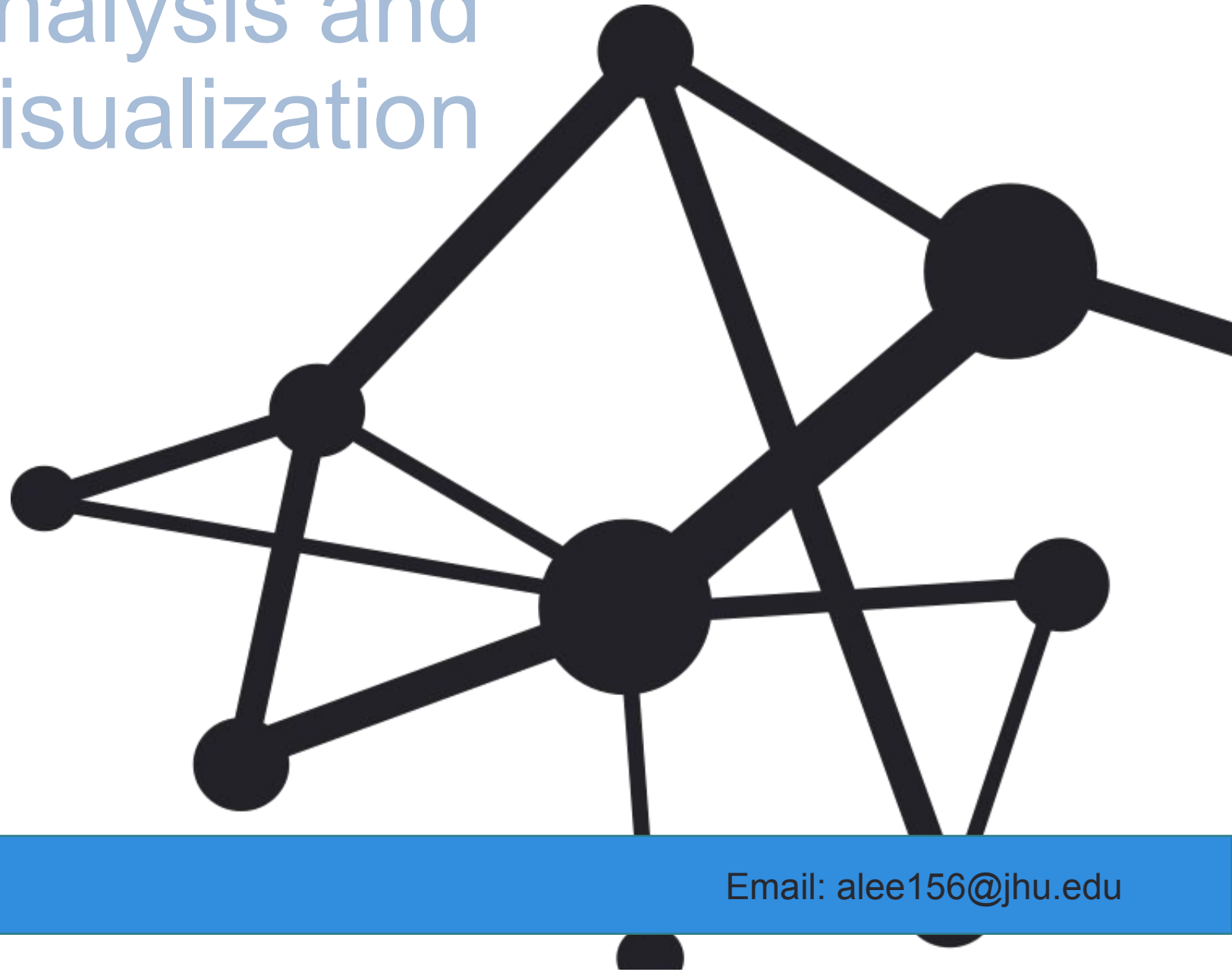


Clviz – Clarity analysis and visualization



Clarity

The Clarity technique allows for visualization of brain matter without damaging structural integrity. This allows for unprecedented access to connection and function estimation.

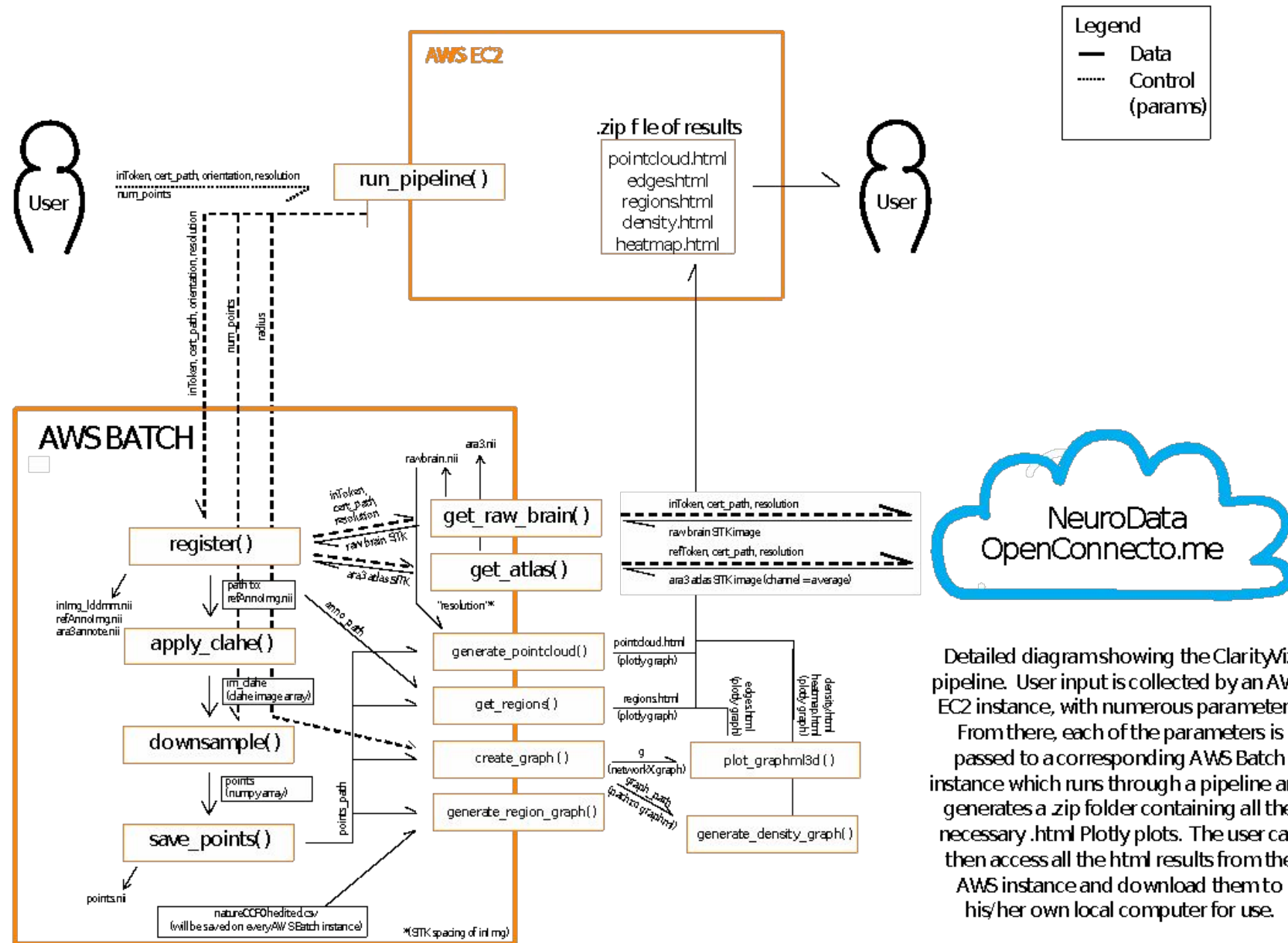
Clarity analysis is underdeveloped

Because Clarity is a relatively new imaging technique, there is a need for the development of high quality pipelines that can easily and quickly analyze and visualize the data.

A 3 click pipeline for visualization and analysis

We developed an open-source visualization and analysis pipeline which is packaged to be able to be used on any modern operating system (OSX, Windows, Linux). The pipeline is implemented as a cloud-computing web service that is highly scalable.

Connectomics at Scale



clviz pipeline

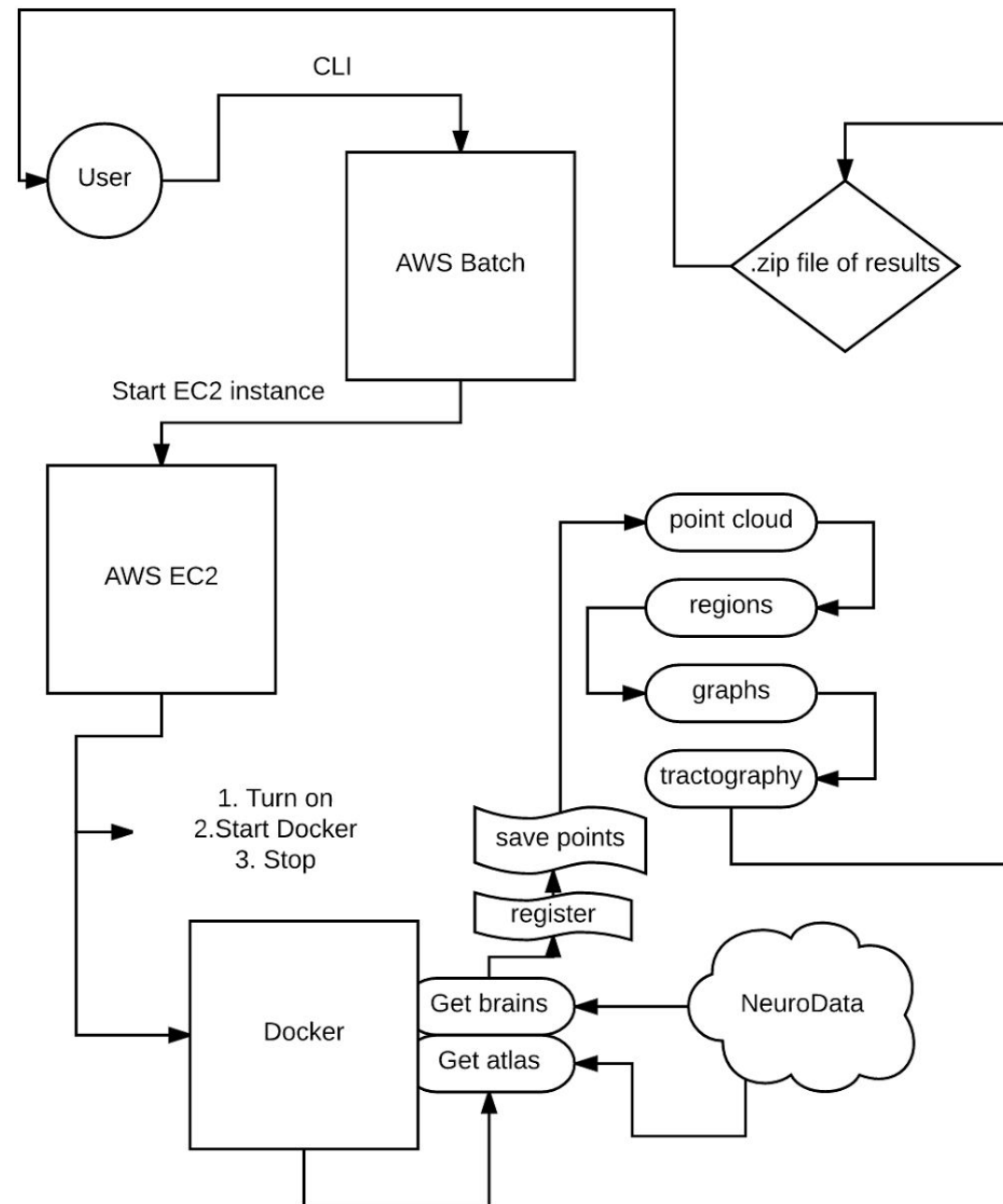
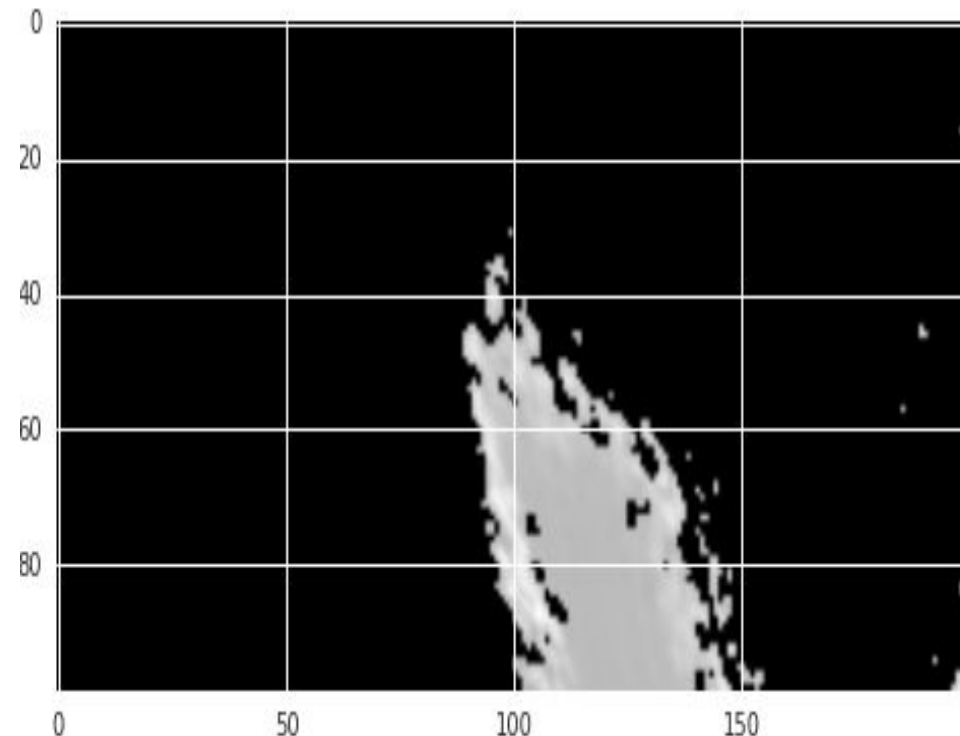
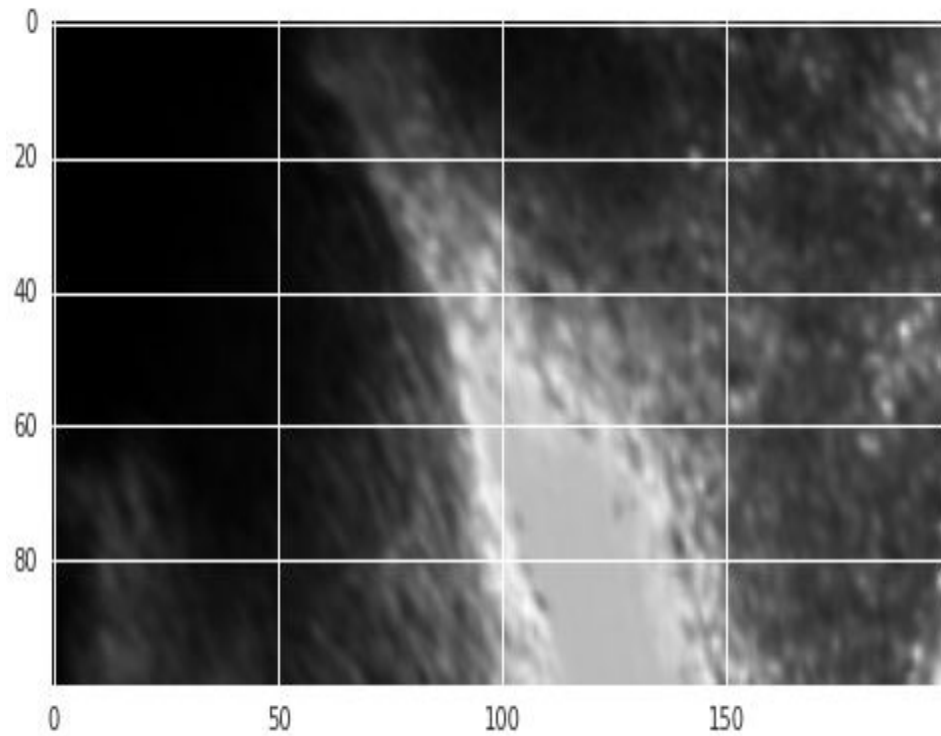
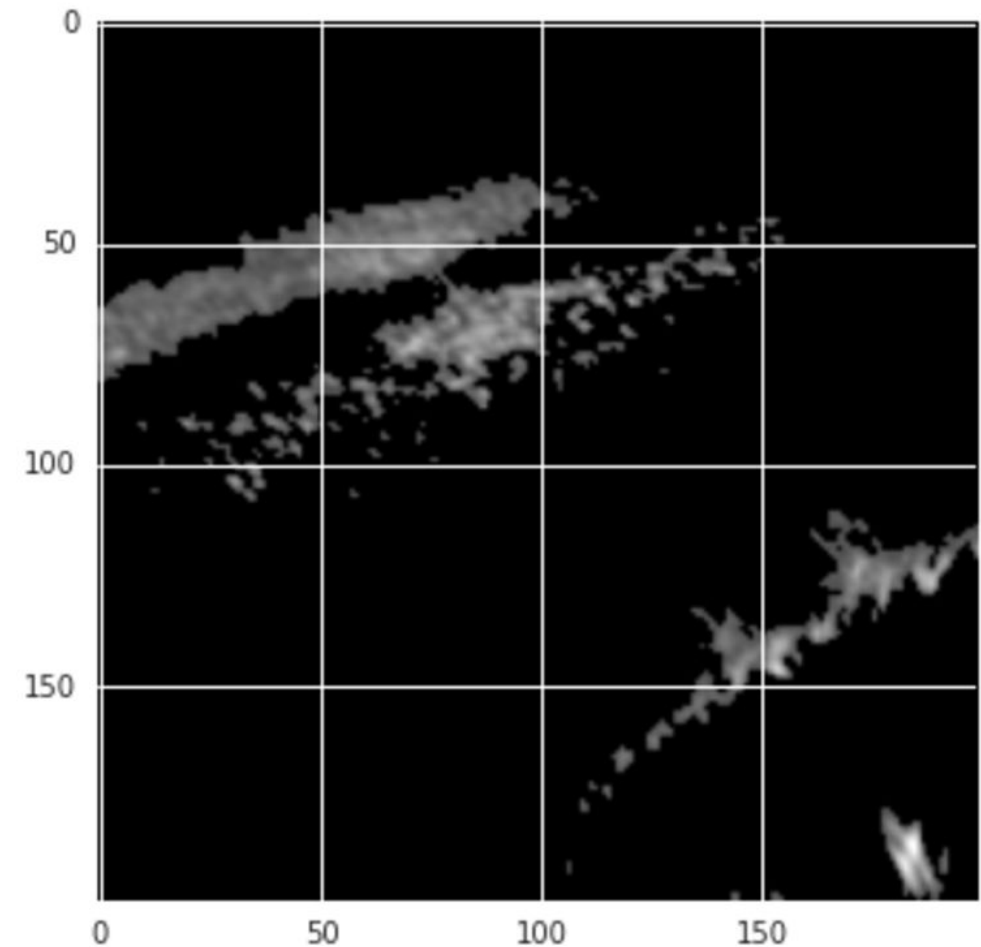
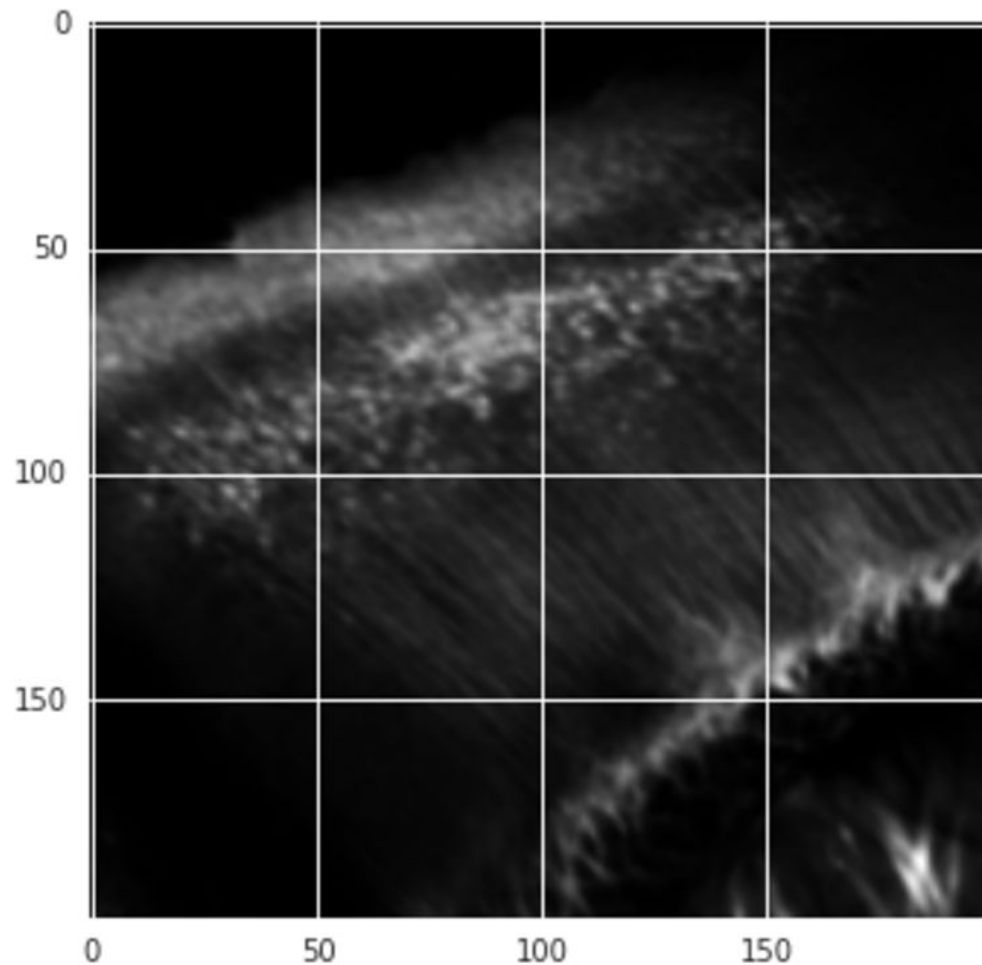


Image Preprocessing

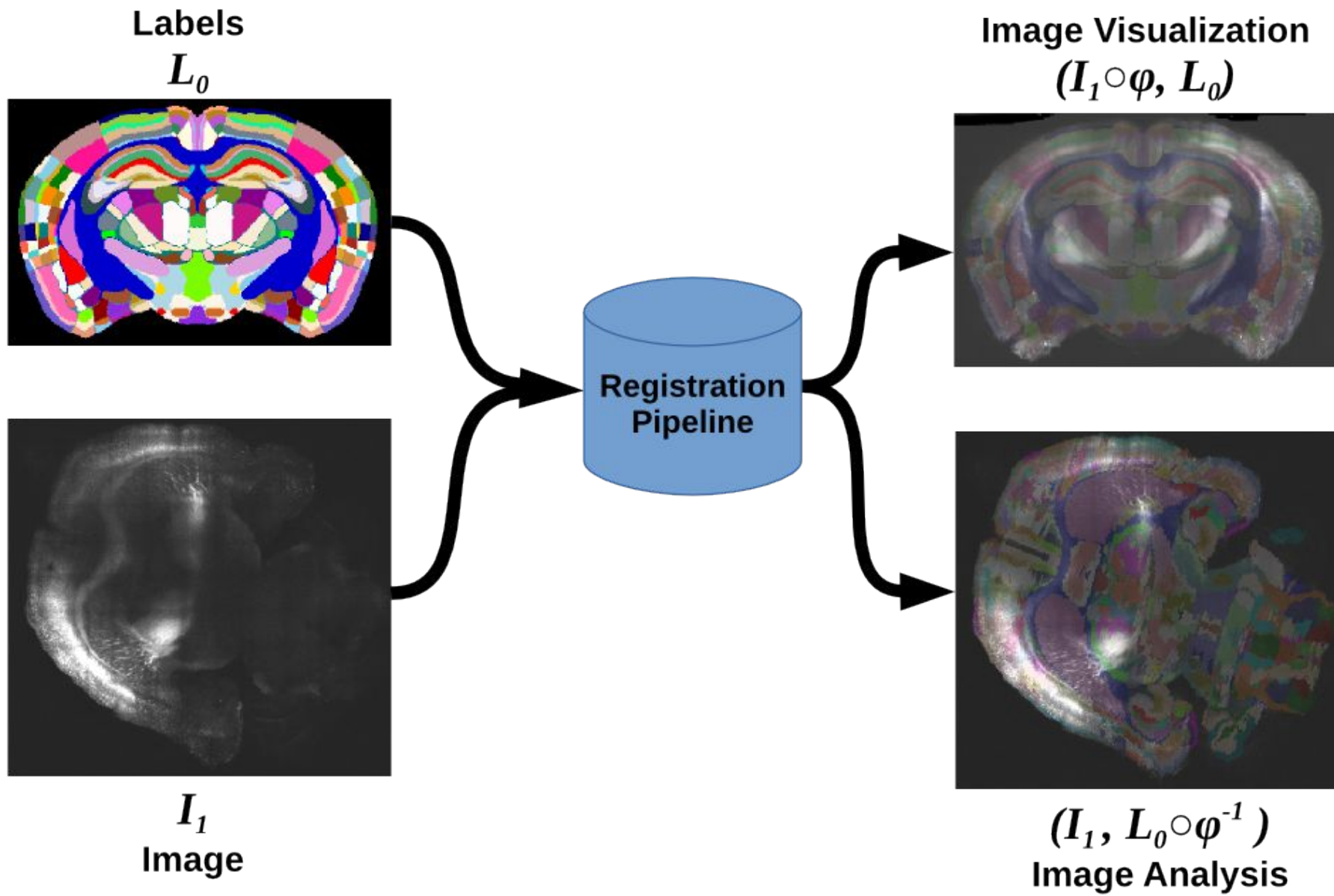
Find Locally Brightest Points in High Background Setting

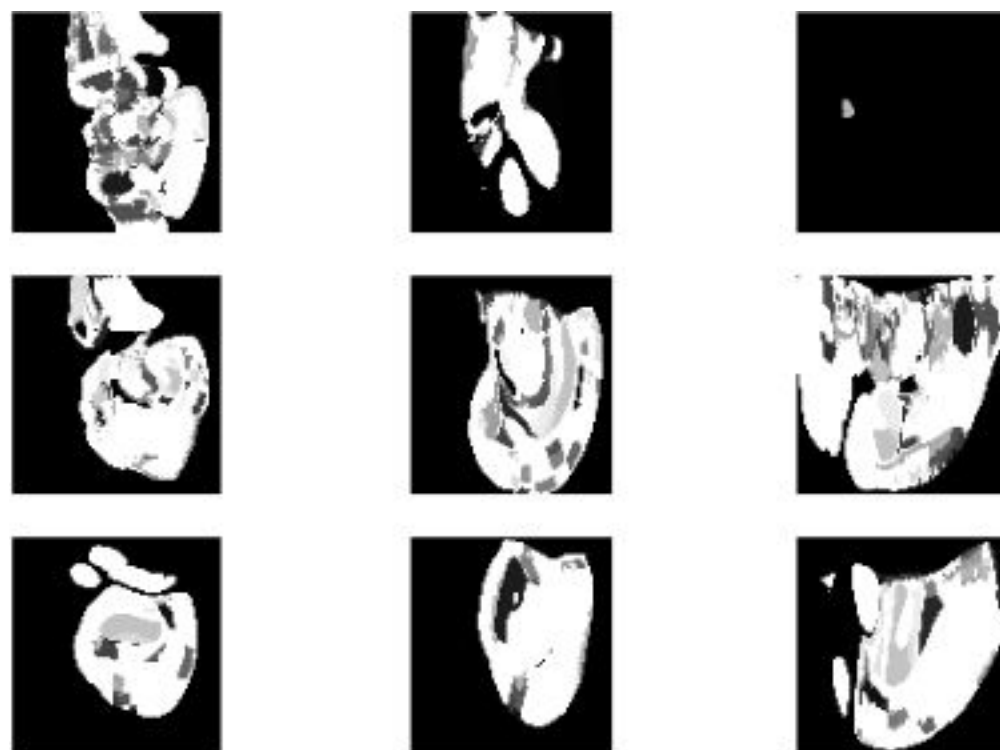


Find Locally Brightest Points in Low Background Setting



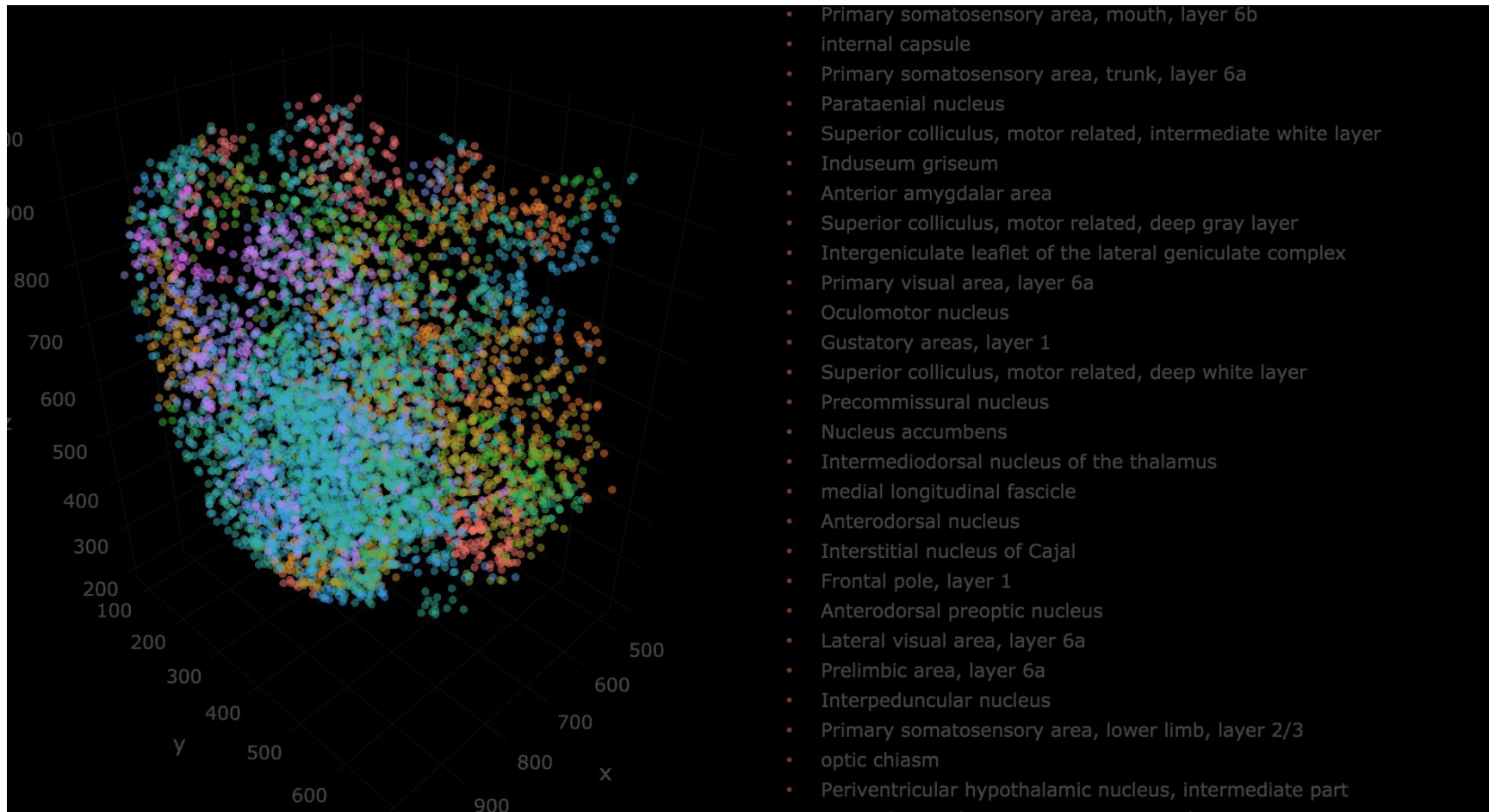
Registration





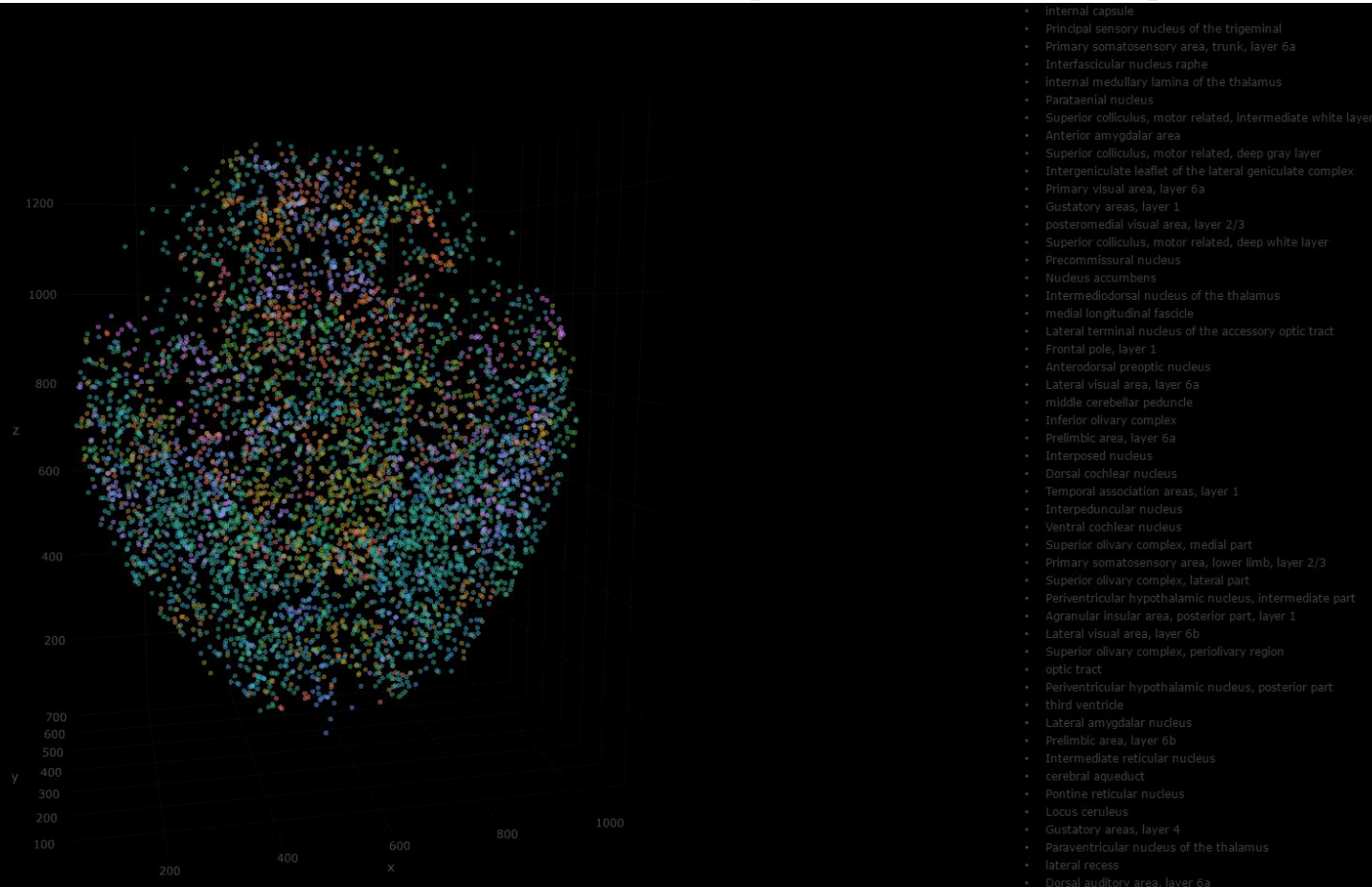
Region Graph

Interactive 3D Plot of 10,000 Brightest Points (s275)



- Each dot is one of the 10,000 brightest points
- Dots are colored by region
- Can interactively select/unselect any region
- Mousing over dot provides region name and 3D coordinate (in ARA space)
- [Link to interactive plot in cloud](#)

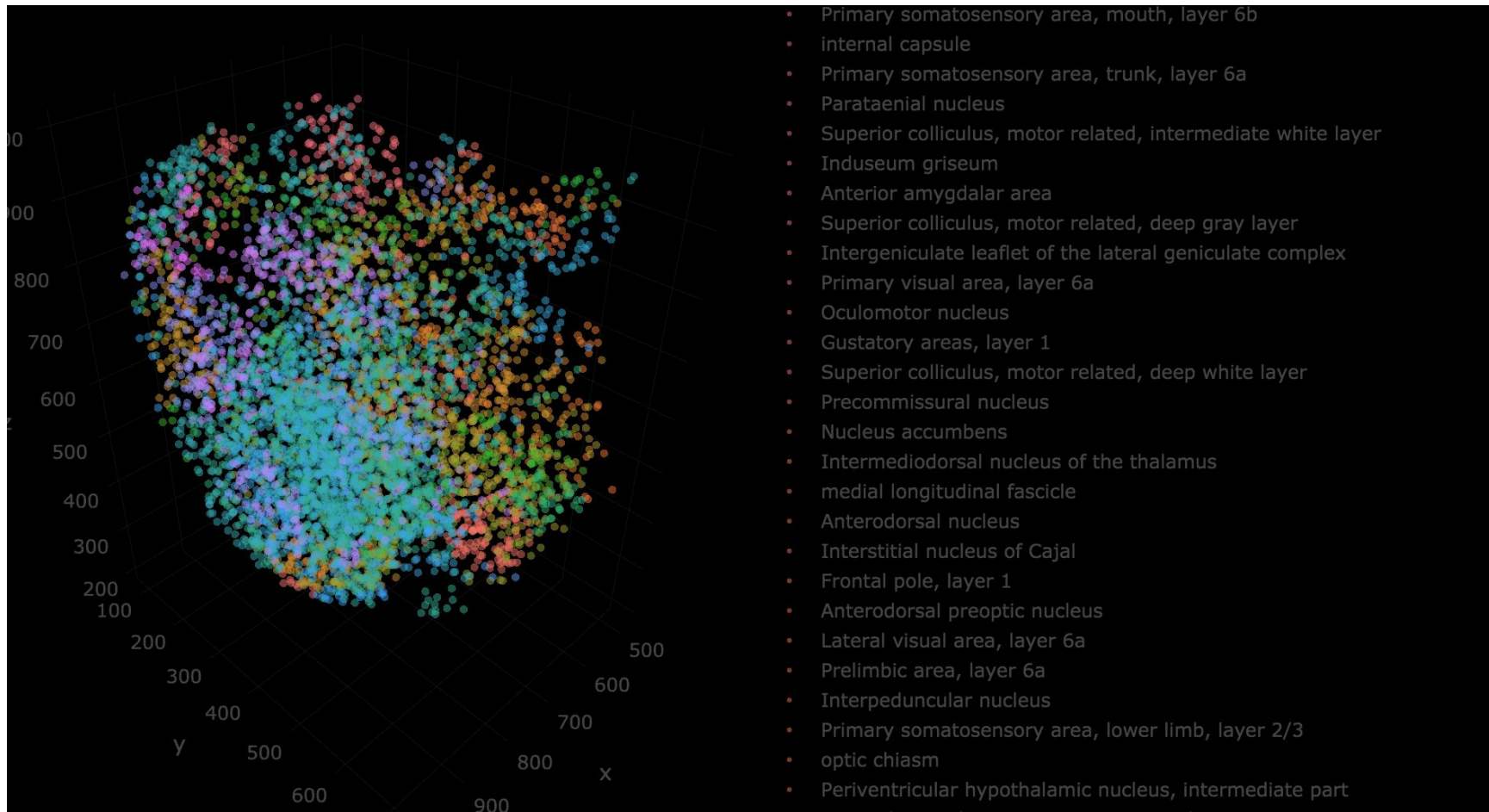
Interactive 3D Plot of 10,000 Brightest Points (s3617)



- Each dot is one of the 10,000 brightest points
- Dots are colored by region
- Can interactively select/unselect any region
- Mousing over dot provides region name and 3D coordinate (in ARA space)
- [Link to interactive plot in cloud](#)

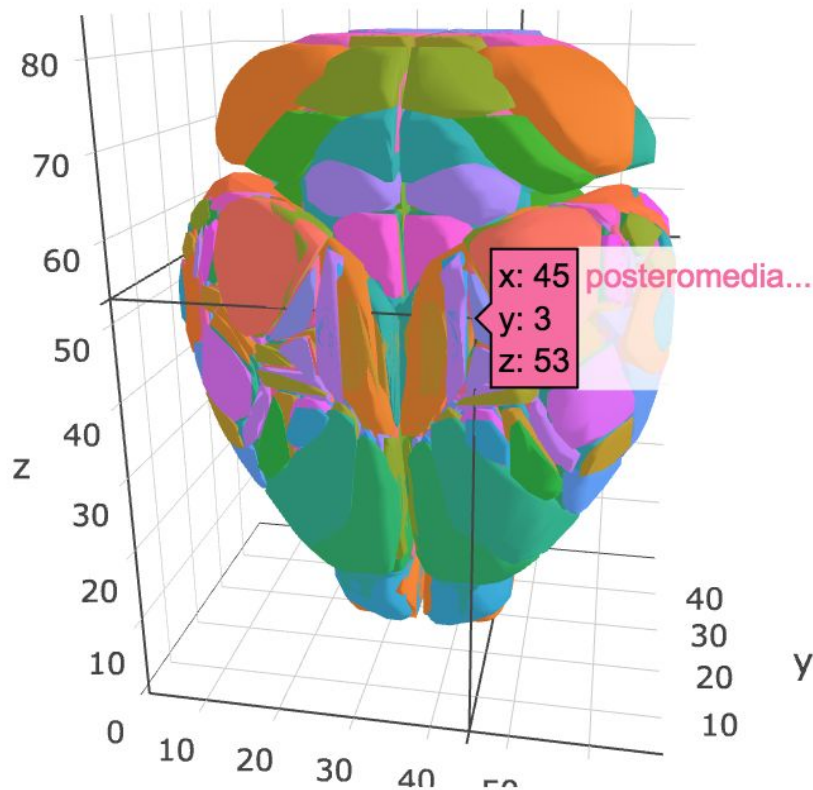
Brightest Centroids and Mesh

Interactive 3D Plot of 10,000 Brightest Points (s275)



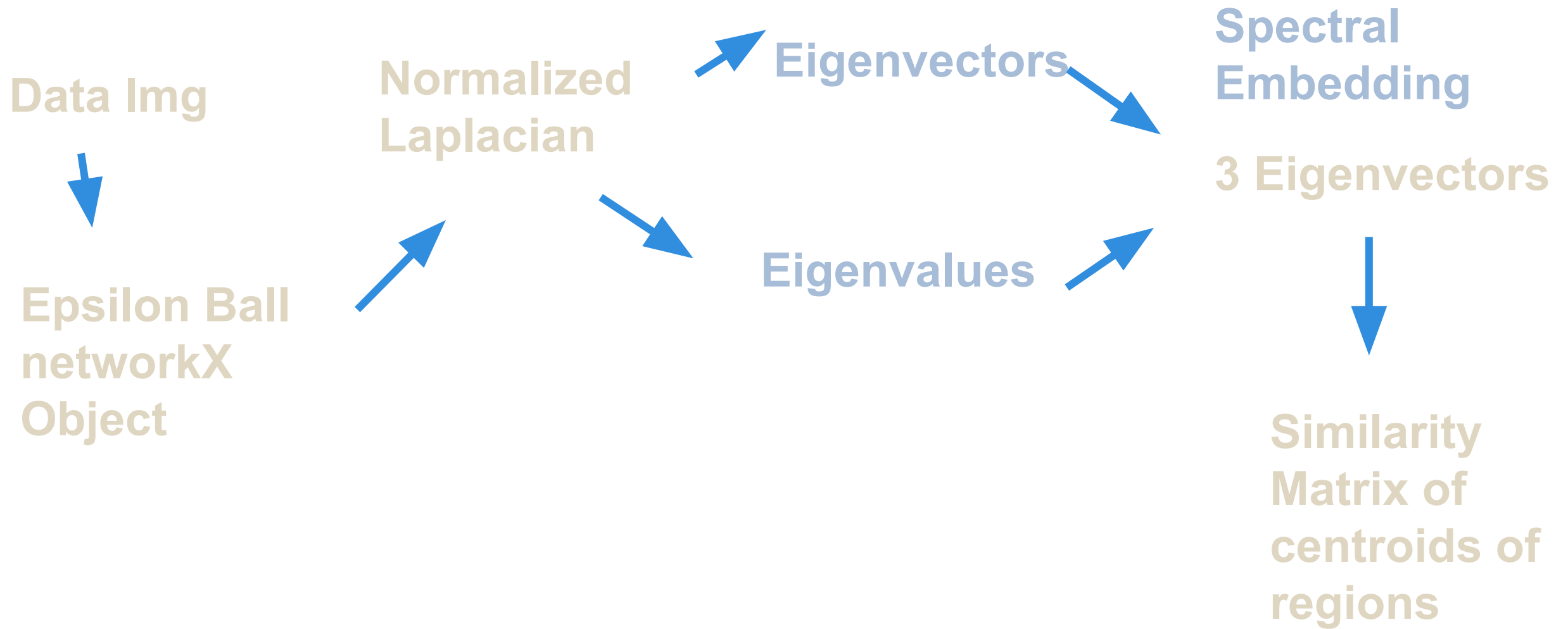
- Each dot is one of the 10,000 brightest points
- Dots are colored by region
- Can interactively select/unselect any region
- Mousing over dot provides region name and 3D coordinate (in ARA space)
- [Link to interactive plot in cloud](#)

Interactive 3D Plot of ROI Meshes: opacity implies # of bright spots



- Opacity of mesh is proportional to # of locally bright spots
- Mousing over dot provides region name and 3D coordinate (in ARA space)
- Dots are colored by region
- [Link to Jupyter notebook making plots](#)
- [Link to interactive plot in cloud](#)
- [Link to hemisphere with medial view](#)

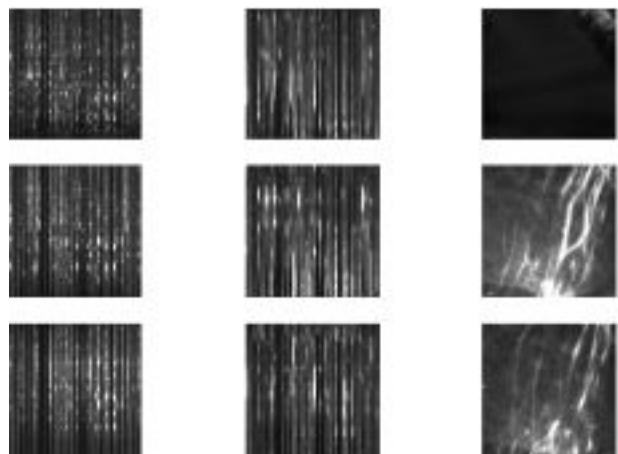
Connection Estimation



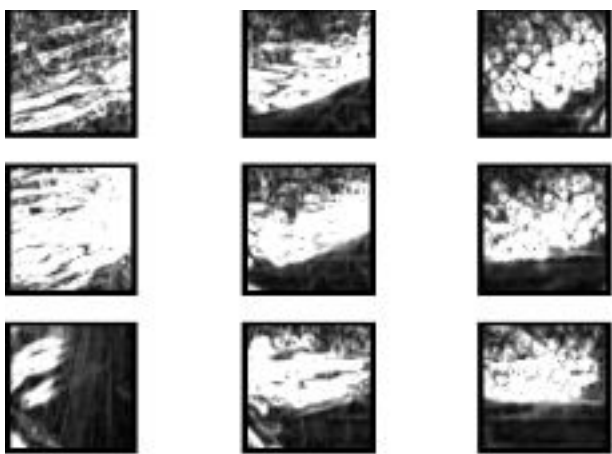
Current Progress:

- Generated epsilon ball graph and density plots.
- Have a methodology and sample code on test data for connectivity of sample data.
- In process of generating a general connectivity estimate for real data.

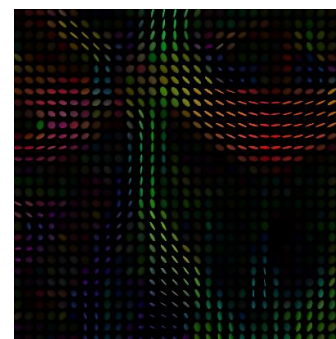
Tensor Estimation



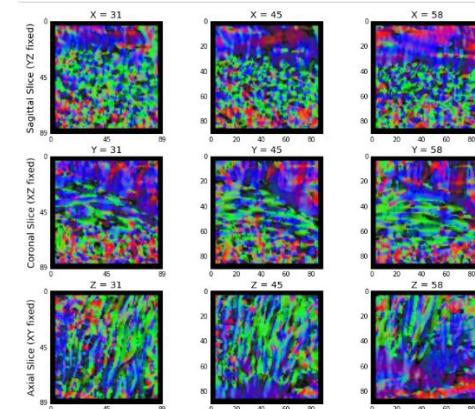
Data Img



Mask



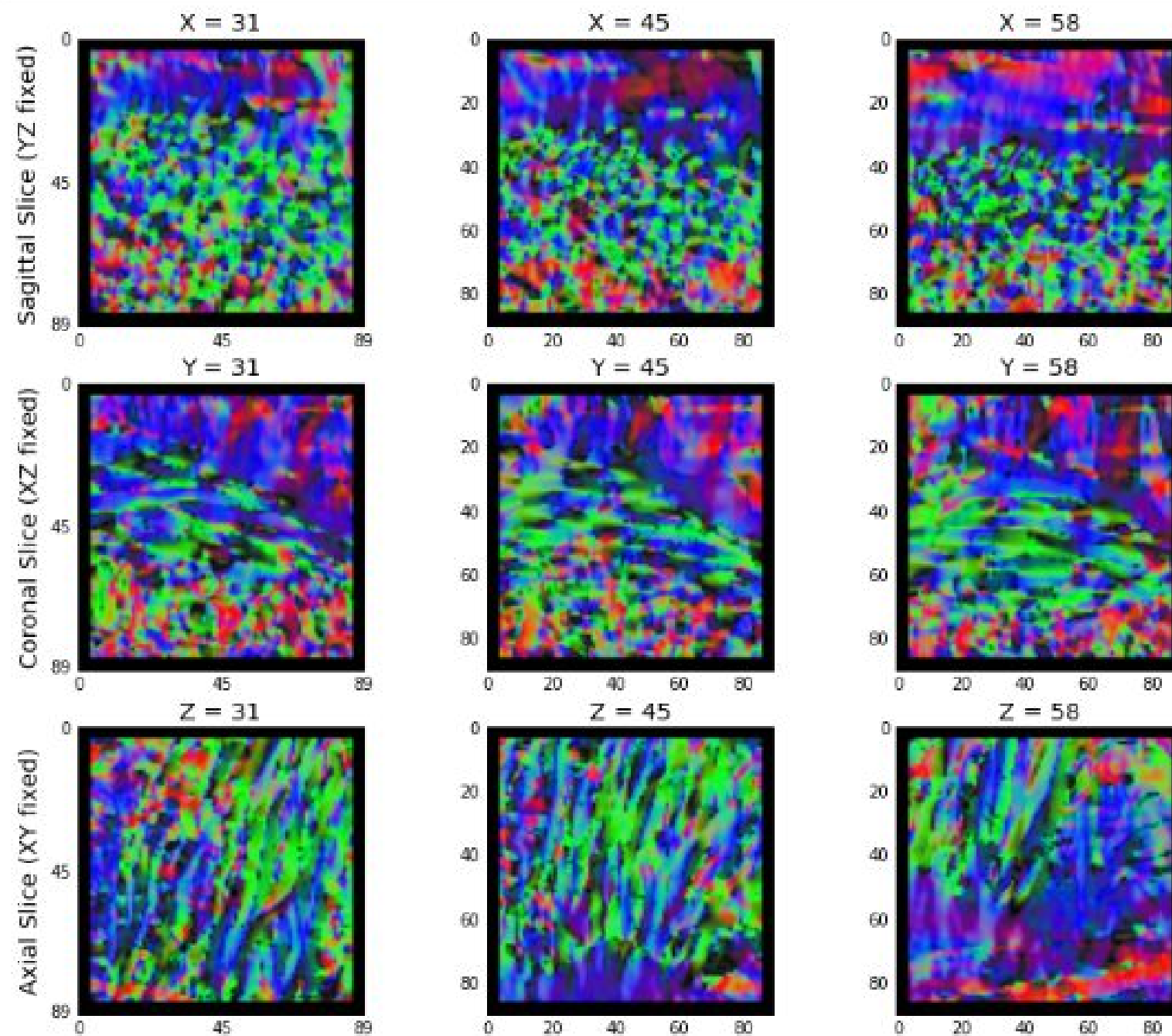
Tensors



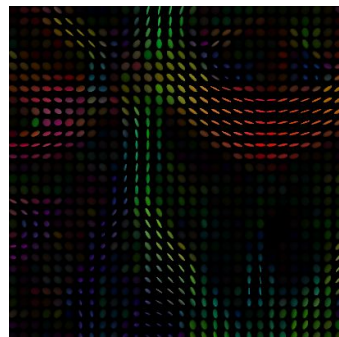
QA

Input
Intermediate
Output

Docs



Fiber Tractography

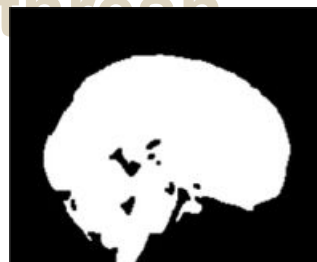


Tensors

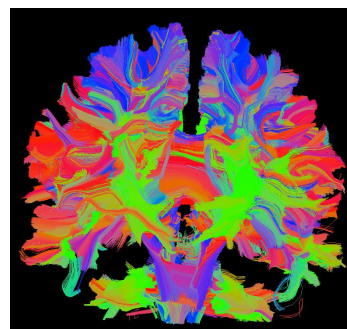
t_{fa}

FA

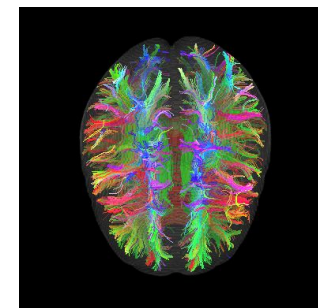
thresh



Mask



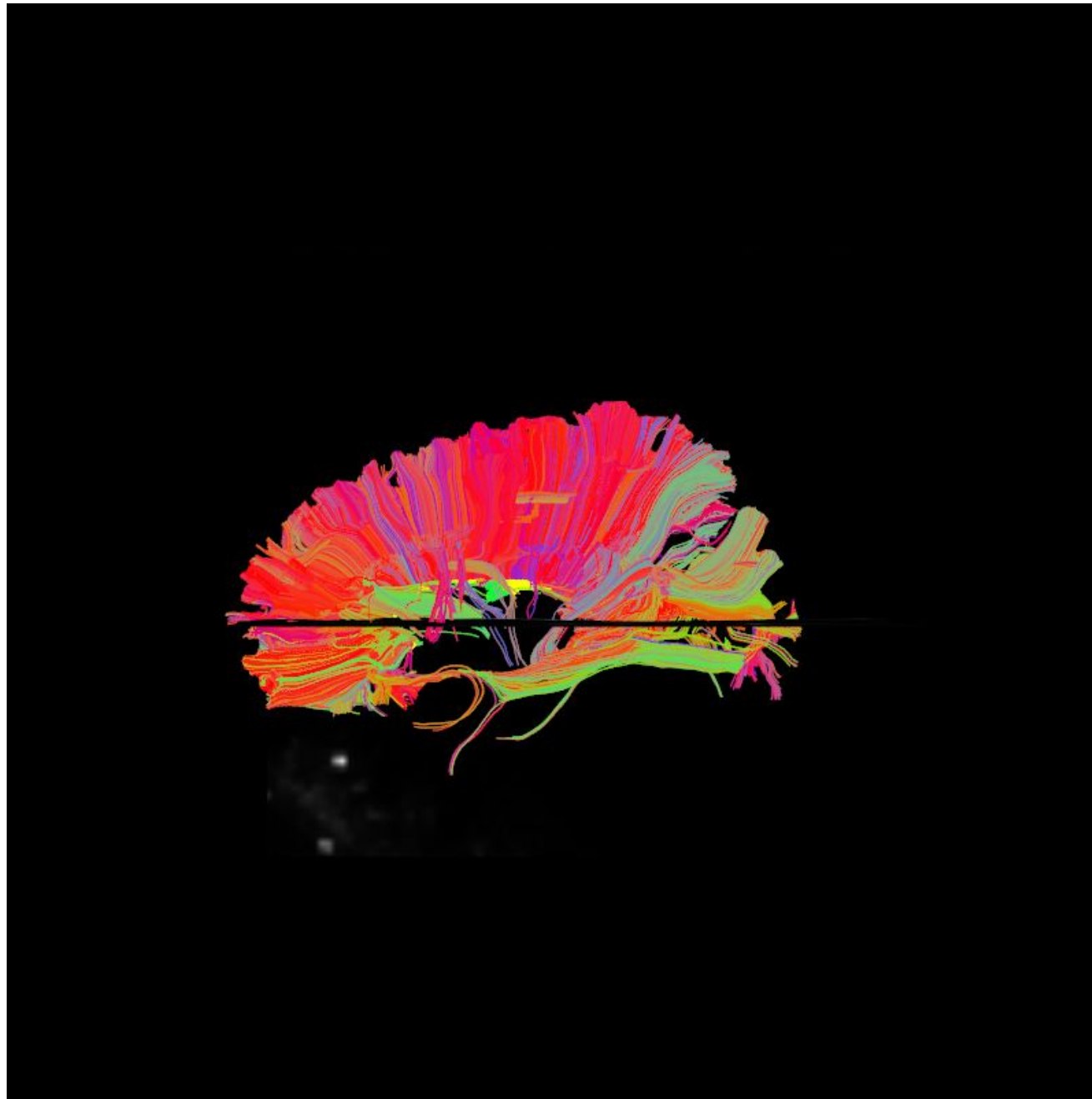
Fibers



QA

Input
Intermediate
Output

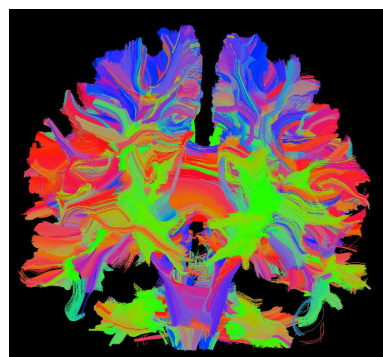
Docs



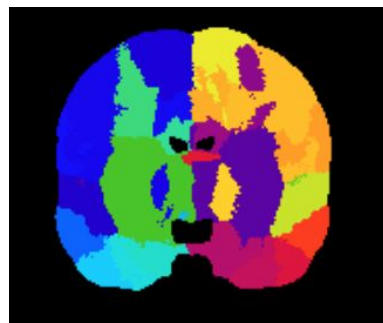
Rest of the slides are in progress

All slides past this point are Greg's

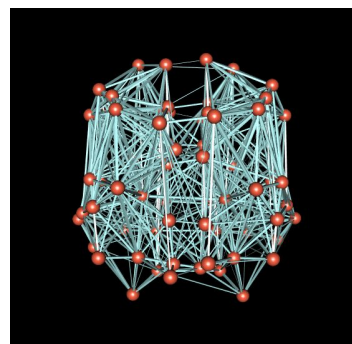
Graph Estimation



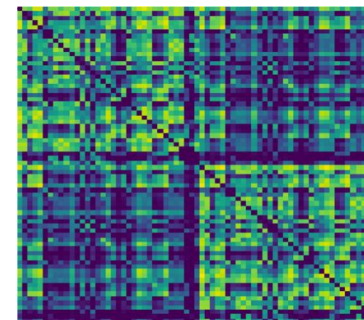
Fibers



Parcellation



Connectome

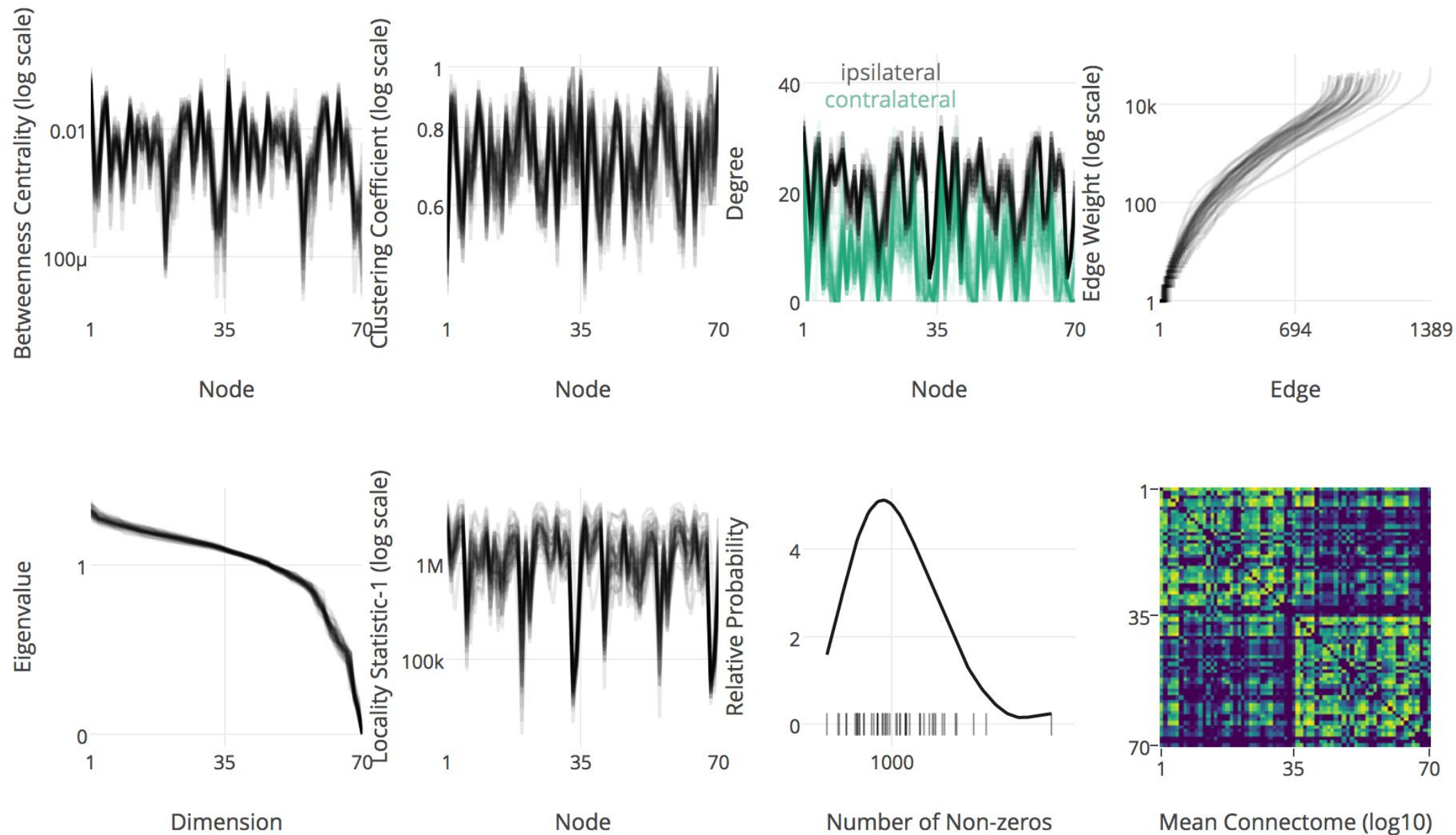


QA

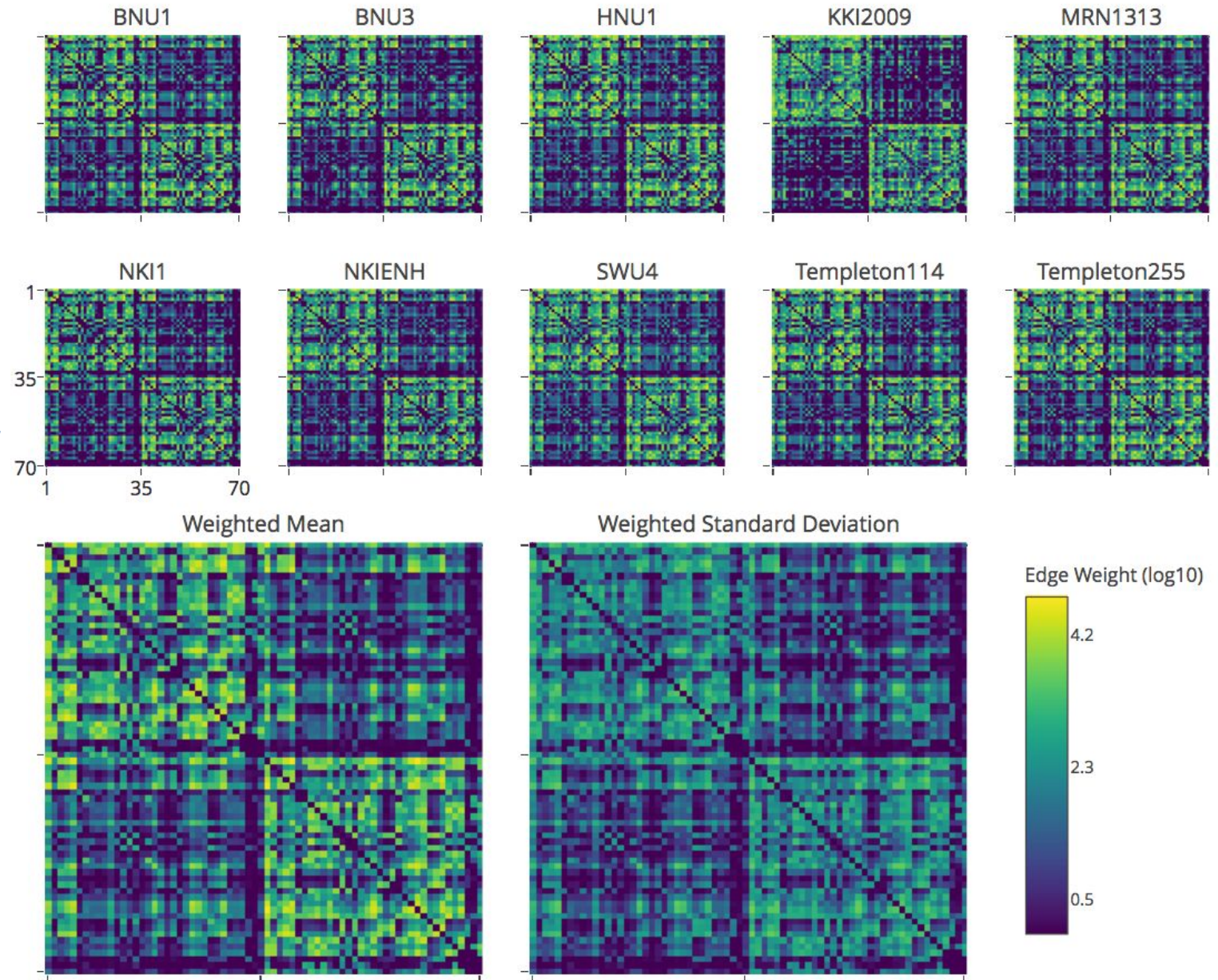
Input
Intermediate
Output

Docs

BNU3 Dataset (Desikan parcellation)



Study Mean Connectomes

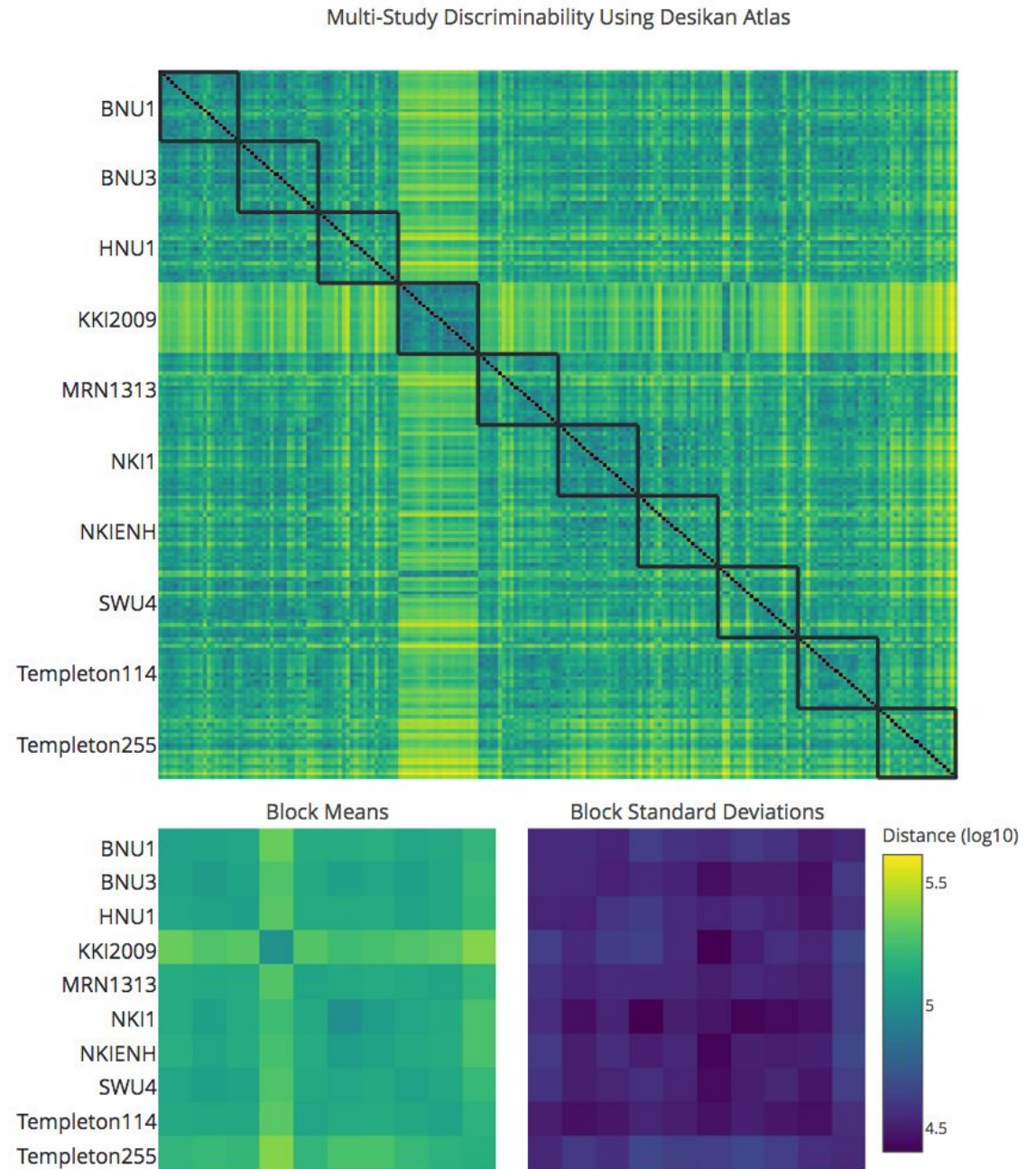


Datasets are
Qualitatively Similar

Datasets are Significantly Quantitatively Different

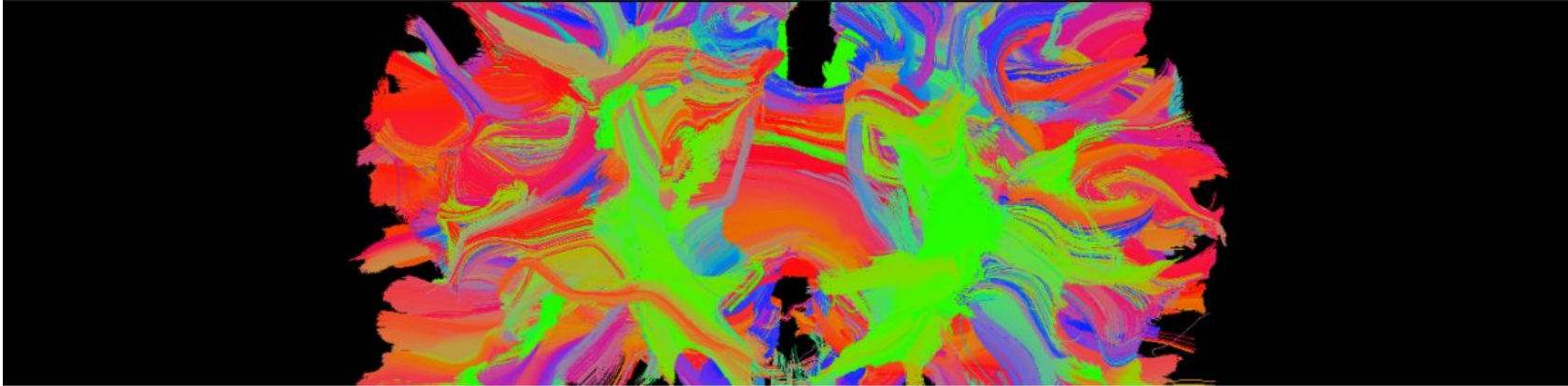
Discriminability = 0.632
(chance = 0.363)

While different datasets are qualitatively similar, they are quantitatively different



One-Click Deployment of clviz

```
ndmg_cloud participant --bucket mrneurodata --bidsdir /data/BNU1/ \  
--jobdir scratch/ --credentials ~/credentials.csv --dataset BNU1
```



A Framework for Extensible Science

Exploiting scientific containers, cloud computing, and cloud data services, we present a framework for performing and communicating scalable, reproducible, and extensible science in the cloud. We show the capability to compute massive amounts of data parallelly in the cloud, and run a web service that enables intimate interaction and demonstration with the tools and data presented. We hope this model will inspire the community to produce reproducible and, importantly, extensible results which will enable us to collectively accelerate the rate at which scientific breakthroughs are discovered, replicated, and extended.

Read our paper @ [GigaScience](#) [arXiv](#)

Try our Demo!

[Try out SIC!](#)

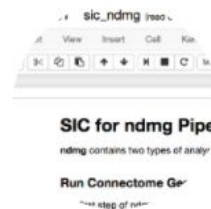
Running as a persistent Jupyter notebook, our demonstration walks through the ndmg pipeline and quality control.



Fork our Code

Download either the frozen-for-publication or up-to-date versions of our code and try sic yourself!

- [GigaDB archive](#)



Use the Cloud

Our pipeline is integrated with a variety of platforms, and has been used to process a variety of datasets in the cloud. We encourage you to pull on one of these threads.



Authors

Kiar, G; Gorgolewski, K, J; Kleissas, D; Gray Roncal, W; Litt, B; Wandell, B; Poldrack, R A; Wiener, M; Vogelstein, R J; Burns, R; Vogelstein, J T

Demo

In Progress