



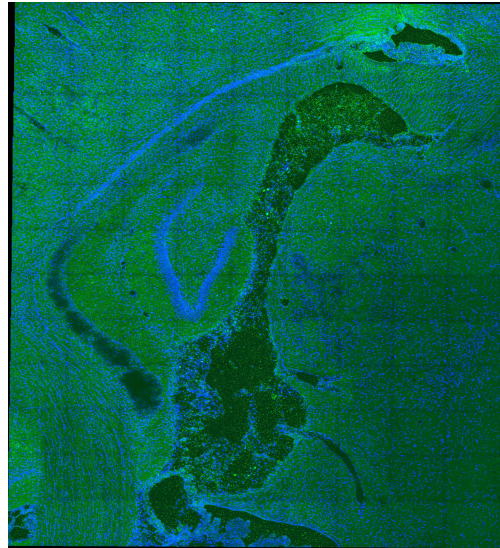
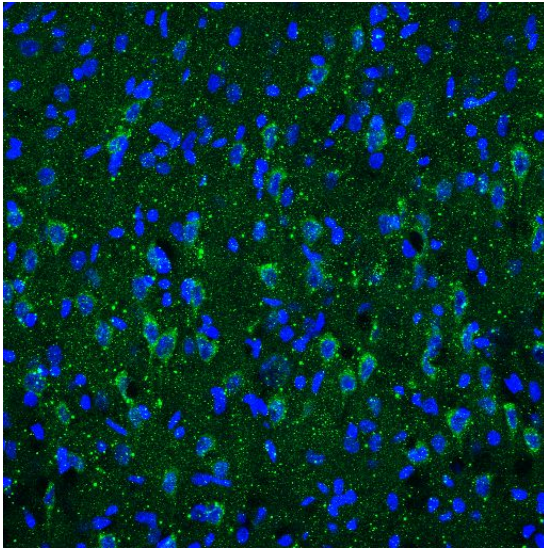
Tech Review

Rockstar_Lifestyle



Background

Goal: Develop a Protein Characterization Package to provide extra Quantification of images already obtained by Nance Lab



NumPy

`numpy.fft.fft()`

Requires: Desired array

Optional: shape of output transform, axis along which the fft is computed, and the normalization of the matrix which can be set to $1/N^{0.5}$

Quick Facts:

Platform: Python

Last update: v1.17.dev0 - 2/19/2019

Developers: Community Project

Pros:

- Ability to take transforms in multiple dimensions.
- Can accept and return a complex array

Downsides:

- The equations NumPy uses makes the Fourier coefficients N times larger than expected.
- Leakage occurs when signal is not periodic in the interval 0 to N .

DiPy

`dipy.reconst.dsi.fft()`
`dipy.reconst.dsi.ifft()`

Required input: Desired array (n-dim)
Optional: Shape of output transform, the axes along which the transform is applied, bool overwrite tag
Output: n-dimensional numpy array

Quick Facts:

Platform: Python

Last update: v0.15 - 12/12/2018

Developers: Community Project

Pros:

- Well documented
- Builds off of `scipy.fftpack` and not `numpy` (= more options than `numpy`)
- Large development team (inc. UW escience!)
- Entire package built with imaging research in mind

Cons:

- Since built with `scipy`, also comes with cons of `scipy` (slower for 2D arrays):

n	sp	np
8:	0.010189	0.005077
16:	0.010795	0.008069
32:	0.014351	0.008566
64:	0.028796	0.019308
128:	0.093085	0.074986
256:	0.459137	0.317680
512:	2.652487	1.811646
1024:	10.722885	7.796856

<https://stackoverflow.com/questions/6363154/what-is-the-difference-between-numpy-fft-and-scipy-fftpack>

Scikit (SciPy Toolkit)



scikit-image
image processing in python

`scikit.image.transform.fft()`

Requires: Desired array

Optional: length of the Fourier Transform/
axis along which the fft is computed/ if array
can be overwritten.

Pros: The entire transform can be created in
one line of code - clean and simple. Many
other image transformation properties in
one package

Cons: Low external documentation.

Quick Facts:

Platform: Python

Package dependence: NumPy

Last update: V 0.14.2 - 1/18/2018

Documentation: Extensive
internal, low external

Functionality: Submodules

Written: Peer-review volunteers

OpenCV

`cv2.dft()` [discrete fourier transform]
`cv2.idft()` [inverse discrete fourier transform]

Requires: Imported image with OpenCV

Pros:

- Offers a variety of high-pass filters
- Supports multiple interfaces and platforms
- Specifically for image processing
- Machine learning

Cons:

- Doesn't have 2D Fourier Transform
- Option to incorporate NumPy



Quick Facts:

Platform: Python

Package dependence: NumPy

Last update: V 4.0.1. - 2018-12-22

Documentation: Extensive

Functionality: Multiple application and machine learning libraries/ submodules

Owner: Intel