1. Introduction to Python

1. Jupyter

Jupyter is an open-source software technology that allows you to create and share documents containing live code, equations and visualisations. The name is based on the three most popular supported languages: **Ju**lia, **Py**thon and **R**. You can think of Jupyter as a Graphical User Interface (GUI) that allows you to interact with a server to run Python code.

Essentially, Jupyter creates an environment that mimics a physical notebook in the virtual world. This virtual notebook is easily (1) accessible, (2) modular, and (3) shareable. This means you can easily access your code, share your work with others, and break down your code into manageable chunks. If you run into an error, it's much easier to pinpoint where the error is coming from. Jupyter can be downloaded and run on your own device, but it's simpler to use a cloud solution, such as **Google Colab.**

2. Google Colab

Google Colab (short for Colaboratory) is a free, cloud-based platform that allows you to write and execute Python code in an interactive environment. One of the key advantages of Google Colab is that it requires no setup – everything runs through a web browser, so you can start coding immediately without worrying about installing Python or any required libraries on your local machine. You can think of Colab as "Google Docs for Jupyter".

3. Setting up Google Colab

Google Colab (e.g., code runner) syncs up with Google Drive (e.g., data storage) as well as other platforms such as GitHub. For this course, we will primarily be using Google Drive to store and back up notebooks and datasets.

To setup Google Drive:

1. Click here: https://drive.google.com/
2. Sign in using your university credentials (e.g., upi@aucklanduni.ac.nz)
3. Under "My Drive" create a new folder named "Infosys 722" (or similar)
4. **Download the lab 8 ipynb notebooks and dataset(s) from Canvas and upload the same to the Google Drive folder**

From here, there are **two ways** to access the notebooks:

1. Through **Google Drive**

a. Double-click on the required ipynb notebook

2. Through **Google Colab**

a. Click here: https://colab.google/
b. Click "Open Colab" in the top-right
c. Click "Sign In" in the top-right
d. Sign in using your university credentials (e.g., upi@aucklanduni.ac.nz)
e. Navigate to "Google Drive" on the right
f. Locate and double-click on the required ipynb notebook

After opening the notebook, press "Connect" in the top-right to connect to a **runtime.** You need to connect to a runtime to **execute** your code. After a moment, this will eventually show a tick, with the words RAM and Disk next to it, which indicate that everything is set up correctly.

4. Exploring Google Colab

Structure: All code is organised within collapsible sections. You can view an overview of these sections by clicking on the "Table of Contents" button on the right.

Runtime: In the top-right, the runtime area shows you the resources you have available on your virtual machine. You will not be able to run your code without connecting to a runtime (e.g., server). It is important to note that (1) runtimes close after a maximum of 12 hours, so it is your responsibility to save your work and maintain backups, and (2) the amount of resources allocated to your virtual machine may vary depending on server capacity, so it is best to avoid manipulating extremely large datasets (e.g., over 1 gigabyte in size).

Gemini: In the top-right, the "Gemini" button provides access to Google's Generative AI assistant. This tool is similar to ChatGPT but has the added advantage of understanding the **context** of your work. Gemini can help with (1) code generation with natural language, (2) explaining errors, and (3) generating charts with accompanying code. You can also watch the video on Programming in Colab with AI by Google Research to get an overview of the capabilities of Gemini on Colab.

Share: In the top-right, the "Share" button allows you to share your notebook with others.

5. Reference Material

- Colab FAQ: https://research.google.com/colaboratory/faq.html
- Charts in Colab: https://colab.research.google.com/notebooks/charts.ipynb
- Data Table Display in Colab: https://colab.research.google.com/notebooks/data_table.ipynb
- Google's Python Class: https://developers.google.com/edu/python
- Learn Python in ~75 Minutes: https://youtu.be/VchuKL44s6E?si=bsWC7cbX3LELiRyV&t=183