

Week of 11/13 Deliverables

Team cobalt

Last week's goals

- Literature review of tractography
- Run and evaluate LoG, DoG, HoG in 3D on all 10 annotated subvolumes
- Add LDDMM evaluation to registration package and publish image on Docker Hub as neurodata/ndreg
- Extend blob-metrics to support region based cell count and intensity summing

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Sprint 2 plans updated

Sprint 2:

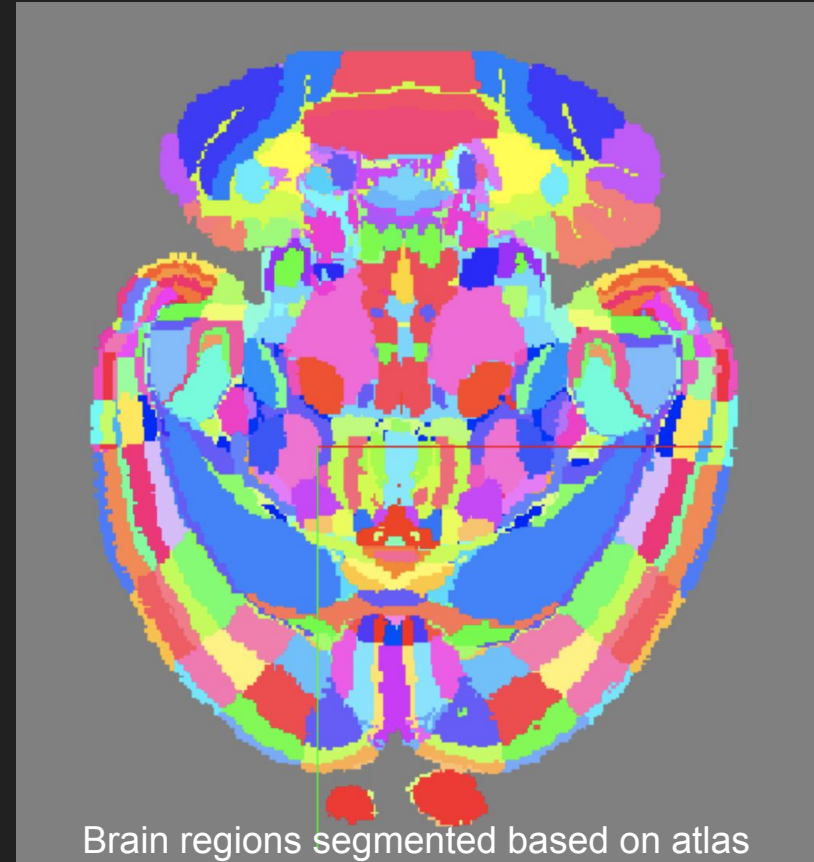
12/8

- ~~Well-documented cell detection python package (w/ 1-2 algorithms for cell detection)~~
- Well-documented, simple blob detection python package with 1 algorithm
- Region-based analysis in package
- ~~Object-based statistics~~
- ~~Create a well-documented python package on pip for registration.~~
- ~~work with nomads to create code to merge annotations from each processed chunk~~
- Registration package with affine and LDDMM registration
- demonstrate MVP to reduce gridding artifacts in COLM/La Vision data

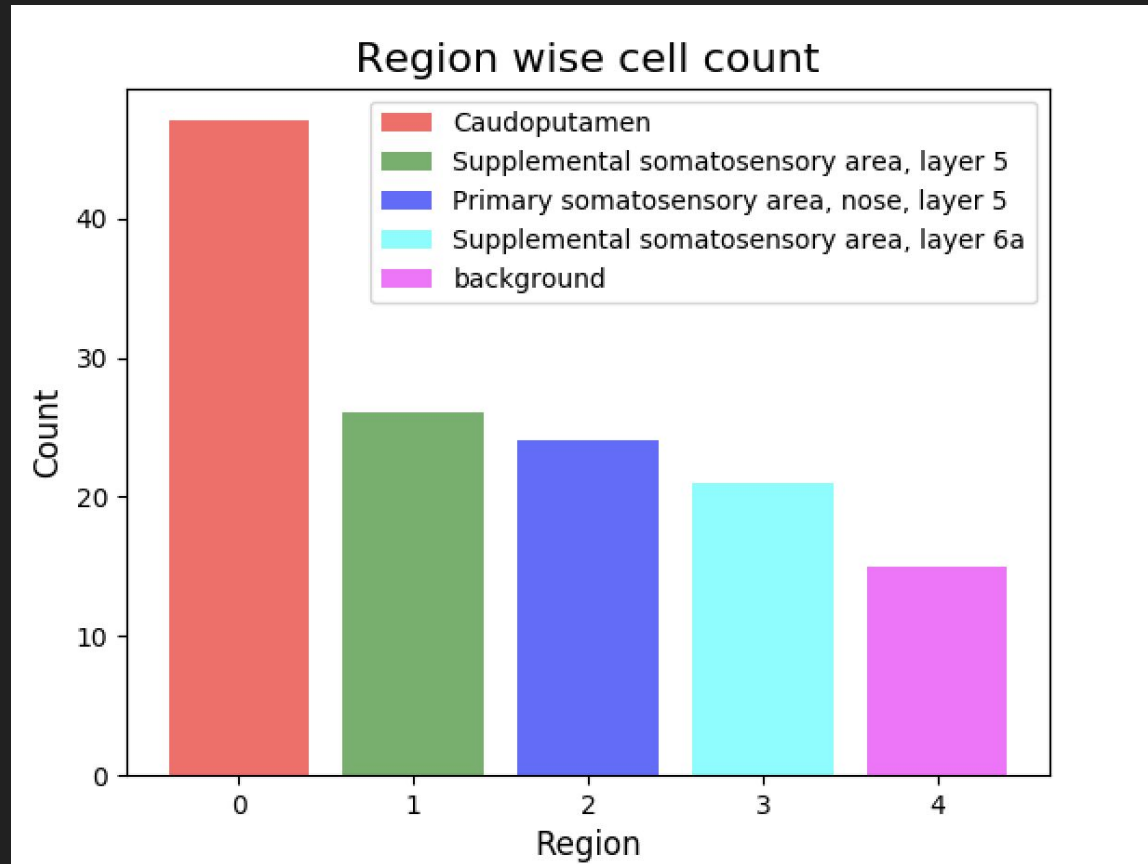
Ndreg makes affine + lddmm registration and evaluation easily accessible

- Updated neurodata github repo: <https://github.com/neurodata/ndreg>
- Updated docker hub image: <https://hub.docker.com/r/neurodata/ndreg/>
- Affine + LDDMM registration evaluation shows that LDDMM improves registration quality
- Inputs:
 - Raw data
 - Atlas to register to
- Outputs:
 - Preprocessed data
 - Affine registered atlas
 - LDDMM registered atlas
 - Evaluation of both with fiducials

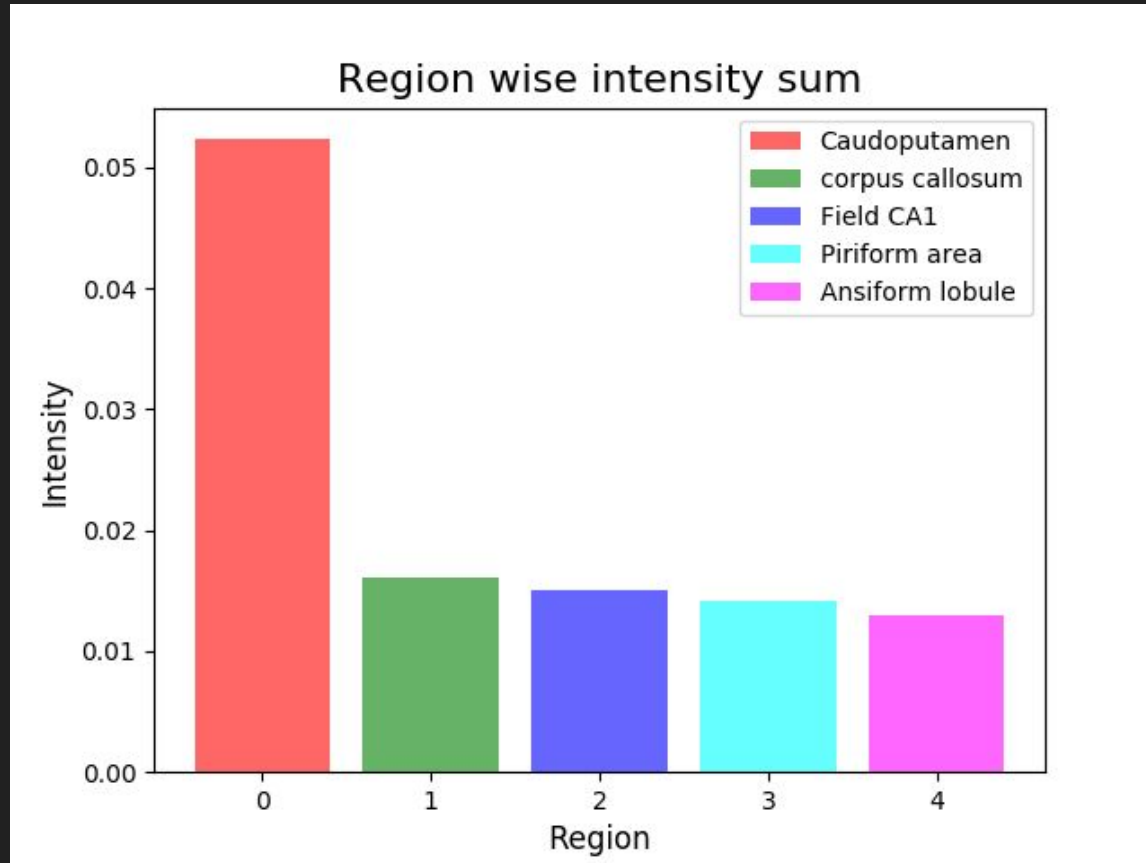
Region based statistics shows correlation between cell count and intensity



Region based cell counts give valuable insights



Region based intensity gives valuable insights

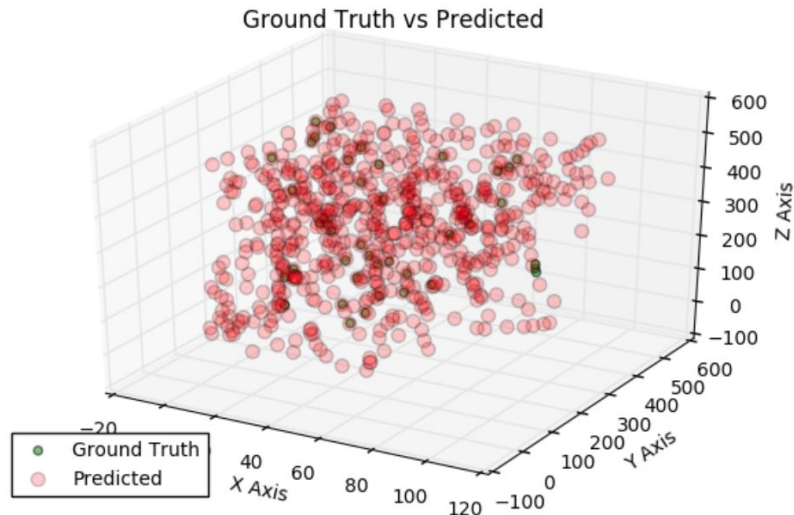


Implement and Evaluate LoG on 10 subvolumes

cell_detection_2

```
output_metrics_for_experiment('../annotation_csv/cell_detection_2.csv', '../output/cell_detection_2.csv')
```

Accuracy: 95.1219512195
Precision: 0.0610328638498
Recall: 0.0612244897959
F-Measure: 0.0611285266458
Mean Square Error: 7.63260921737

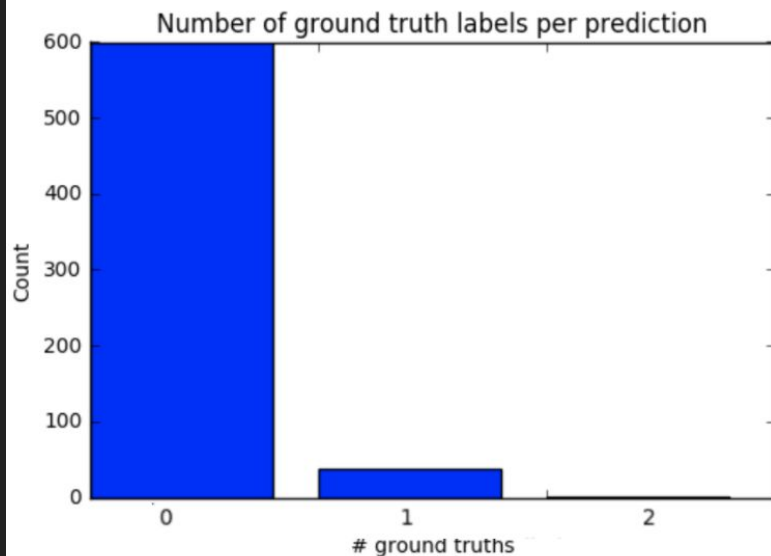
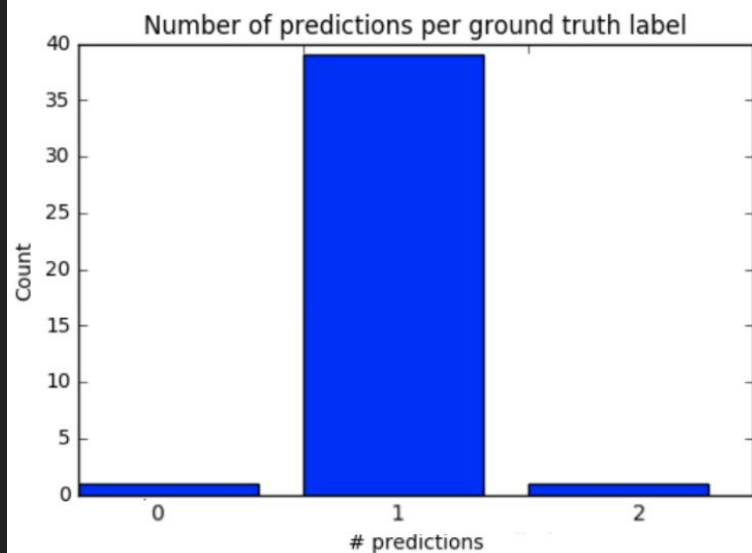


[notebook link](#)

[python code](#)

[blob-metric
notebook](#)

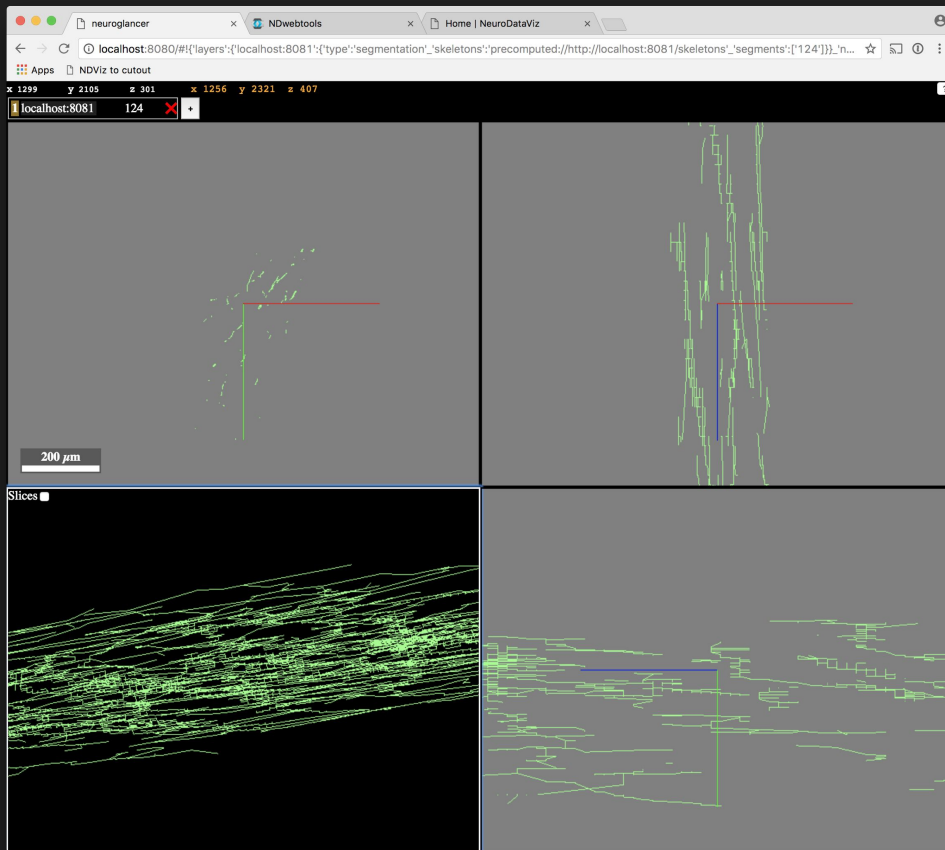
	Accuracy	Precision	Recall	F-Measure	MSE
cell_detection_0	75	0.07	0.07	0.07	7.24
cell_detection_1	85.29	0.08	0.08	0.08	12.39
cell_detection_2	95.12	0.06	0.06	0.06	7.63
cell_detection_3	92.86	0.1	0.1	0.1	19.31
cell_detection_4	100	0.01	0.01	0.01	2.63
cell_detection_5	83.33	0.06	0.06	0.06	18.64
cell_detection_6	60.29	0.16	0.18	0.17	9.95
cell_detection_7	60	0.02	0.02	0.02	11.63
cell_detection_8	59.8	0.21	0.25	0.23	8.31
cell_detection_9	60	0.14	0.15	0.14	12.12



Tractography literature review

- Goal: look into the current tractography work for CLARITY images in preparation of starting tractography after cell detection package is done.
- Reviewed two methods:
 - CAPTURE: CLARITY-based activity projection tracking upon recombination
 - Minimal-Spanning Tree (MST) construction of vascular vessels in CT scans
- Summary:
<https://github.com/NeuroDataDesign/cobalt/blob/master/docs/jyim6/Tractography%20Review.ipynb>
- Takeaways:
 - We need to see what kind of CLARITY data our collaborators are interested in solving.
 - Tractography for general CLARITY images? Only EYFP treated?
 - Is CAPTURE good enough for EYFP treated CLARITY tractography? Should we look into improving CAPTURE?
 - We have some preliminary results of running the MST algorithm on our subvolumes. Is this useful to the collaborators? Should we continue pursuing this?

Running MST tractography algorithm on Ailey



Next week's goals

- Determine type of manual annotations needed for tractography evaluation based on lit review
- Talk to jovo