Introduction to SciPy

SciPy(Scientific Python) is a scientific computation library that uses NumPy underneath. SciPy is a powerful tool for scientists, engineers, and researchers who need to perform complex mathematical and scientific operations in Python.

NumPy vs SciPy

- NumPy and SciPy used for mathematical and numerical analysis
- NumPy contains array data and basic operations
- SciPy consists of all the numerical code
- SciPy contains fully-featured versions of mathematical and scientific functions

SciPy 1st Steps: install and import

- SciPy is an easy package to install. Open up your terminal program (shell or cmd) and install it using either of the following commands:

```
pip install scipy
```

- To import matplotlib we usually import it with a shorter name since it's used so much:

```
import scipy
```

```
print(scipy.__version__)
```

SciPy Subpackage

Subpackage	Description
`cluster`	Clustering algorithms
`constants`	Physical and mathematical constants
`fftpack`	Fast Fourier Transform routines
`integrate`	Integration and ordinary differential equation solvers
`interpolate`	Interpolation and smoothing splines
`io`	Input and Output
`linalg`	Linear algebra
`ndimage`	N-dimensional image processing
`odr`	Orthogonal distance regression
`optimize`	Optimization and root-finding routines
`signal`	Signal processing
`sparse`	Sparse matrices and associated routines
`spatial`	Spatial data structures and algorithms
`special`	Special functions
`stats`	Statistical distributions and functions

Constants in SciPy

```
from scipy import constants
```

As SciPy is more focused on scientific implementations, it provides many built-in scientific constants. These constants can be helpful when you are working with Data Science. A list of all units under the constants module can be seen using the dir() function.

```
print(dir(constants))

print(constants.gram)
print(constants.degree)
print(constants.minute)
print(constants.hour)
print(constants.inch)
print(constants.foot)
print(constants.liter)
print(constants.pi)
print(constants.zero_Celsius)
```

Unit Categories

The units are placed under these categories:

- Metric
- Binary
- Mass
- Angle
- Time
- Length
- Pressure
- Volume
- Speed
- Temperature
- Energy
- Power
- Force