VesiclePy: A Python API for Vesicle Detection

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January 5, 2016

1 Introduction

In order to diagnose and treat neurological disorders, we need a mapping of the human brain. Although there are large volumes of brain image data available, there are still challenges in creating the mapping. The main mapping structures, the synapses, are difficult to detect due to their small size and poor image contrast. VESICLE is the first program that detects mammalian synapses with consideration to biological contexts. With VESICLE, large volumes of image data may be processed, but VESICLE is currently written in MATLAB, which relies on too many dependencies. This problem can be solved if VESICLE is written in Python. Python offers more open source capabilities, and Python itself offers efficient open-source libraries for use.

2 Project Outline

2.1 Methods

We plan to choose from existing python libraries such as SciPy and NumPy for the actual random forest algorithm. If time permits, depends on how well our API performs, we might tweak the implementation and test out additional features that might affect the detection accuracy.

2.2 Schedule

Jan.7th -

- Read Matlab tutorial (`http://docs.neurodata.io/vesicle/tutorials/vesiclerf.html`).
- Understand MATLAB VESICLE (document/take note of the MATHLAB code).

Jan.16th -

- Finish up Coding.
- Test python libraries we can use in place of tool folder files.

- Minimize dependency, refactor code, etc.

Jan 22nd -

- Add additional features to the data points and try to improve performance.
- Finalize report.
- Finalize poster.

2.3 Allocation of Tasks

Zhou:

- Documenting MATLAB VESICLE.
- Poster Making.
- Coding.

Jizhou:

- Coding.
- Finding alternate dependencies.
- Refactoring.

Mary:

- Coding.
- Documenting Python code.
- Testing.