Project 3: Mahoney
Neuron Segmentation in Calcium Imaging

Chris Barrick, Weiwen Xu, Raj Sivakuamr • 2018-21-03

Overview

Success

- NMF
- CNMF

Biggest risk

- Dask
- U-net from scratch

Progress - NMF

Preprocessing

- Normalization across time and space

- Opening

  - Successive erosion and dilation

Thunder Extraction

- Used thunder libraries to extract regions of interest

- Initially chosen because we believed it would be faster that scikit-learn's NMF

Progress - CNMF

Accomplishments

- Scalable constrained NMF using CaImAn

- Able to produce overlapping areas

Issues

- Messy setup for CaImAn package

- A lot of dependency

- Hard coding inside the demos made it hard to integrate with our code structure

Attention areas

Risk 1: Software Stack

- Dask can be difficult to deploy

- Using CaImAn introduced several packages

- U-Net used PyTorch (never got output)

- Scikit-learn API actually sucks

Risk 2: Teamwork

- Each tool used a different stack

- No single entry point for experiments

- No unified deployment strategy

- Little reusable code

Scikit-learn + PyTorch = 🗆

Scikit-learn

- No real work in `__init__`.

- Must not assume shape until `fit`.

- Must have `set_params` to reset estimator.

- Cannot compute metrics in batches.

PyTorch

- Construct network in `__init__`.

- Must know shape to build network.

- Cannot reset optimizers.

Questions?