be "Pythonic" in your style
- Isolate your projects from each other
  - Use venv, conda, and/or pixi.sh
- Stuck? Try an Internet search
- Which version of Python are you using?
- Find good code examples and make them work
- Keep learning!

Some Python libraries/frameworks

Building web applications	Django Flask
Scientific/numerical	Numpy Scipy Pandas
Machine Learning	scikit-learn, tensorflow
Data Visualization (check out www.python-graph-gallery.com)	matplotlib bokeh ggplot (like ggplot2 in R) plotly (<- interactive) seaborn

Things we learned today in Python that most coding languages also share (Part 1)

- variables
- different data types: numeric, text, logical, etc.
- data structures for holding more than a single value: lists/arrays/matrices/etc.
- loops
- conditional logic (if/then)
- functions
- libraries/packages for bringing in extra functionality

Data analysis you can perform using Pandas

- loading in (reading in) a data set
- subsetting based on columns and/or rows based on data criteria
- exploring data variables, both numerical and text/categorical
- merging/joining data frames
- plotting data (e.g., with matplotlib and with ggplot2)

To Learn More

- PyFlo pyflo.net ← NEW!
- Kaggle: kaggle.com/learn
- learnpython.org
- Software Carpentry, Data Carpentry (not just Python)
- docs.python.org/3/tutorial (and docs.python.org)
- GW Online: Get data off the ground with Python
- Upcoming Python workshops @ GW Libraries
- LinkedIn learning it.gwu.edu/linkedin-learning courses
  - 253 Python, 6 Pandas
- More on Pandas:
  - Pandas cookbook: github.com/jvns/pandas-cookbook
  - pandas.pydata.org/pandas-docs/stable/10min.html
  - pandas.pydata.org/pandas-docs/stable/tutorials.html
  - pandas.pydata.org/pandas-docs/stable/cookbook.html
  - www.datacarpentry.org/python-ecology-lesson/

Contact us:

Coding Consultations (with Dan & colleagues):
calendly.com/gwul-coding – Python, R, HTML/CSS/JavaScript

Stats Appointments (with Stats grad students):
go.gwu.edu/dataconsulting

Workshop Materials: go.gwu.edu/pyw

kerchner@gwu.edu