# What is numpy?

Well, It means numeric python…

```
import numpy as np
a = np.random.random([3,3])
#Return random floats in the half-open interval [0.0, 1.0).
a
```

```
array([[ 0.19160074,  0.15250941,  0.28307011],
       [ 0.28790573,  0.15795578,  0.29146718],
       [ 0.98388842,  0.73749285,  0.76317301]])
```

# Why using numpy?

- Save loops: Hence save time… At Least can 2X faster…
- Easy slicing using locations
- Easy to do elementwise operations
- Form more advanced data type: For e.g., pandas Dataframe

```
import time
numpy_array=np.array([[1,2,1],[2,0,1]])
start=time.time()
arr*arr
end=time.time()
print(end-start)
```

```
6.508827209472656e-05
```

```
start=time.time()
for i in arr:
    print(i*i)
end=time.time()
print(end-start)
```

```
[1 4 9]
[16 25 36]
0.0003089904785156250
```

# What can numpy do?

- Math and statistics : sqrt, sin, cos, log, mean, sum, cumsum…
- Matrix operations: x.dot(y), inverse, transpost, eigenvalues (本征值), determint (行列式)
- Sort, finding max, min positions, generation of random numbers
- …

# More resources

- Numpy Quickstart tutorial:

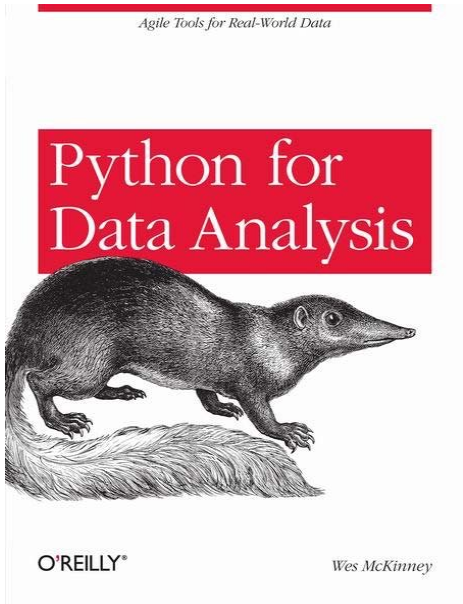
https://docs.scipy.org/doc/numpy-dev/user/quickstart.html

- Python for Data Analysis

  Data Wrangling with Pandas, NumPy, and IPython

  By William McKinney

  Publisher: O'Reilly Media



# What is Pandas ?

- Pandas Series
- Pandas Dataframe

Yes We Are !

Thank you!