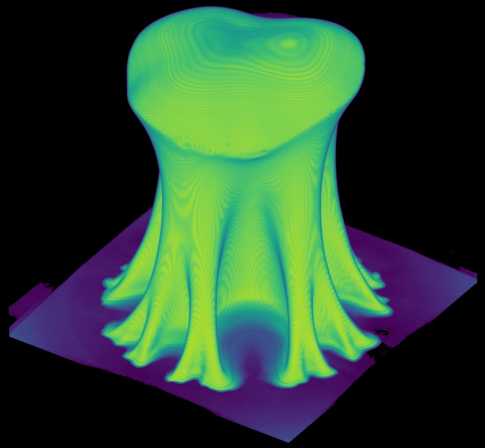
Center for Imaging



nD Image Visualization with Open-Source Tools

Imaging Lunch - 19 March 2025

Mallory Wittwer, Edward Andò

Volume rendering: **ray casting**

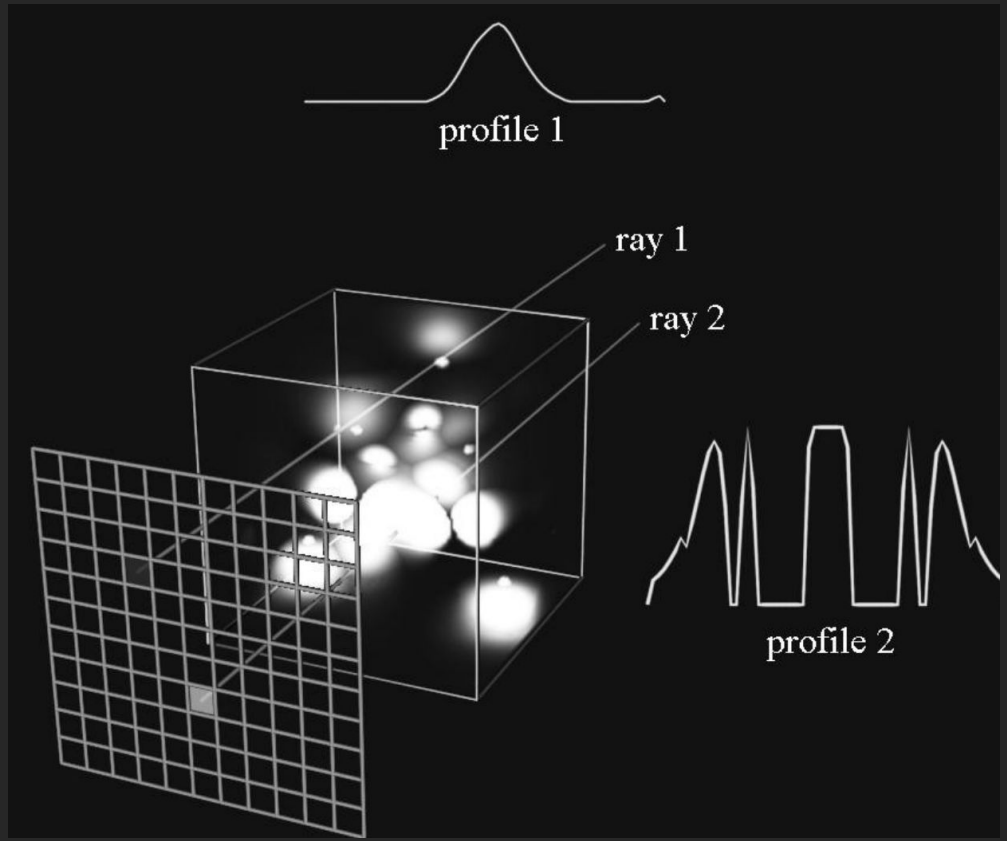
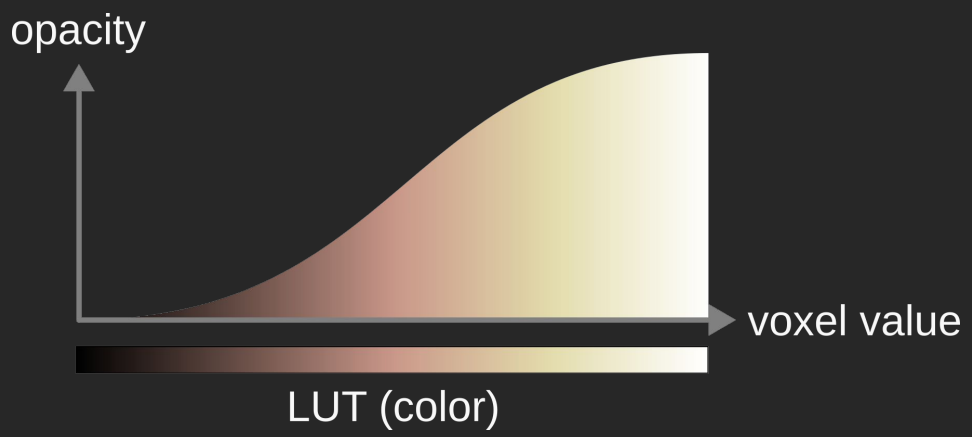


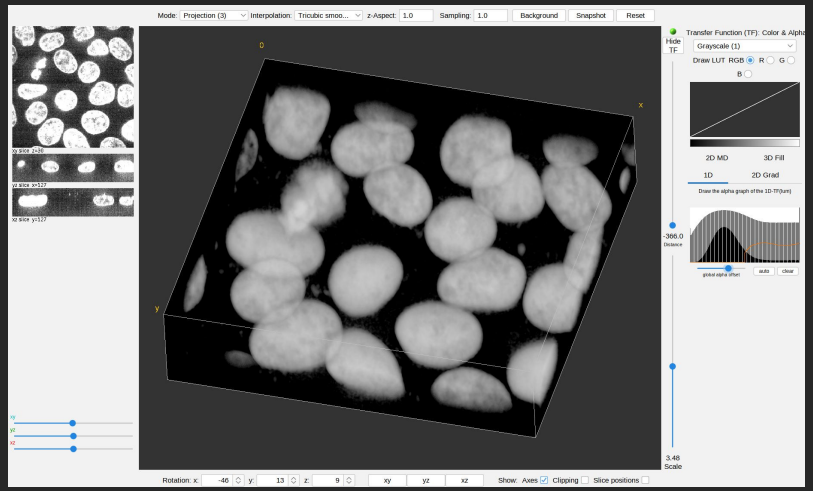
Image source: Visualisation - Lecture 9, Taku Komura (https://www.inf.ed.ac.uk/teaching/courses/vis/lecture_notes/lecture9.pdf)

Volume rendering:
You can control the **transfer function**



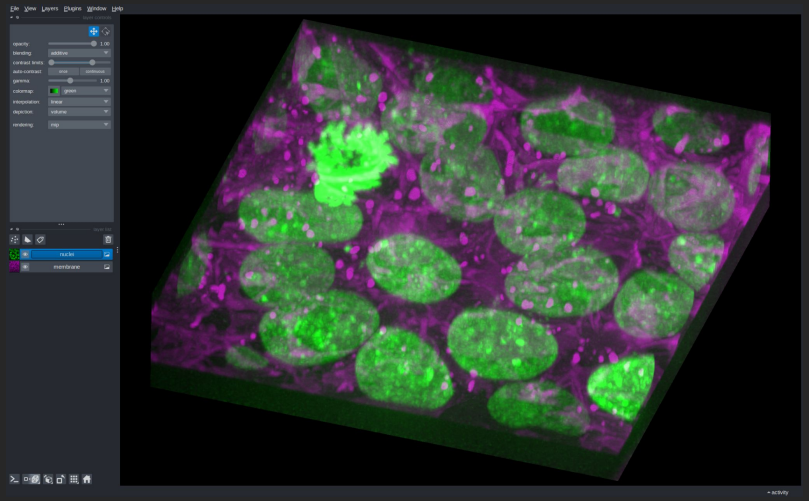
TF: Assigning to each voxel value an **opacity (0-1)** and a **color (RGB)**.

Fiji Volume Viewer



- ✅ Ideal for Fiji Users
- ✅ Good control over the 3D rendering
- 🔴 No glyphs or overlays (masks, points, vectors…)
- 🔴 4D (3D+time or multichannel) not supported
- 🔴 Not controllable programmatically

Napari



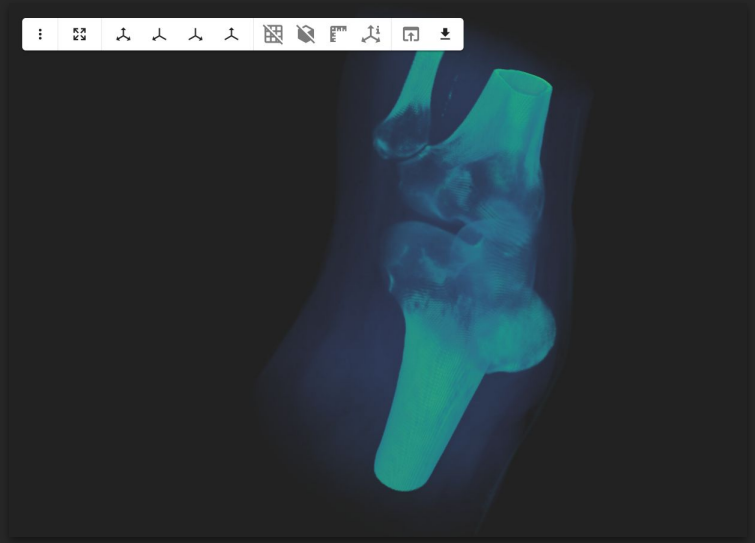
✅ Ideal for nD: 3D+time, multichannel

✅ Ideal for overlays: masks, points, vectors...

✅ Controllable programmatically

🔴 No fine control over the transfer function

PyVista



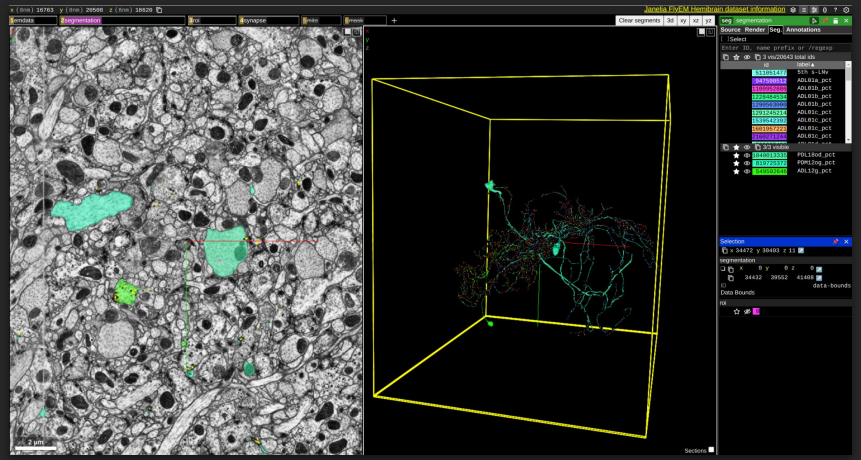
✅ Ideal for reproducible visualizations in Python

✅ Good control over the 3D rendering

✅ Desktop or web-based (e.g. in Jupyter)

🔴 Not as interactive as other tools

Neuroglancer



- ✅ Ideal for Zarr and large images
- ✅ Visualizations can be shared simply with a URL
- 🔴 Not as intuitive as other tools

Features summary

Software	3D+time	Multichannel	Large data	Volume rendering	Projections (mip)	Isosurface / meshes	Glyphs	Intuitive	Scriptable
Fiji Volume Viewer	-	-	-	✅	✅	-	-	✅	-
Fiji 3D Viewer	✅	✅	-	✅	-	✅	-	✅	-
Napari	✅	✅	✔️	✔️	✅	✅	✅	✅	✅
PyVista	-	✔️	✔️	✅	-	✅	✅	✔️	✅
Neuroglancer	✅	✅	✅	✔️	✔️	✅	✔️	-	✔️
Paraview	✅	✔️	✔️	✅	-	✅	✅	-	✔️

✅ Yes ✔️ Sort of

Center
for Imaging

📍 Next Imaging Lunch: 02/04/2025

“Image Reconstruction 101: Computational Methods & Tools”

Feedback