



MRC Cognition
and Brain
Sciences Unit



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Primer on Python

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MRC Cognition and Brain Sciences Unit

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Python

Python is a general-purpose programming language.

Designed to be a small core language that is easily extensible with libraries.

A key principle of its design philosophy is
“Borrow ideas from elsewhere whenever it makes sense”



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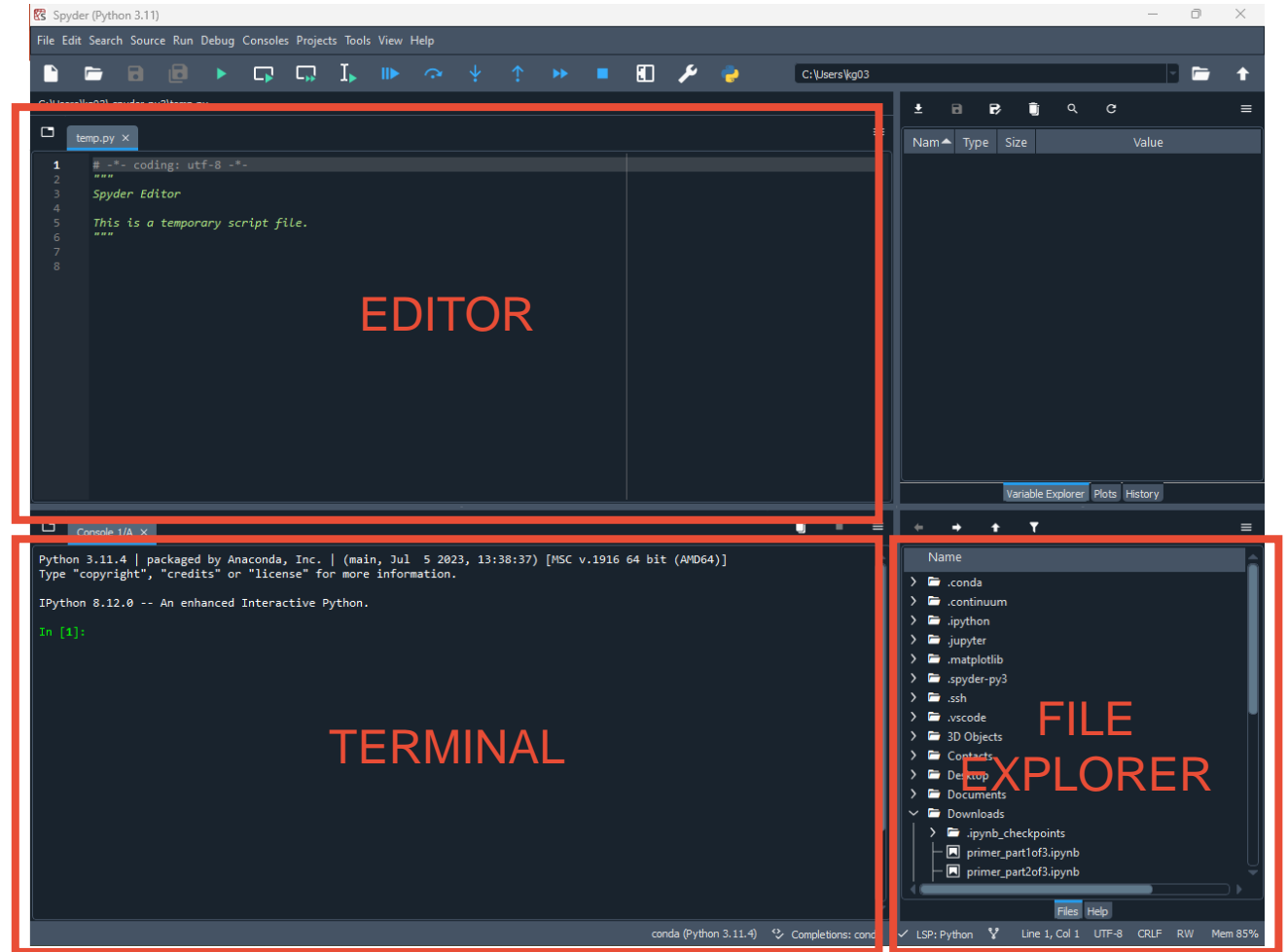
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IDE

Integrated development environment (IDE) is an application for code development

Some popular Python IDE's:

- PyCharm
- Spyder
- Visual Studio Code



Notebooks



Notebooks combine code, outputs, narrative text, etc. into a single document.

Popular for presenting and explaining data analysis projects.

Jupyter is a popular interactive computing software.

Named after the 3 core languages which are supported: **Julia**, **Python** and **R**

Narrative text

Simple spectral analysis

An illustration of the [Discrete Fourier Transform](#) using windowing, to reveal the frequency content of a sound signal.

$$X_k = \sum_{n=0}^{N-1} x_n e^{-\frac{2\pi}{N}kn} \quad k = 0, \dots, N-1$$

We begin by loading a datafile using SciPy's audio file support:

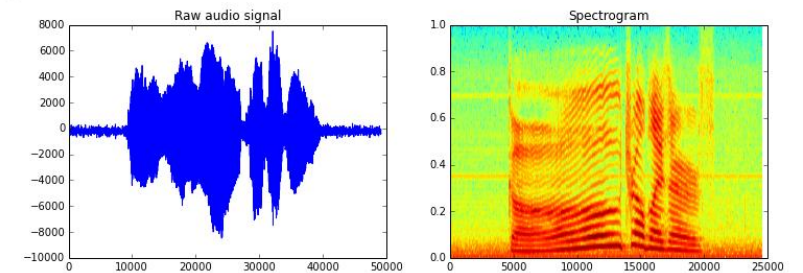
```
In [1]: from scipy.io import wavfile
rate, x = wavfile.read('test_mono.wav')
```

And we can easily view its spectral structure using matplotlib's builtin specgram routine:

```
In [2]: %matplotlib inline
from matplotlib import pyplot as plt
fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(12, 4))
ax1.plot(x); ax1.set_title('Raw audio signal')
ax2.specgram(x); ax2.set_title('Spectrogram');
```

Code

Output



Virtual Environments

Folder that contains your Python installation and associated packages.

When you have different versions of Python or libraries/packages:

1. Avoid dependency conflicts
2. Minimise reproducibility issues

Recommended to set up virtual environments for different projects.

Conda is a popular environment manager for Python and other languages.



```
conda activate environment_name  
  
... work with scripts ...  
  
conda deactivate
```

Module	Conda Environment
01_Primer_on_Python	mri
02_Statistics	stats



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Let's Get Started!