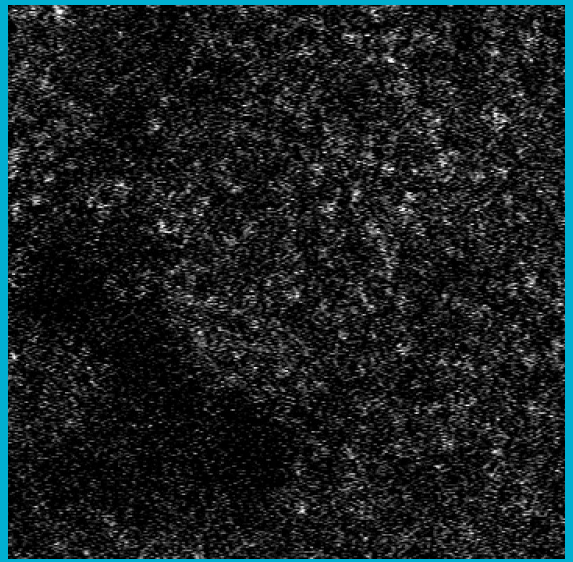
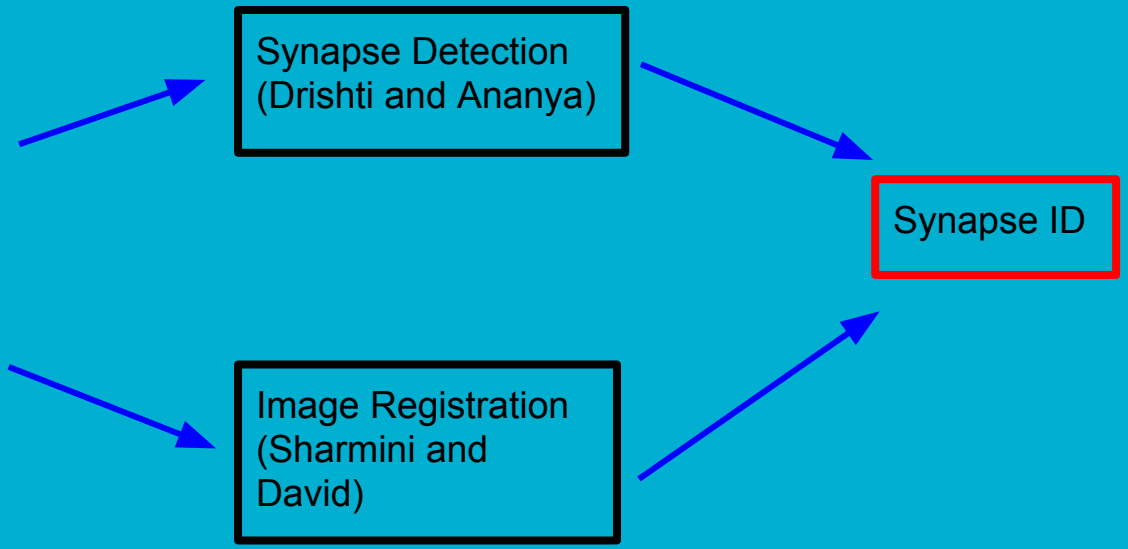
LIDS

Week 04/02-04/06: Sprint 4

The Idea

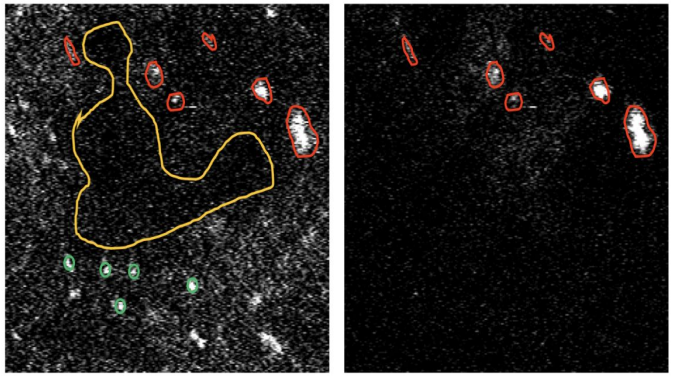



Synapse Detection
(Drishti and Ananya)
Image Registration
(Sharmini and
David)
Synapse ID

Drishti/Ananya

Recap Sprint 3

- Used LDA/*Bloby* to detect synapses: algorithms based on intensity of voxels good at detecting synapses, however, need to factor size of noise.



Drishti/Ananya

Sprint 4 Goals

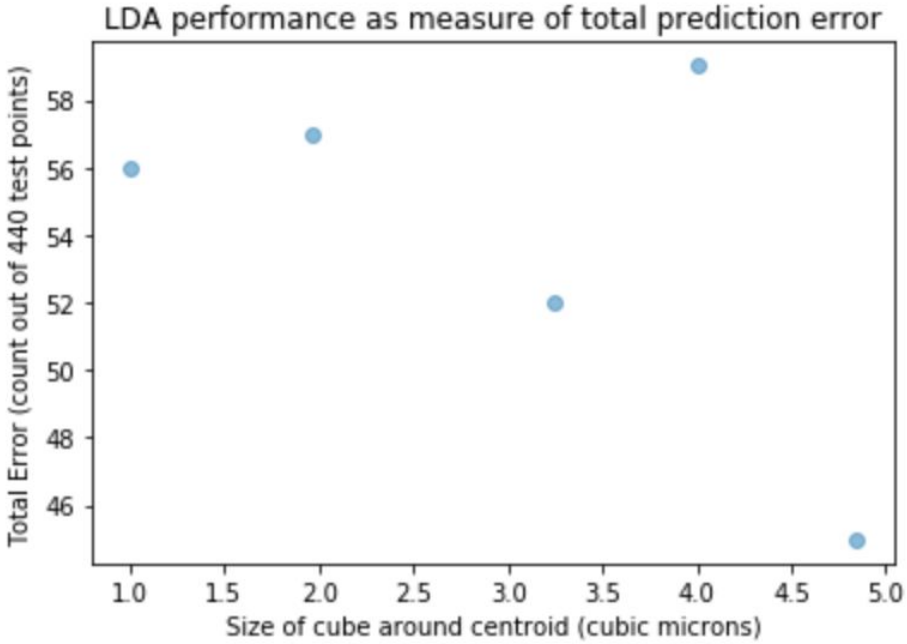
- Factor size of noise to improve *Bloby* and LDA performance
  - DoD: Achieve precision and recall of statistically significantly better than chance;
  - Notebook with publication quality quantitative and qualitative plots
- Use ilastik to detect synapses
  - DoD: Report on how to do it
  - Publication quality qual & quant plots
  - Compare quantitative results to *Bloby*

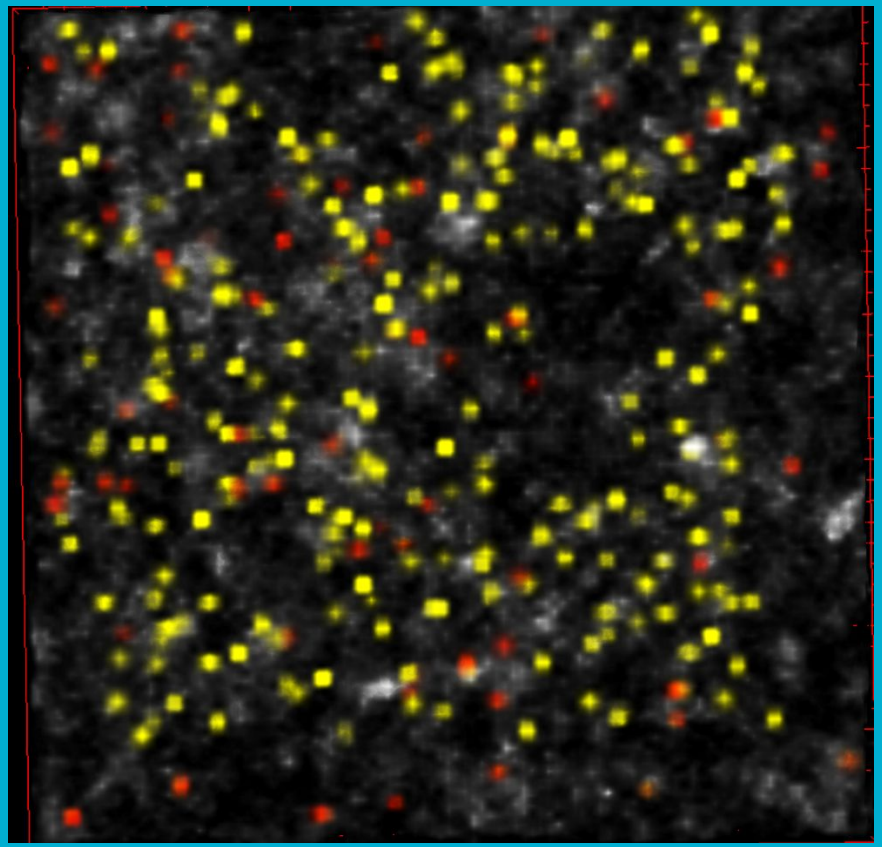
Last Week: LDA cube sweep

Note: Due to limitation of data, cube sizes were limited to ~5x volume of a synapse (1 microns cubed)

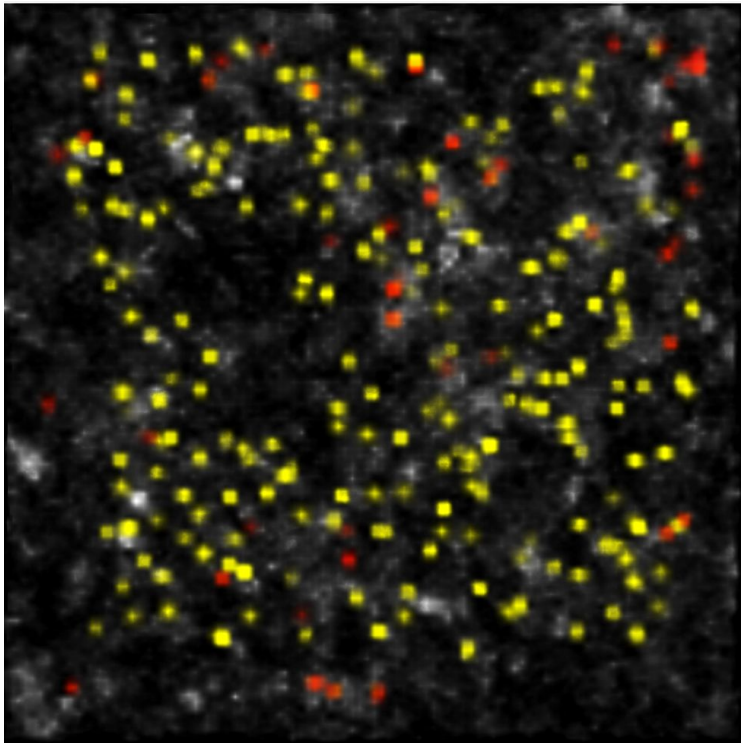
Learning: Sweeping over cubes of different sizes a good idea, but need more data

- LDA performance on cubes of varying sizes: 1 um^3, 1.96 um^3, 3.24 um^3, 4 um^3, 4.84 um^3





Plot from Sprint 3 for comparison: Red is mislabelled non-synapses (i.e labelled as synapse) and yellow is true synapse



Plot: Size 4.84 microns cubed Red is mislabelled non-synapses (i.ei labelled as synapses) yellow is true synapse

Drishti/Ananya

Next Week

- Run updated Bloby (Sri's version)
- Run ilastik

Sharmini

Sprint 4 Goals

- Match synapses across time points using Hungarian algorithm on Huganir data
- Understand how to match synapses using Hungarian algorithm when number of synapses across time points are unequal
    - DoD: Jupyter notebook demonstrating implementation of Hungarian alg to match synapses across time points with an unequal number of synapses in each time point
        - Include both qualitative and quantitative plots (physical units)

Sharmini

Last Week

- Still working out bugs in code to match equal number of synapses across timepoints
  - Eric has told me about some things that I can do to extract the necessary permutation matrix, so I will try those options this weekend

David

Sprint 4 Goals

- Synapse Tracking over multiple timepoints
  - DoD: Notebook demonstrating synapse tracking with qualitative plots and quantitative reports on growth (change in intensity, size, etc.) in Huganir data

David

Last Week

- Investigate tools for object tracking
  - OpenCV, ilastik, PointCloudLibrary, trackpy

David

Last Week

- Installed all, but trackpy has some issues with imports
- Went through object tracking tutorials in all methods that work
  - Unable to run on Huganir data because of data format issues

David

Next Week

- Get trackpy working and reproduce tutorial
- Run OpenCV object tracking on Huganir Data using PLoS synapse predictions
    - DoD: Notebook with quant/qual plots of tracking results