3d modeling of EM images

Alex Zhou

Why

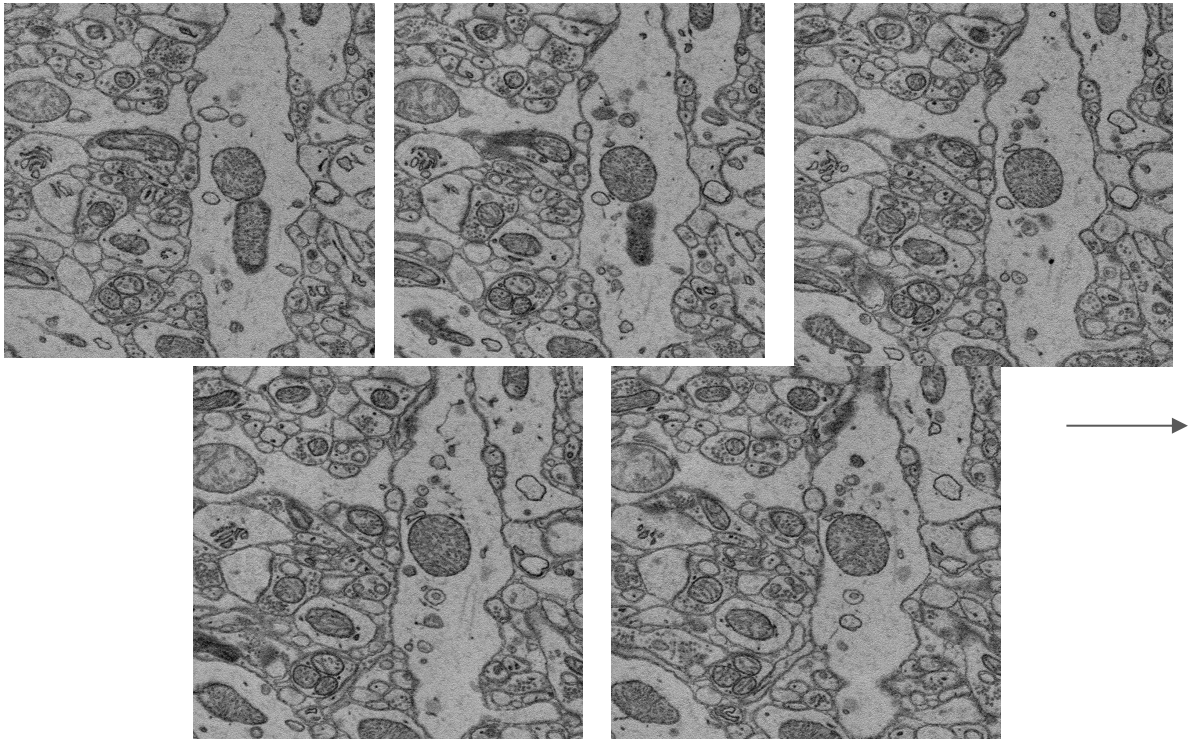
It is unbiased reconstruction per voxel, based on pre-aligned images.

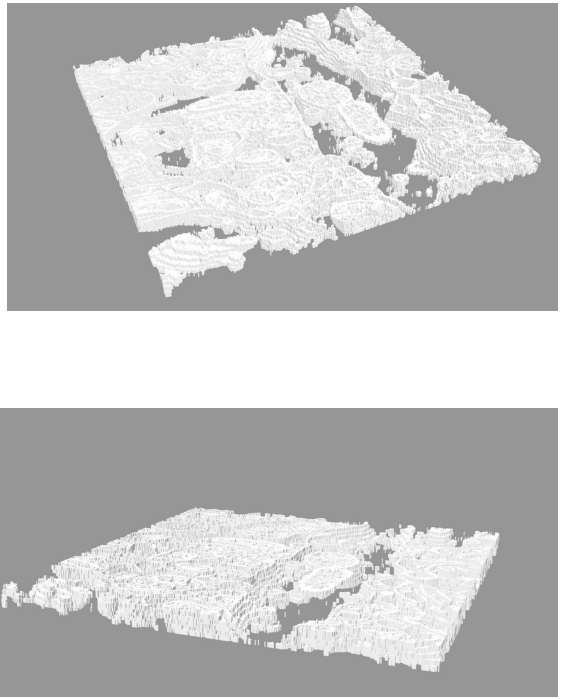
Reduces time needed for identification of objects as things are easier to register for a human brain in 3d instead of stack 2d images

Creates extra plain of view, instead of just top down, it establishes how it would look like front to back, left to right

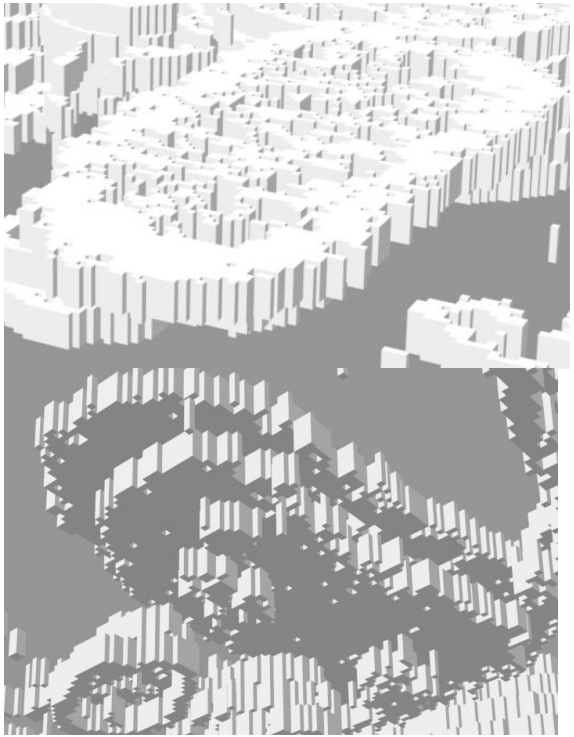
Standard stl format the most standard format working with 3d objects. 3d printable

Currently achieved





Current 3d model details



Mitochondria

Vesicle

Next step

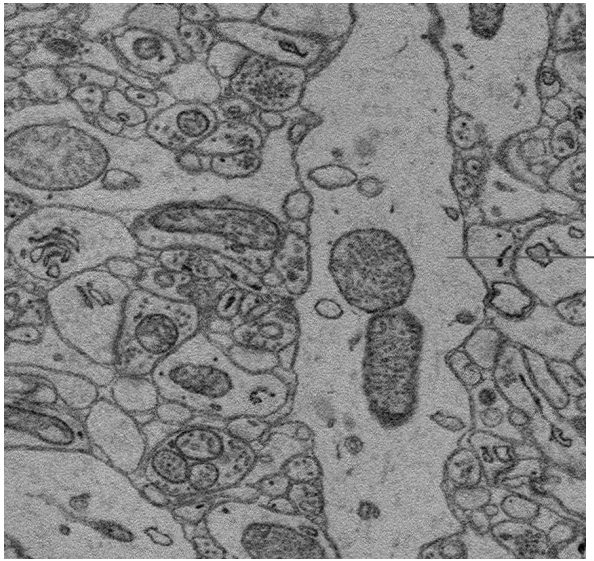
Recurrent network that isolates each cellular component, it will be very close to the Flood Fill Network in terms of how it works, will require bias+inference to completely achieve functionality

Could potentially identify and label mitochondria, vesicles and other cellular components

Can make the whole tracing completely automatic with similar accuracy to humans, and could potentially raise flags for humans for verification

Current progress

Able to do similar function in 2d



Next steps

Function related:

Fix recursion to include cell components of cells

Figure out how to determine when to fill in voxels that was missing in the original image that is supposed to be there

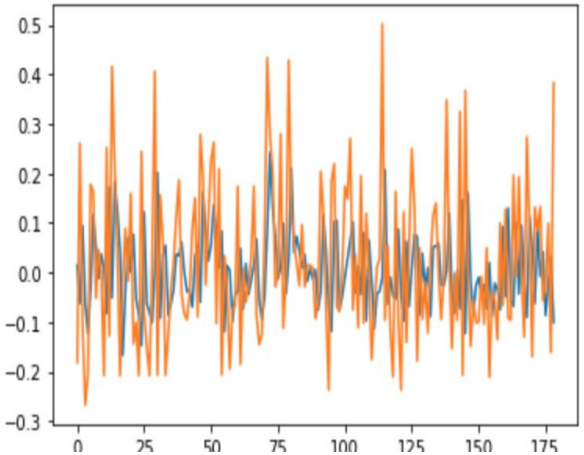
3d recursion

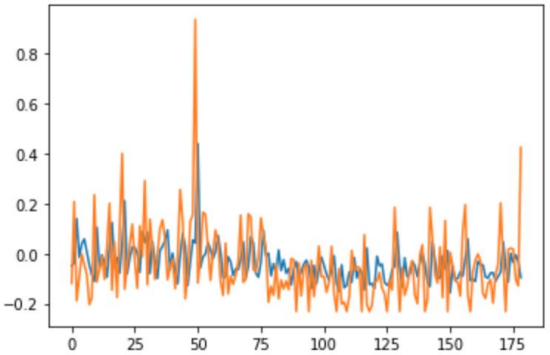
Label cell components and cells

Non-function related:

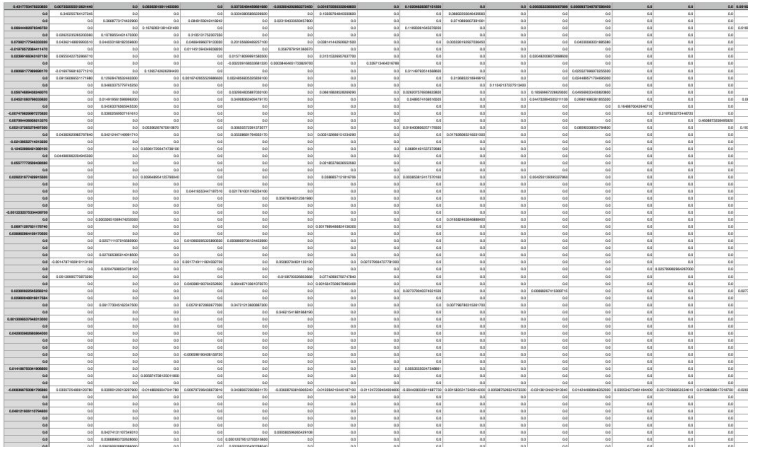
A viewer optimized to view 3d models and synaptic connections

Next step part 2(current calcium imaging prediction model)





Current prediction using lasso



Weights

Next step part 2

Utilized weights for obtained from the calcium model to study anatomical connections of synapses using the 3d model