

Overview

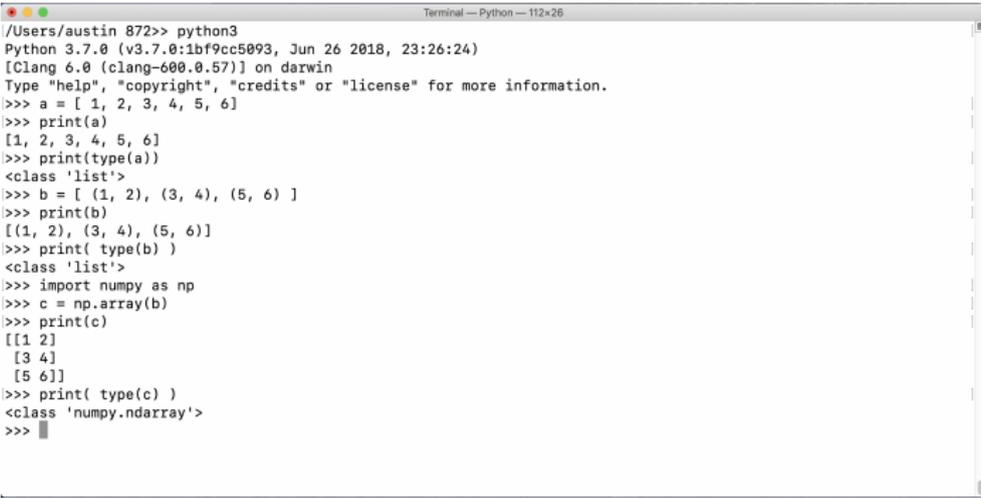
Part 1

- 1 What is Python?
 - Origins, Features, Framework for Scientific Computing
- 2 Program Development with Python
 - Working with the Terminal
 - Integrated Development Environments
- 3 Data Types, Variables, Arithmetic Expressions, Program Control, and Functions
- 4 First Program (Evaluate and Plot Sigmoid Function)
- 5 Builtin Collections (Lists, Dictionaries, and Sets)
- 6 Numerical Python (NumPy)
- 7 Tabular Data and Dataset Transformation (Pandas)
- 8 Spatial Data and Dataset Transformation (GeoPandas)

First Steps: Working with the Terminal

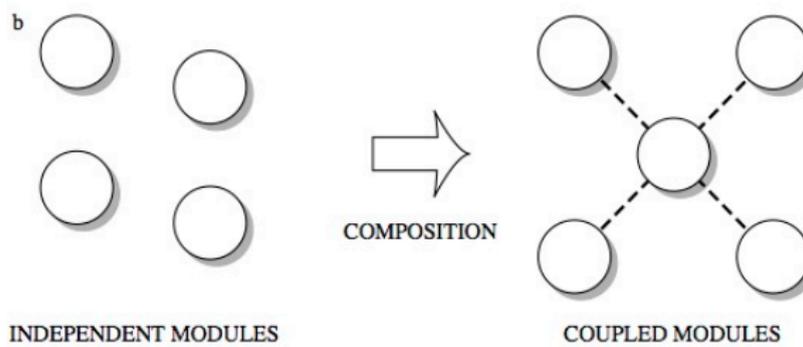
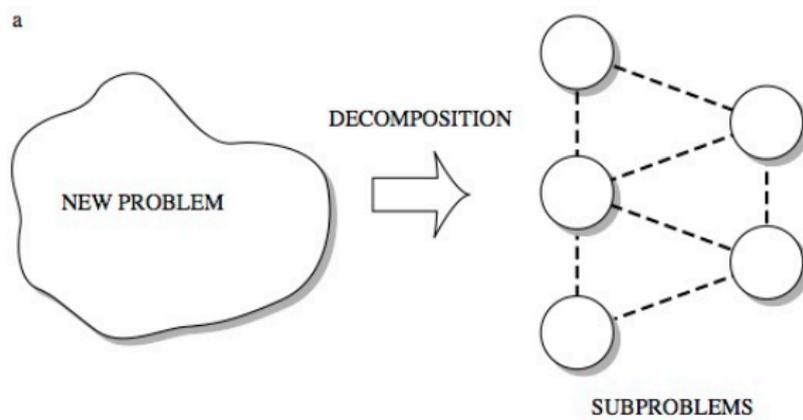
Terminal Window (Console)

The **standard approach** runs a program directly through the **Python interpreter**.



```
Terminal — Python — 112x26
/Users/austin 872>> python3
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 26 2018, 23:26:24)
[Clang 6.0 (clang-600.0.57)] on darwin
Type "help", "copyright", "credits" or "license" for more information.
>>> a = [ 1, 2, 3, 4, 5, 6 ]
>>> print(a)
[1, 2, 3, 4, 5, 6]
>>> print(type(a))
<class 'list'>
>>> b = [ (1, 2), (3, 4), (5, 6) ]
>>> print(b)
[(1, 2), (3, 4), (5, 6)]
>>> print( type(b) )
<class 'list'>
>>> import numpy as np
>>> c = np.array(b)
>>> print(c)
[[1 2]
 [3 4]
 [5 6]]
>>> print( type(c) )
<class 'numpy.ndarray'>
>>> █
```


Top-Down and Bottom-Up Program Design



Interpreted and Compiled Programming Languages

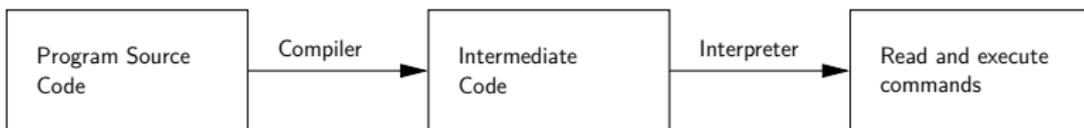
Modern Interpreter Systems

Transform source code into a lower-level intermediate format.
Interpreter then executes commands.

Compiled Code



Compiled and Interpreted Code



Examples: Java and Python (even MATLAB).

Integrated Development Environments

(Simplifying Program Development)

Visual Studio Code

Graphical Interface

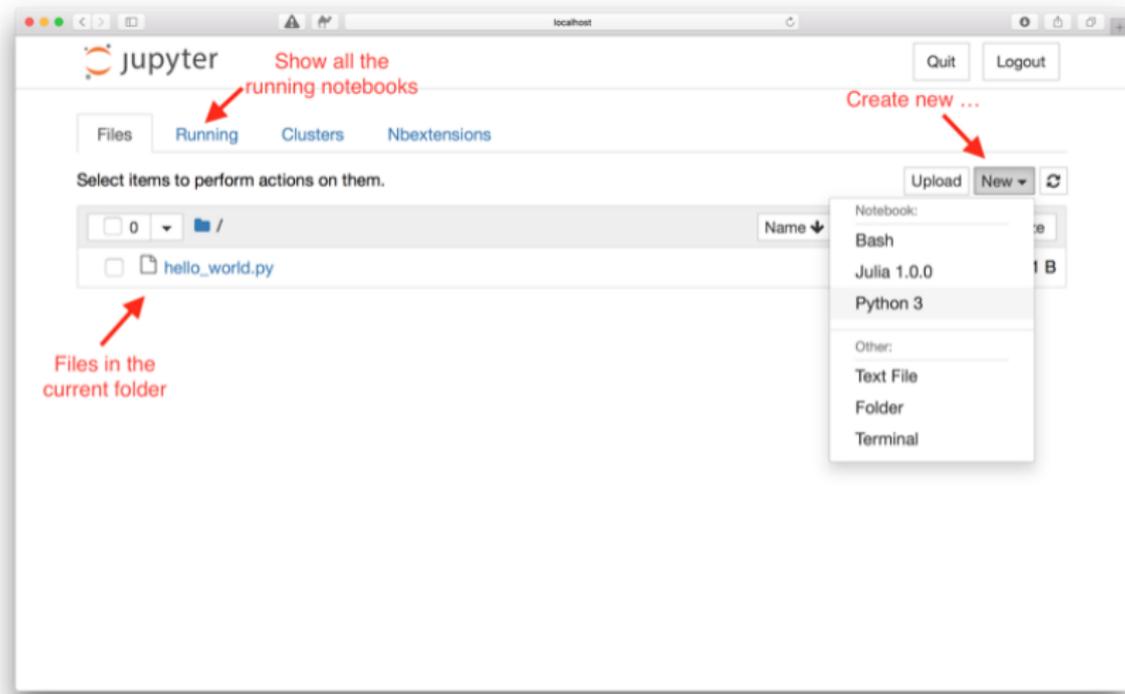
The screenshot displays the Visual Studio Code interface. On the left, the Explorer sidebar shows a project structure with folders like '.venv' and files 'hello.py' and 'standardplot.py'. The main editor window shows the code for 'standardplot.py':

```
1 import matplotlib.pyplot as plt
2 import numpy as np
3
4 x = np.linspace(0, 20, 100) # Create a list of evenly-spaced numbers
5 plt.plot(x, np.sin(x))      # Plot the sine of each x point
6 plt.show()
```

Overlaid on the editor is a window titled 'Figure 1' containing a plot of a sine wave. The x-axis ranges from 0.0 to 20.0 with major ticks every 2.5 units. The y-axis ranges from -1.00 to 1.00 with major ticks every 0.25 units. The plot shows three full cycles of a sine wave, starting at (0,0), peaking at approximately (1.57, 1.0), crossing zero at approximately (3.14, 0), reaching a trough at approximately (4.71, -1.0), and continuing this pattern.

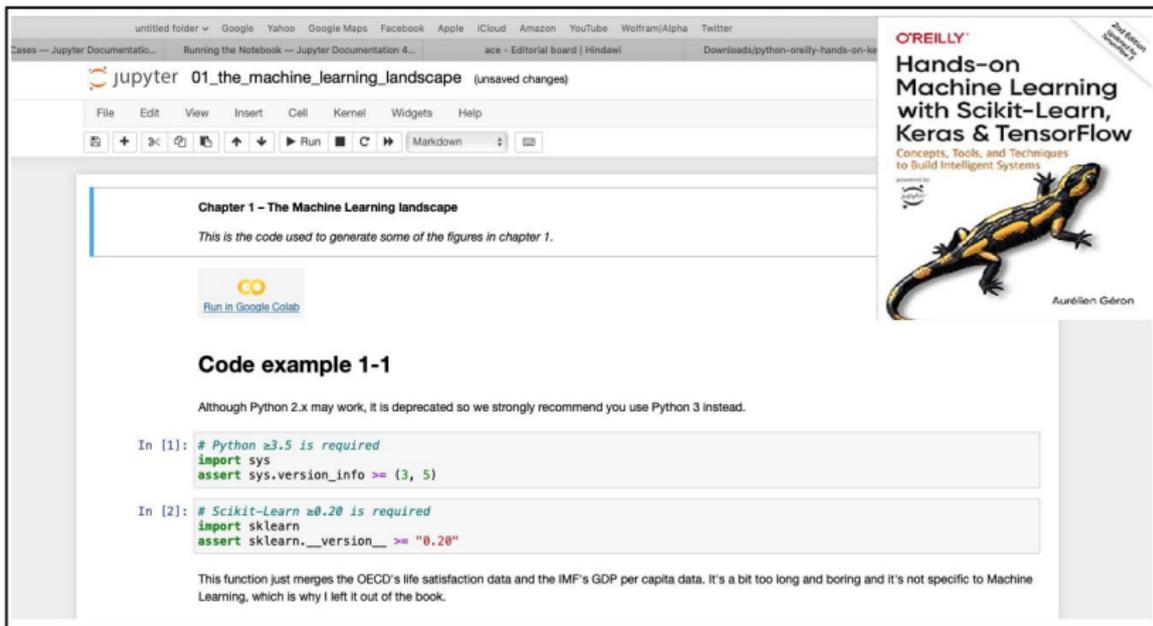
At the bottom of the VS Code window, the status bar indicates 'Python 3.9.6 64-bit (.venv: venv)', 'Ln 6, Col 14', 'Spaces: 4', 'UTF-8', 'CRLF', and 'Python'.

Jupyter Notebook User Interface



Jupyter Notebook and Machine Learning

Jupyter Notebook (Machine Learning with TensorFlow)



The screenshot shows a Jupyter Notebook window titled "01_the_machine_learning_landscape". The interface includes a menu bar (File, Edit, View, Insert, Cell, Kernel, Widgets, Help) and a toolbar with navigation icons. The main content area displays the following text:

Chapter 1 – The Machine Learning landscape

This is the code used to generate some of the figures in chapter 1.

[Run in Google Colab](#)

Code example 1-1

Although Python 2.x may work, it is deprecated so we strongly recommend you use Python 3 instead.

```
In [1]: # Python ≥3.5 is required
import sys
assert sys.version_info >= (3, 5)

In [2]: # Scikit-Learn ≥0.20 is required
import sklearn
assert sklearn.__version__ >= "0.20"
```

This function just merges the OECD's life satisfaction data and the IMF's GDP per capita data. It's a bit too long and boring and it's not specific to Machine Learning, which is why I left it out of the book.

On the right side of the notebook, there is a book cover for "Hands-on Machine Learning with Scikit-Learn, Keras & TensorFlow" by Aurélien Géron, published by O'Reilly. The cover features a yellow and black salamander.

