

Multi-feature registration pipelines often afford functionality at the cost of simplicity. **brainreg3D** is a simple open-source software for widefield registration based on **v3do**<sup>1</sup> and **brainrender**<sup>2</sup> packages.

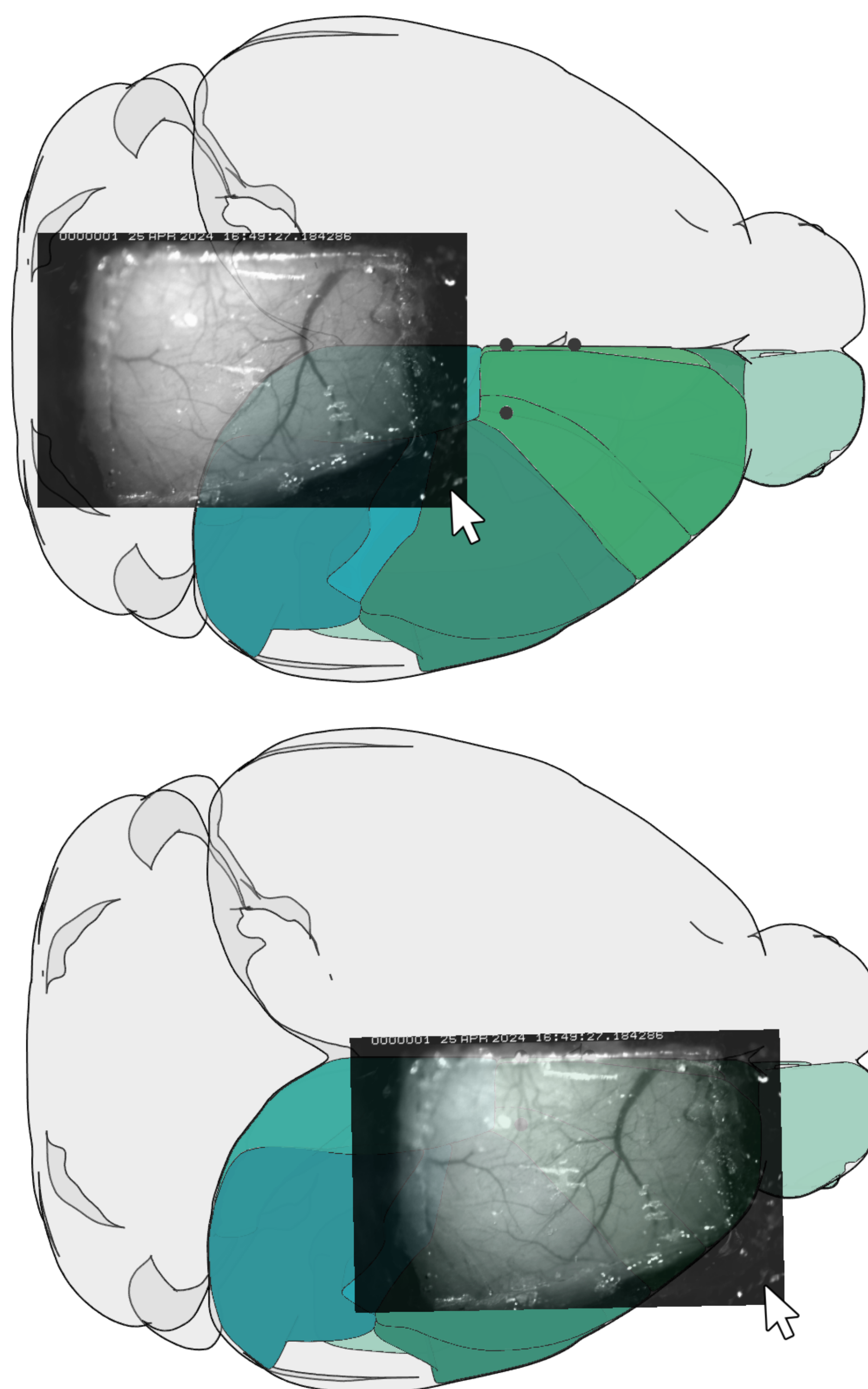
## Input

**Run** Python script to initialize.

```
#!/usr/bin/python3

from brainreg3D import BrainReg3D
reg = BrainReg3D('./your_image.tif')
reg.run()
```

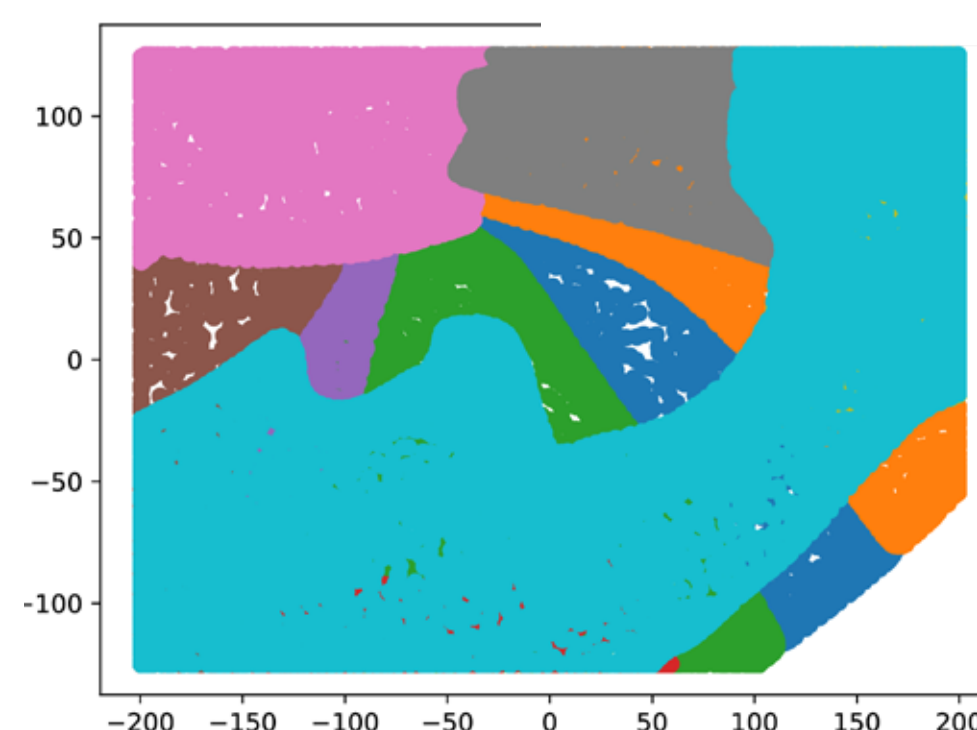
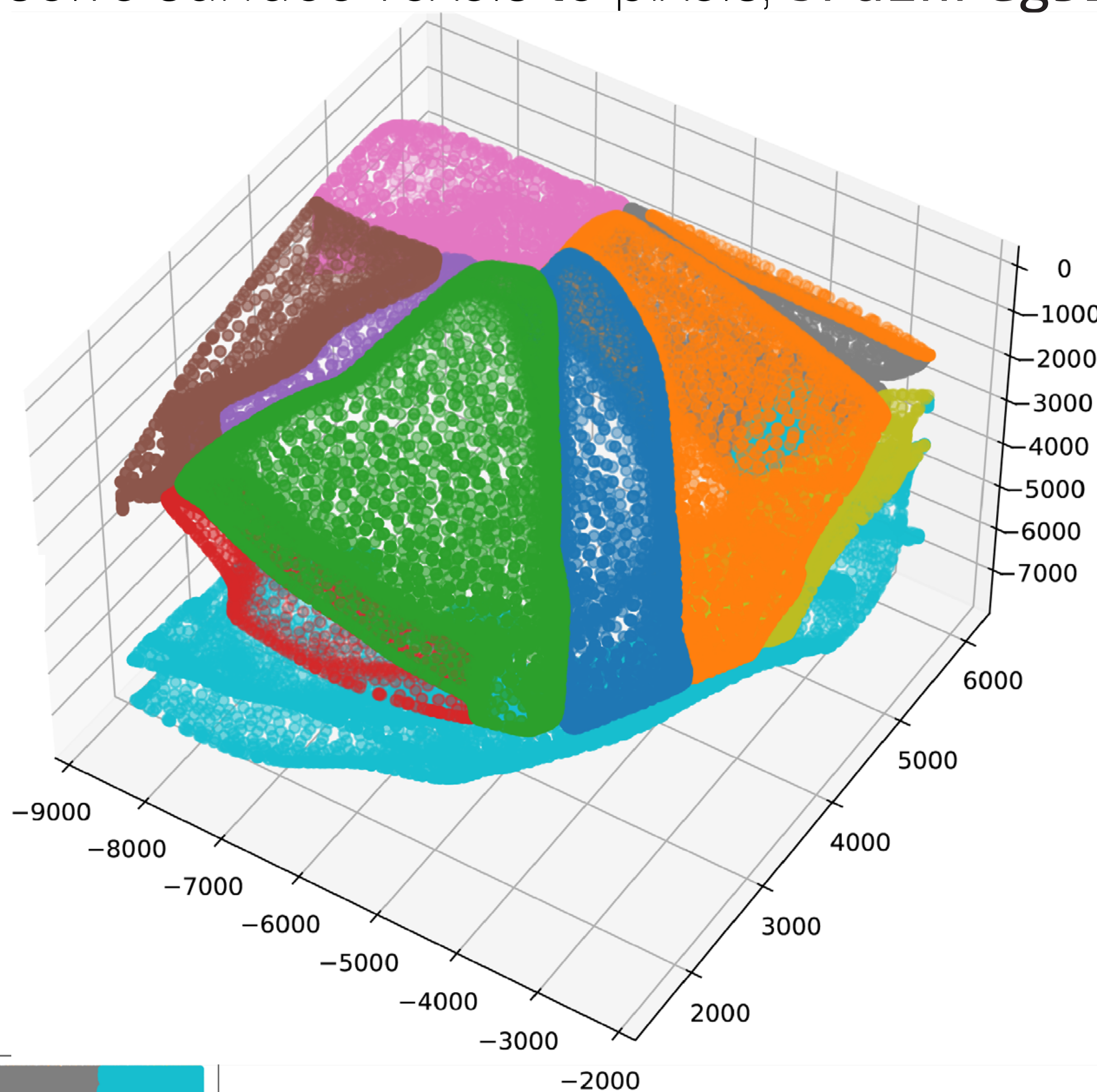
**Manually** align image over the Allen Common Coordinate Framework<sup>3</sup>.



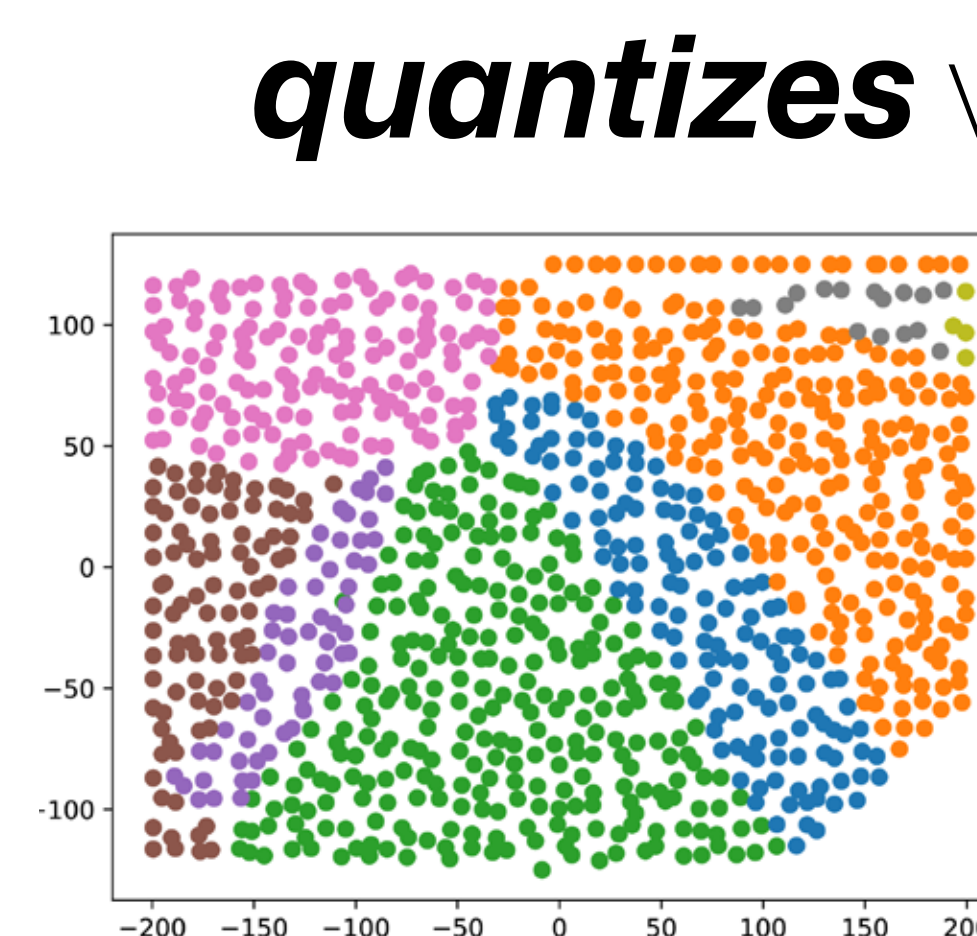
## Algorithm

To resolve surface voxels to pixels, **brainreg3D**:

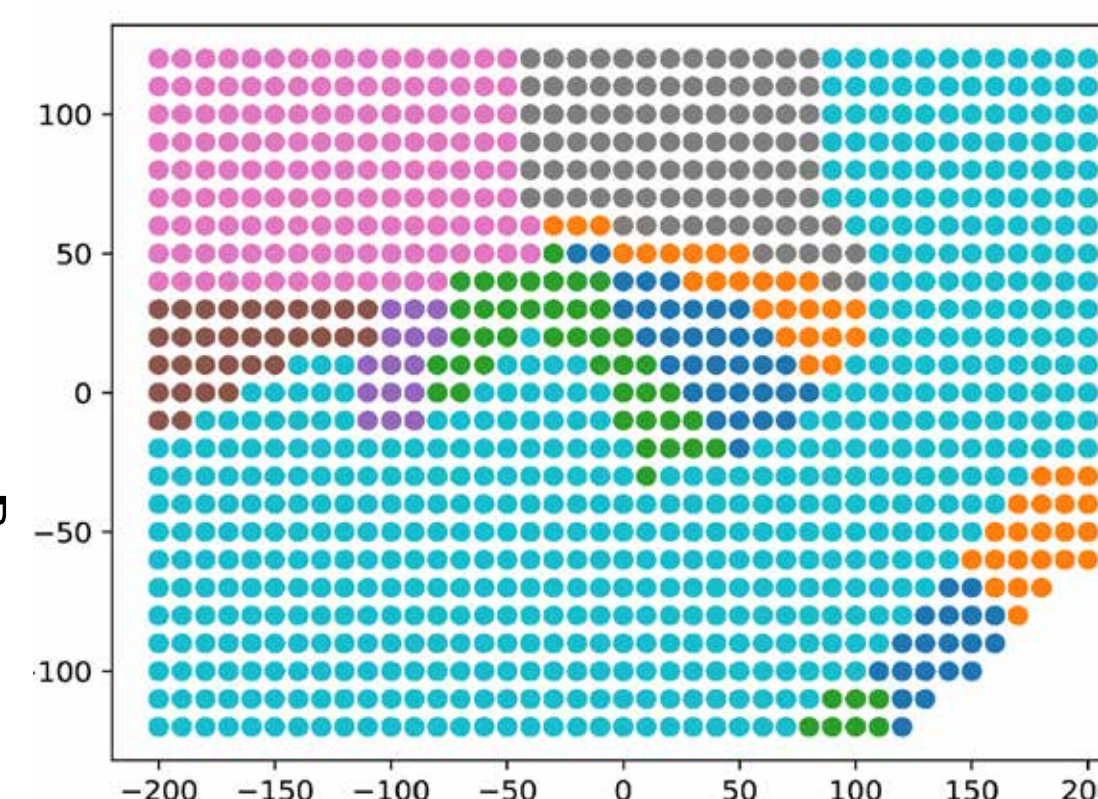
- ACA
- MOp
- MOs
- ORB
- OLF
- PTLp
- RSP
- SSp
- SSs
- VIS



**projects** voxels onto the image plane,

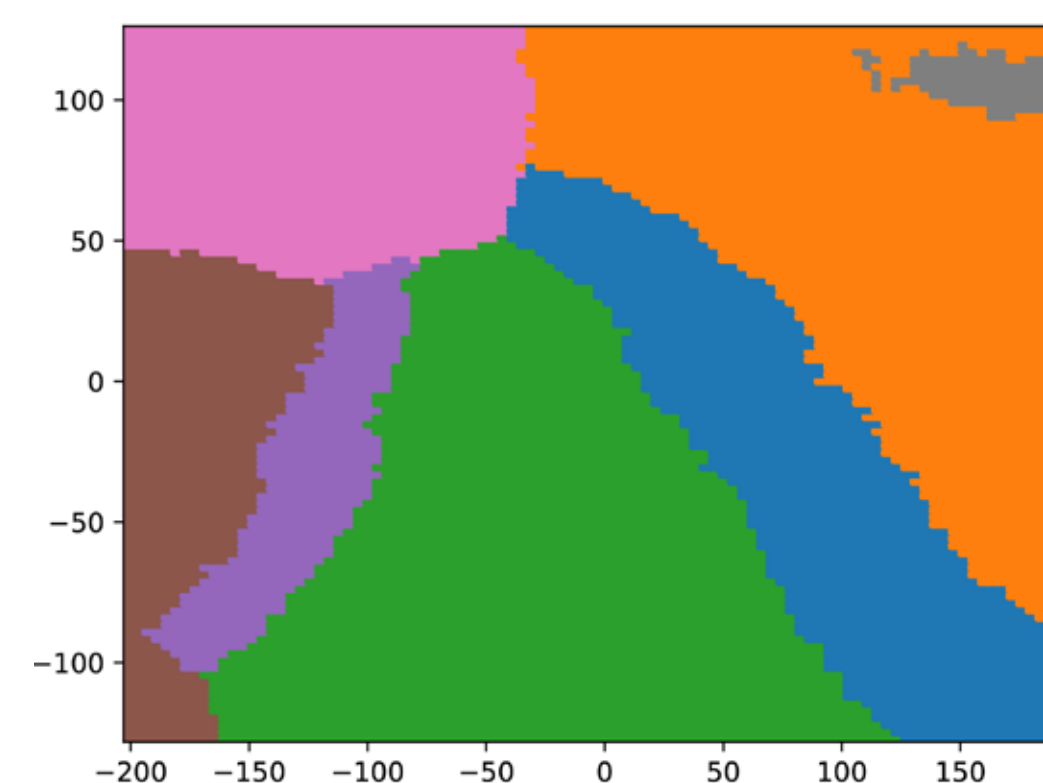


**quantizes** voxel projections,



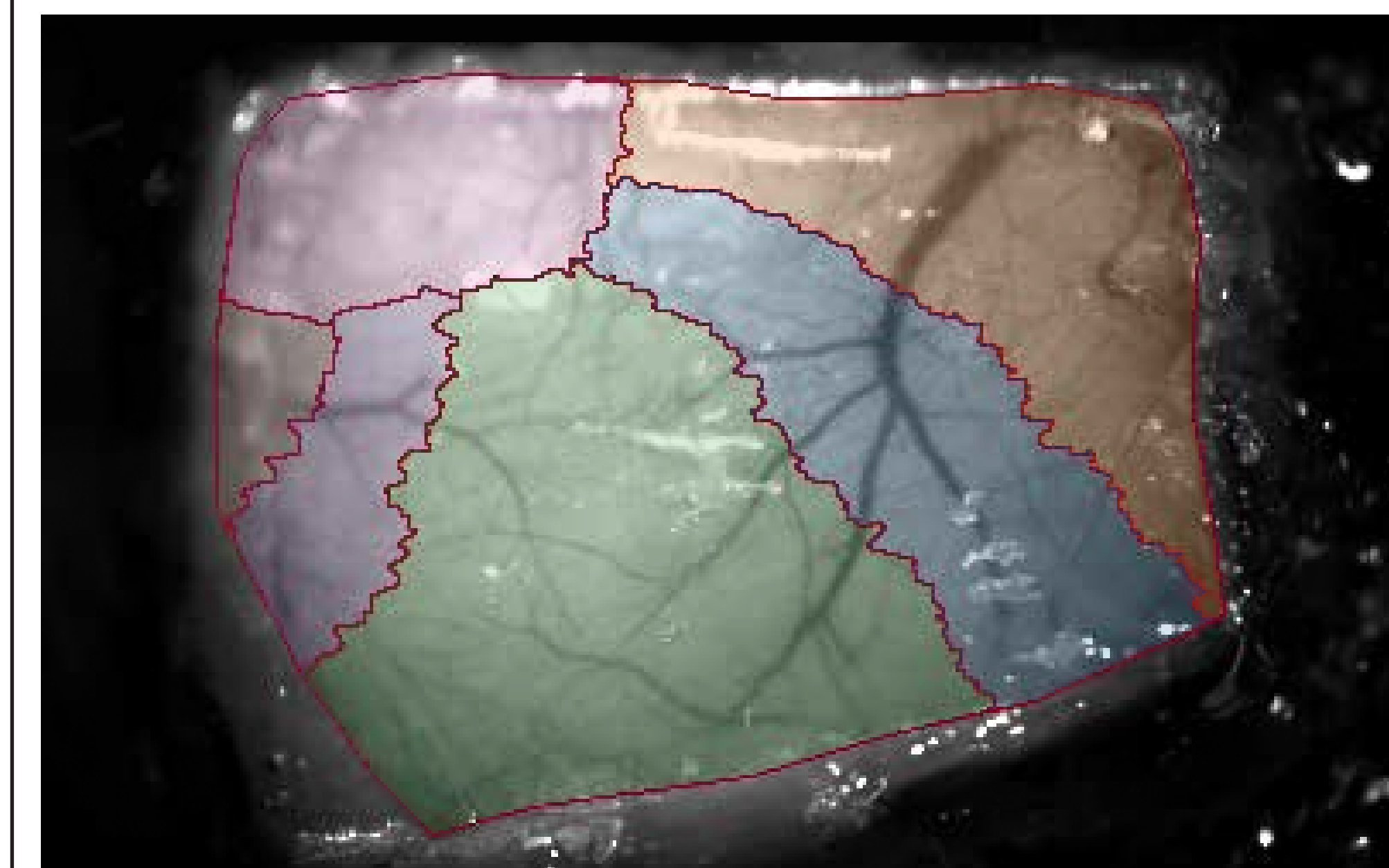
**resolves** projections by depth, and

**uses k-nearest neighbors** to estimate surface boundaries.



## Output

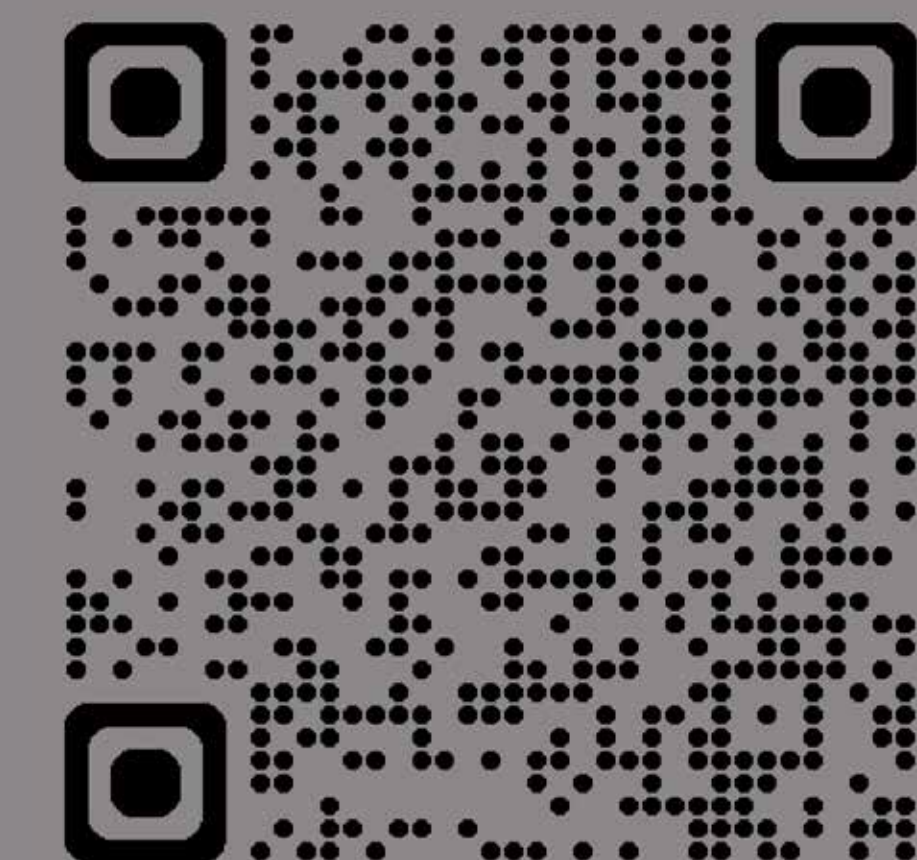
**Use** results in any program supporting TIFF I/O.



## Features

- command-line interface
- serial registration
- FOV specification
- brain region specification

integrate **brainreg3D** into your pipeline to fit your own needs.



1. Musy M. et al. "vedo, a python module for scientific analysis and visualization of 3D objects and point clouds" Zenodo. 2021. doi: 10.5281/zenodo.7019968
2. Claudi F. et al. "Visualizing anatomically registered data with Brainrender" eLife. 2021;10:e65751 doi.org/10.7554/eLife.65751
3. Wang Q. et al. The Allen Mouse Brain Common Coordinate Framework: A 3D Reference Atlas. Cell. 2020 May 14;181(4):936-953.e20. doi: 10.1016/j.cell.2020.04.007.

