Follow the following three python scripts to run them in turn

**01\_FileChange.py**

* **Input data:**

Neuron SWC file, please modify the path in the run\_\_pool() function

* **Output data:**

According to the given brain resolution size, restore the unregistered SWC file, and add the brain region information where the node is located, and store it in a File\_Temp folder in the same directory

* **Other documents required:**

1. annotation\_25.nrrd CCFv3 standard brain nrrd file
2. all\_brain\_metainfo.csv Files containing all the brains in their native resolution

* **How to Use:**

1. Adjust the number of cpu\_worker\_num in the run\_\_pool() function, which is the number of parallel threads, and you need to adjust it according to your own computer performance
2. It can be run directly, and there are no special python package dependencies

**02\_DensityCal.py**

* **Input data:**

The first step is to restore the SWC file after resolution in the File\_Temp folder

* **Output data:**

The distance between the calculated nodes, node type, and brain region information is stored as a new SWC file in a File\_Info folder in the same directory

* **Other documents required:**

not

* **How to Use:**

1. Adjust the number of cpu\_worker\_num in the run\_\_pool() function, which is the number of parallel threads, and you need to adjust it according to your own computer performance
2. It can be run directly, and there are no special python package dependencies

**03\_RegionCal.py**

* **Input data:**

The second step is to organize the SWC file in the File\_Info folder

* **Output data:**

The number of Boutons and the total length of Axons projected by all neurons in the specified region within the specified region, as well as the Bouton Density obtained by dividing the two

* **Other documents required:**

1. TableS6\_Full\_morphometry\_1222\_layer.csv

The latest 1876 neuron cell types in Mr. Yumine's paper contain layer information

* **How to Use:**

1. region="VISp"

layer="L6"

with open('VISpL6.csv') as f:

Here we explain the meaning of these three variables, please modify them according to the layer you need to calculate

region specifies a cell type type, layer specifies a layer under that type, and the csv file specifies the projection area, which contains all the ids belonging to the region, which is divided and set according toCCF v3. Therefore, the CSV file can be set to any region of interest, and you only need to add the corresponding region ID to the file.

I have also provided some previously calculated regions, such as M1, S1, L1/L23/L5/L6 for VISp, etc.

The implication here in the code is that the number of boutons and the total axon length projected into the VISpL6 region by all VIS p layer6 neurons are calculated, and the same can be said for the rest

1. Adjust the number of cpu\_worker\_num in the run\_\_pool() function, which is the number of parallel threads, and you need to adjust it according to your own computer performance
2. It can be run directly, and there are no special python package dependencies