Appendix A2

Getting Started with Google Colab

A2.1 Overview

Google Colab is an excellent tool for learning Python, as well as creating and documenting professional Python-based analyses. It allows you to write one or more lines of code in its cells and to run one or several cells at a time, similar to Jupyter Notebook. In addition to code cells, you can also intersperse documentation cells. These features make the notebook style of development well suited to coding, as well as exploratory data analysis. Google Colab is cloud-based, so you don't need to install anything to get started. In this appendix, we'll look at how to get started with Google Colab.

A2.2 Getting Started

Since Google Colab runs in your browser over the internet, there is nothing you need to have installed on your computer other than a web browser. However, Colab stores your work in Google Drive, which is included with a Google account. If you don't yet have a Google account, you can create one at google.com (choose Sign in, then Create account).

Note that since Google Colab is enhanced over time, the specific screens and icons you see may differ a bit from the screenshots in this appendix.

A2.3 Starting

To use Colab, you'll need to sign into your Google account. You can do this from google.com.

Colab can be started from a browser by entering:

https://colab.research.google.com/

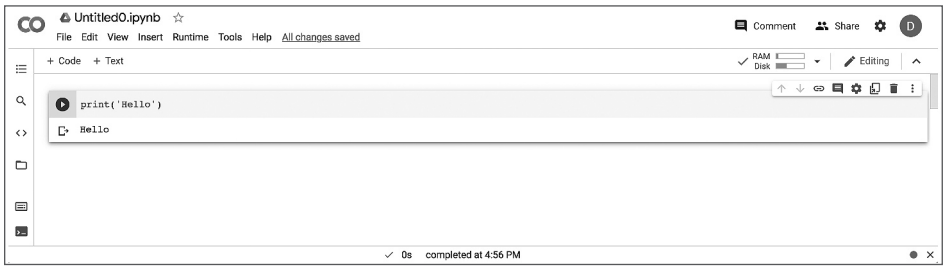
or searching for Google Colab in a web browser.

The first time you use Colab, you will see a menu frame within your browser like this:

From this menu, select New notebook from the lower right. A new empty notebook screen will be displayed:

A2.4 Entering and Running

Once you have a notebook in view, you can enter code statements in its cells, then click on the triangle next to the cell to run that code. For example:



Above we see the result of our statement. We can then revise our cell code and rerun with the triangle. Or we can add a new cell by clicking on + Code at the top left.

If we define a variable and run that cell, that variable is available in subsequent cells. For example:

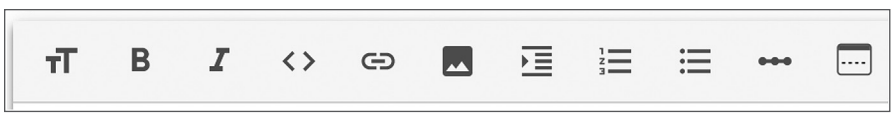
```
[2]  sales = 124.5

[3]  sales

     124.5

[4]  print('Sales=', sales)

     Sales= 124.5
```

As you enter statements and run code, Colab automatically saves your notebook in your Google Drive in a file with the filetype .ipynb in the folder called Colab Notebooks. Your first new notebook is given the name Untitled0.ipynb, but you can change this by clicking on the filename and entering a new name.

Though the above examples show one statement in each cell, you can enter and run multiple statements in a single cell. The organization of code in cells is up to you, but in general, you should place statements for a logically related set of work in one cell.

A2.5 Text

Notebook cells can also contain documentation with support for formatted notes. In order to add a text cell, select the + Text choice from the toolbar. Text cells can be formatted using the toolbar available above that cell:



The ability to intersperse formatted notes between code cells is a distinguishing and useful feature of notebooks.

Once you've completed entering a text cell, you can continue working with your notebook by clicking anywhere else in your notebook, such as another cell, + Code or + Text, or by choosing a menu selection.

A2.6 Editing and Inserting Cells

You can evolve your notebook by working with cells. This includes:

- deleting one or more cells (Edit > Delete Selected Cells)
- moving one or more cells up or down (up and down arrows in cell's own toolbar at its right)

You can also insert cells anywhere in your notebook by first moving your cursor to a particular cell, and then selecting + Code or + Text.

A2.7 Running and Clearing All

When developing a notebook, you typically run one cell at a time. As cells take shape, you may want to rerun several or all cells.

- To run all cells, use Runtime > Run All.

In order to keep your cell inputs, but clear all output results:

- Select Edit > Clear all outputs.

Clearing all outputs is useful if you'd like to demonstrate the steps of your notebook to someone, by running one cell at a time.

A2.8 Exporting and Importing Notebooks

Colab notebooks are stored as .ipynb files in Google Drive. If you'd like to download a notebook file to your computer, you can use:

File > Download > Download .ipynb

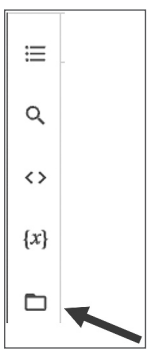
Conversely, if you have a .ipynb on your computer, and you'd like to load it into Colab, use:

File > Upload notebook

The .ipynb format is the same used by Jupyter Notebook. This allows you to use both Google Colab and Jupyter Notebook with your notebooks.

A2.9 Loading Data Files to Your Colab Session

Since Google Colab runs in the cloud, by default, it doesn't have access to data files on your computer. However, you can interactively load your local data files into your Colab session. In order to do this, click on the folder icon in the left toolbar:



This will open the Files choices (below), which include an icon (pointed to below) for selecting a data file to upload to your Colab session:

Click on this "Upload to session storage" icon and your computer's file chooser will open. Then navigate to and select the data file you'd like to load into the Colab session. Once loaded, your code in Colab will be able to read the data in this file.

Note that your data file is available to Colab for the duration of your session only. Once you leave Colab, the data file is no longer remembered for your next Colab session, so you will need to upload your data again when you return to Colab.

A2.10 Opening a Previously Saved Notebook

To return to a previously saved notebook, use File > Open notebook to open Colab's file chooser. From here, locate and select the notebook you'd like to open and Colab will open it in your browser.

Note that the Colab file chooser includes an Upload tab; from here, you can select a .ipynb saved on your computer to be loaded into Colab. You can also use File > Upload notebook to go to the Upload tab.