Neuron3D Documentation

Release 0.5.1

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ONE

TUTORIAL EXAMPLES

1.1 Example 1: Harmonic oscillator

To demonstrate the potential of Mayavi. Play around with the GUI, get to know the pipeline.

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TWO

MAYAVI INSTALLATION ON MAC

2.1 Enthought

Download Academic version for free at http://www.enthought.com/products/edudownload.php

2.2 Neuron

Neuron must be installed from source in order to import neuron as a python module in enthought. This has been tested on Mac OS X *Snow Leopard*.

```
mkdir /nrn
cd /nrn
hg clone http://www.neuron.yale.edu/hg/neuron/iv
hg clone http://www.neuron.yale.edu/hg/neuron/nrn
cd /nrn/iv
./build.sh
./configure --prefix=/nrn CFLAGS='-arch i386' CXXFLAGS='-arch i386'
make
make install
make clean
cd /nrn/nrn
./build.sh
./configure --prefix=/nrn --with-iv=/nrn PYLIBLINK='-framework Python' PYLIB='-framework Python' CFL
make
make install
make clean
cd /nrn/nrn/src/nrnpython
python setup.py install
```

2.3 Test

Test NEURON in a new python session

```
>>> from neuron import h, gui
>>> soma = h.Section()
>>> h.run()
```

CHAPTER

THREE

CLASSES

Contents:

3.1 Electrode

class **Electrode**()
Create an intracellular electrode

display()
Display Electrode in Mayavi

3.2 DBS

class **DBS**()
DBS Electrode Model

display()
Display Electrode in Mayavi

3.3 Cell

class **Cell**(*name='Cell', var='v'*)
multi-compartment neuron in hoc

calculate_voltage()
Calculate the voltage at this time

display(*var='v', scaling=1*)
Display current cell in mayavi

play(*fileroot='cell', show_colorbar=True, show_title=False*)
Step through cell response over time

3.4 Nucleus

class **Nucleus**(*ptsFile=None, trisFile=None, color=(0.29999999999999999, 0.29999999999999999, 0.29999999999999999), name=''*)

create_pts_tris_from_file(*ptsFile, trisFile*)
Load points and triangular connectsions from file

display()
Display Nucleus in Mayavi

3.5 All

class All()

3.6 Network

class Network(*spikefile=''*)

display()
Plot background field

plot_points(*x, y, z, spikes=, [], t=0, color=(0.5, 0.5, 0.5), csize=0.013333333333333334*)
Plot spheres representing each node in network

read_file_to_vector(*file_name, spike_ids=None*)
Read the spike data formatted from NEURON where each line is a timestamp of spike followed by a cell (or other spike generator) id that gave the spike.

Parameters

- *file_name* – Name of the spike file to read.
- *spike_ids* – If specified, a subset of ids to load. This should be an sorted-ascending list.

Returns The data in a vector of tuples of the format (time, gid).

CHAPTER

FOUR

FUNCTIONS

Contents:

4.1 Find Neuron Branches

retreive_coordinates(*sec*)
Only works with cell which have an xtra mechanism

4.2 Find New Point

find_neuron_branches()

4.3 Retrieve Coordinates

retreive_coordinates(*sec*)
Only works with cell which have an xtra mechanism

CHAPTER

FIVE

HOW-TO

To run all files, install the Enthought Python Distribution, compile neuron with the -nrnpython flag, install Neuron3D, and from the Neuron3D directory, run:

```
ipython -wthread main.py
```

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