Python


Numerical Python - NumPy

Women Who Code DC

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- Women Who Code (WWCode) is global non-profit dedicated to inspiring women to excel in technology careers. We work to support this generation in being and becoming leaders and role models in the tech industry.
- We are the DC Chapter!
- Volunteer / Donate
- Visit our Meetup site
- Python Beginners: 1st Wednesday of the Month; Python Hack Night: 3rd Wednesday of the month

NumPy

- Overview
- NumPy reference document
- PIP review and NumPy install – video clip - 10 secs
- Hands-on exercises
- Creating even-space Arrays: arange and linspace,
- Broadcasting
- Hands-on exercises: arrange, linspace, broadcasting

NumPy

- Open source extension module for Python
- Designed for scientific computation
- Provides a large library consisting of multidimensional array objects and a collection of routines for processing those arrays.
- NumPy is not installed by default. NumPy has to be installed before installing SciPy (another library module that extends NumPy capabilities).

NumPy Ndarray Object aka array

- A grid of values
- ALL of the same data type
- Cell size ALL the same
- Indexed by nonnegative integers.

NumPy - Reference Manual

- Provides documentation on the multidimensional array object, various derived objects (such as masked arrays and matrices), and an assortment of routines for fast operations on arrays, including mathematical, logical, shape manipulation, sorting, selecting, I/O, discrete Fourier transforms, basic linear algebra, basic statistical operations, random simulation and much more.....
- At the core of the NumPy package, is the *ndarray* object.

- SciPy.org Reference Manual:
- https://docs.scipy.org/doc/numpy1.10.1/reference/index.html

Hands-on with Functions, Routines, Indexing

SciPy.org Reference Documentation:
https://docs.scipy.org/doc/numpy-1.10.1/reference/index.html

Array Object >ndarray> shape

Array Object >indexing (check out examples)

Routine>Array Creation routine> zeros, eye, ones
Routine>Array Creation routine> numerical ranges> arange, linspace

Routine>Random sampling(numpy.random)

Do Exercises:
http://www.labri.fr/perso/nrougier/teaching/numpy.100/
#3, 5, 7, 10, 12, 17

Python package installer: pip

- Opensource
- **pip** is a package management system use to install and manage software written in Python
- Python comes with pip pre-installed
- User Guide: https://pip.pypa.io/en/stable/

- At the command prompt: pip install numpy
- Takes all but 10 seconds for pip to find, download & install
- https://www.youtube.com/watch?v=-llHYUMH9Dg

Create evenly spaced values in Array

One uses a given distance 'arange' and the other one 'linspace' needs the number of elements and creates the distance automatically.

arange returns evenly spaced values within a given interval.

arange

The syntax of arange:

```
arange([start,] stop[, step,], dtype=None)
```

linspace

The syntax of linspace:

```
linspace(start, stop, num=50, endpoint=True, retstep=False)
```

linspace returns an ndarray, consisting of 'num' equally spaced samples in the closed interval [start, stop] or the half-open interval [start, stop).

Broadcasting

If the dimensions of two arrays are dissimilar, element-to-element operations are not possible.

However, operations on arrays of non-similar shapes is still possible in NumPy, because of the broadcasting capability.

The smaller array is broadcast to the size of the larger array so that they have compatible shapes.