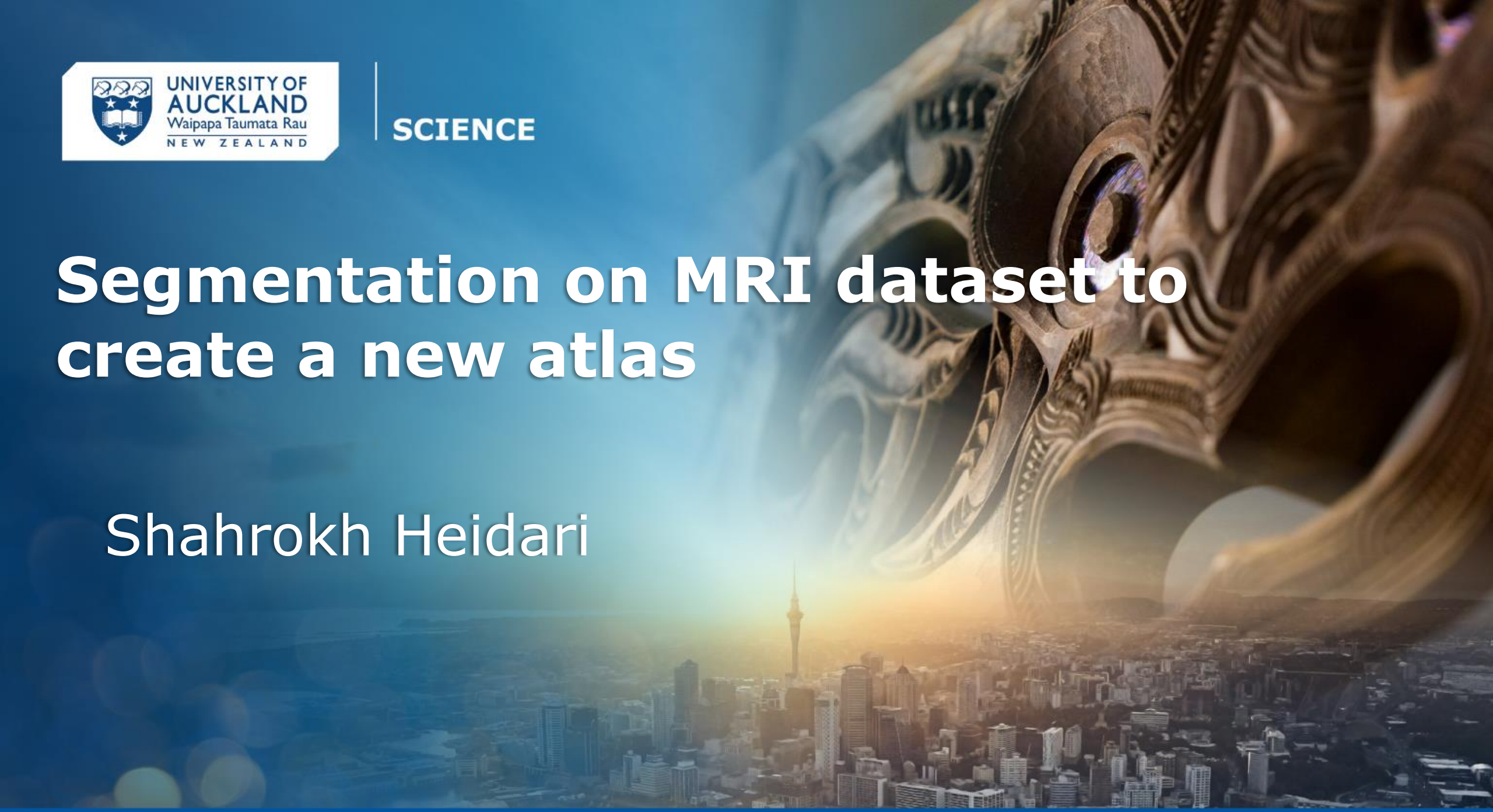


Segmentation on MRI dataset to create a new atlas

Shahrokh Heidari

Segmentation on MRI dataset to create a new atlas

Testing different segmentation algorithm:

- Segment Anything Model (SAM)
- Atropos
- Fuzzy Spatial Cmeans Segmentation
- Prior-based Segmentation

First step:

Choosing a specific ID label

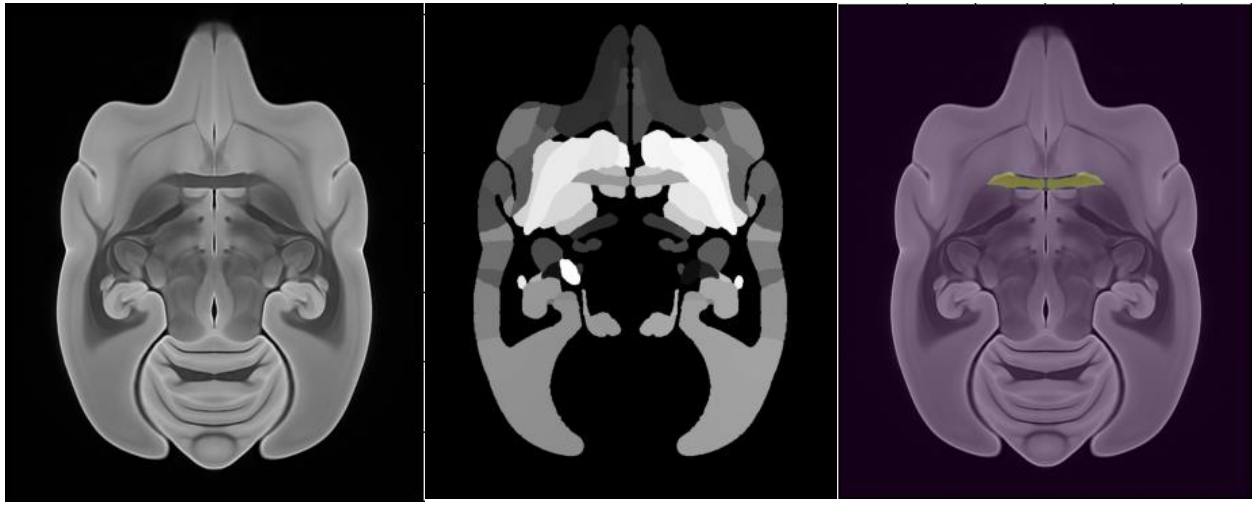
Take advantage of the current atlas to get seeds for the ROI:

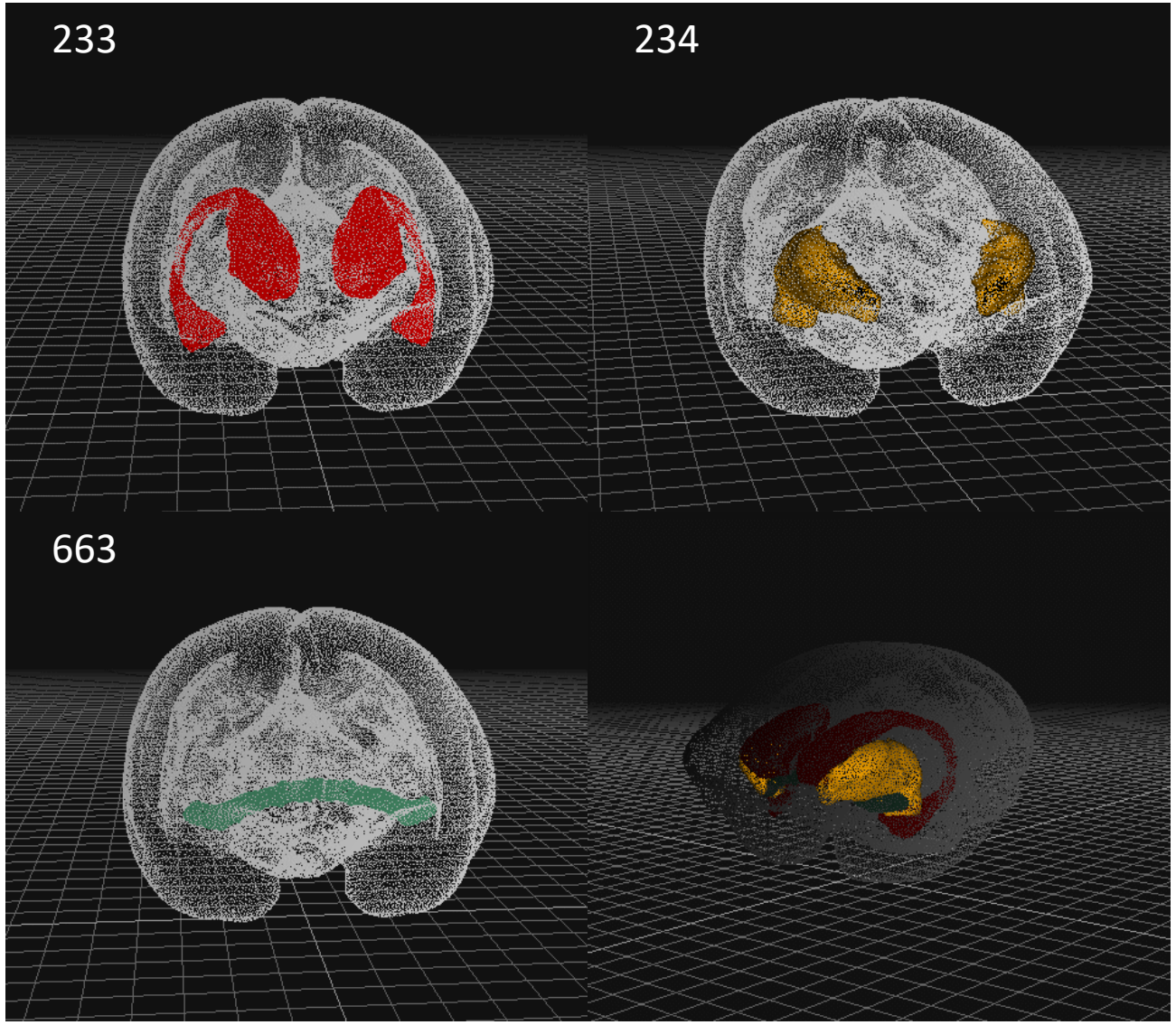
Pixel-based seeds or box-based seed (SAM)
Probability images

Second step:

Defining evaluation metrics to get the best result for the ROI

Marmoset average MRI dataset





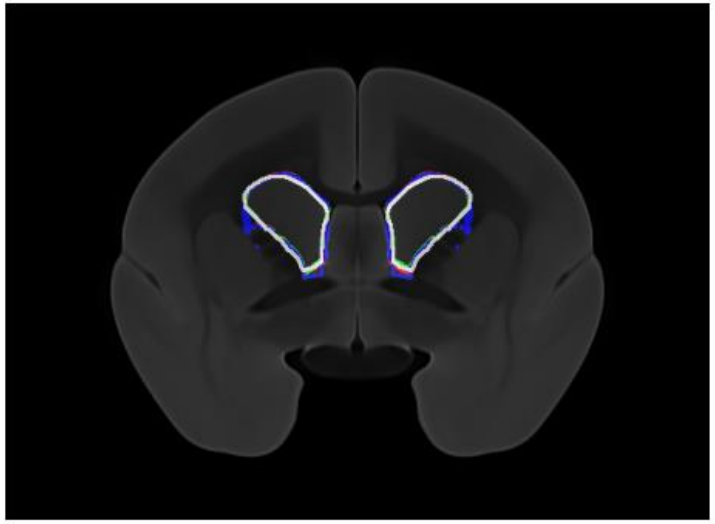
- **Selected ROIs**:
  - 233-Caudate
  - 234-Putamen
  - 663-Anterior Commissure
- **Ground truth**: only for 233
- **Methods**:
  - Segment Anything Model
  - ANTs segmentation methods
- **Metrics**
  - Overlap measures
  - Surface distance measures
  - Volume similarity

UNIVERSITY OF AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

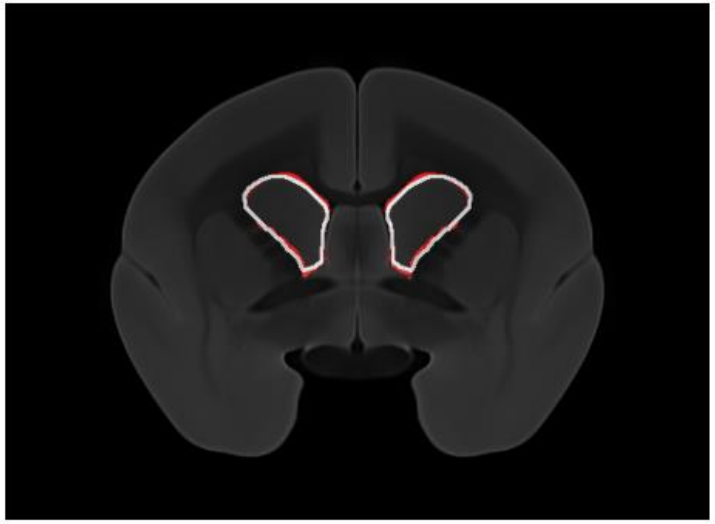
SCIENCE

https://pixy.org/1299536/

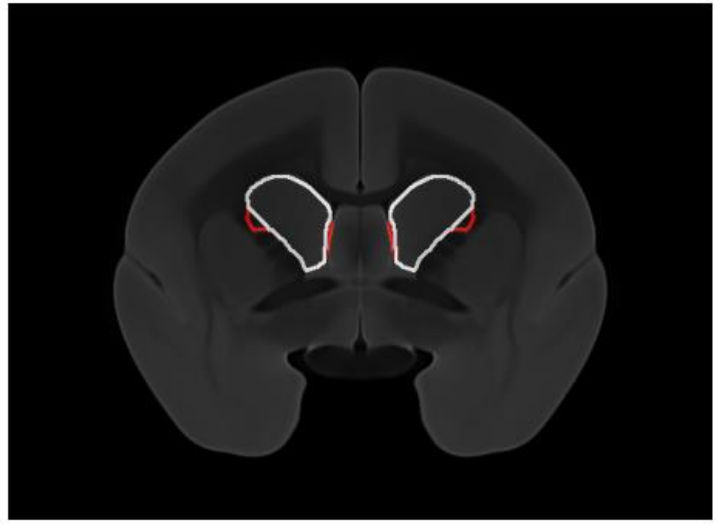
SAM segmentation results along different axes



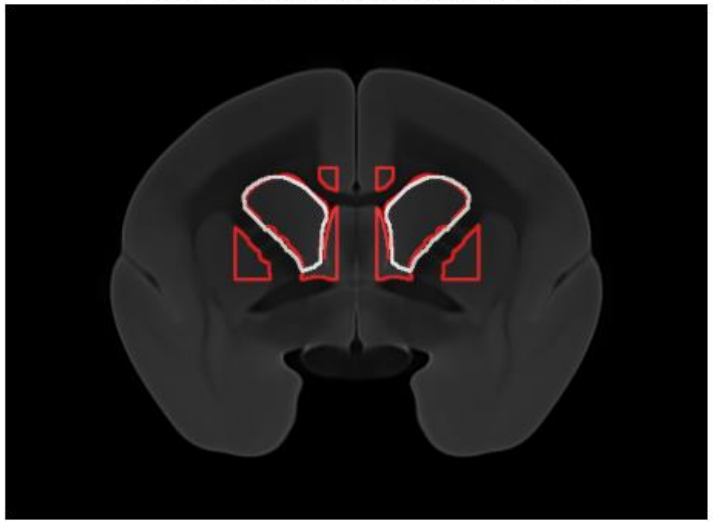
SAM majority-vote segmentation results



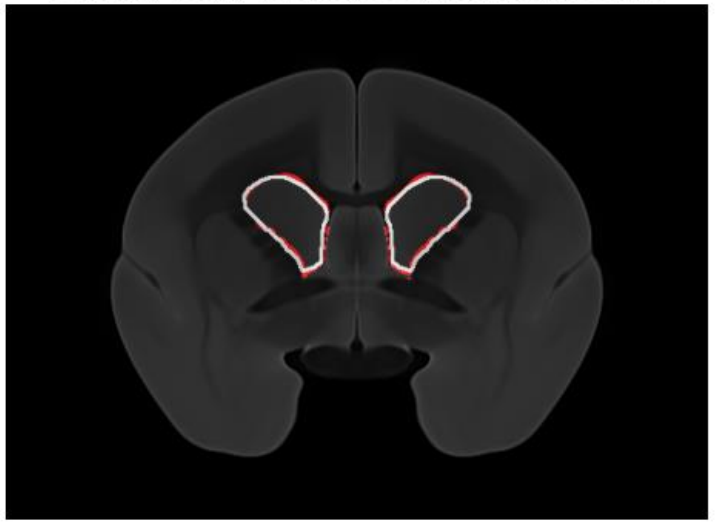
Atropos results



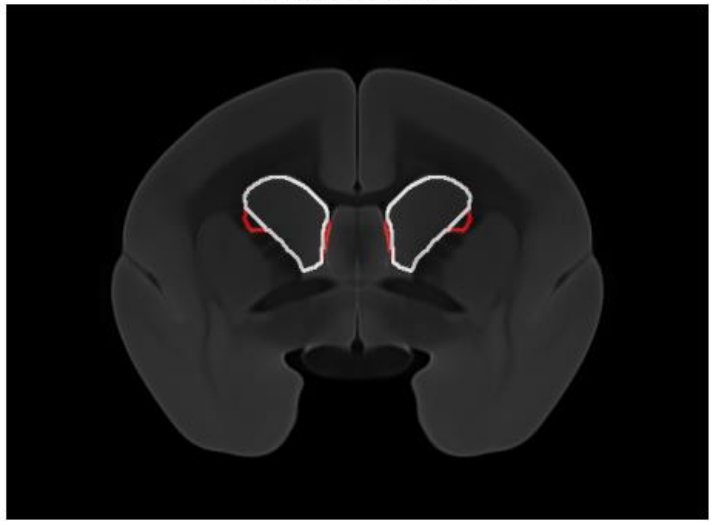
Fuzzy spatial segmentation results



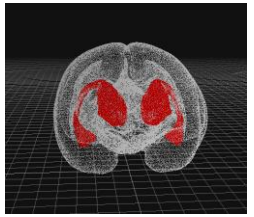
Majority voting for all the segmentation results



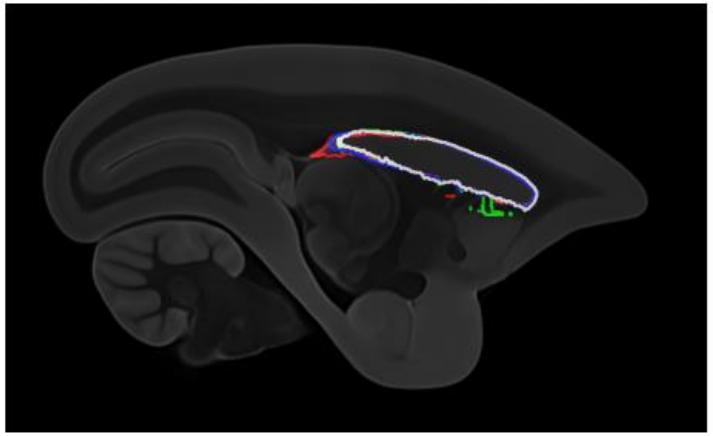
Old labels results



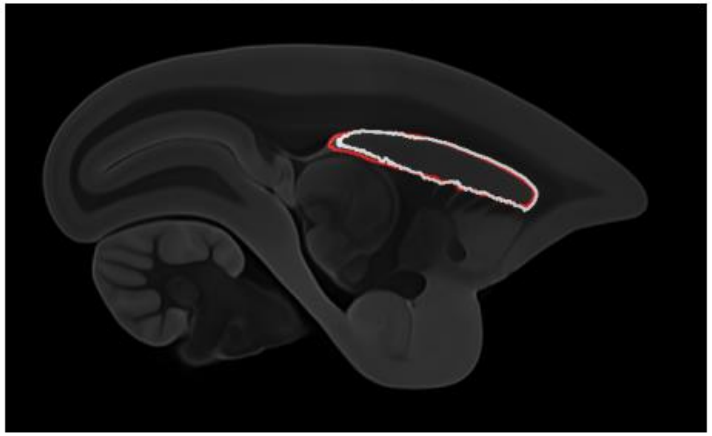
sym_avg_mri_2023_50mu.nii
coronal axis, slice-470



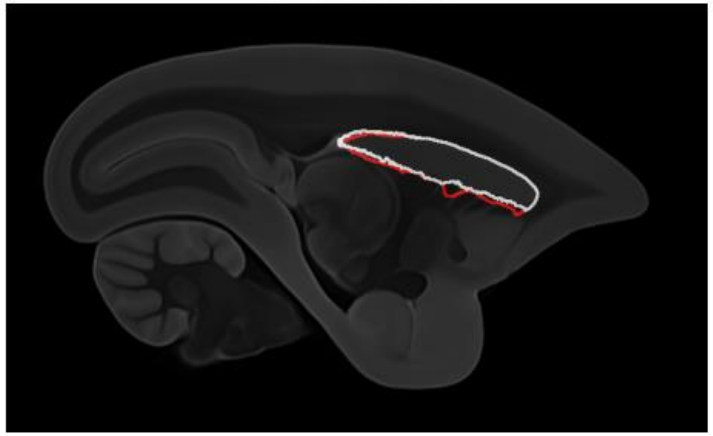
SAM segmentation results along different axes



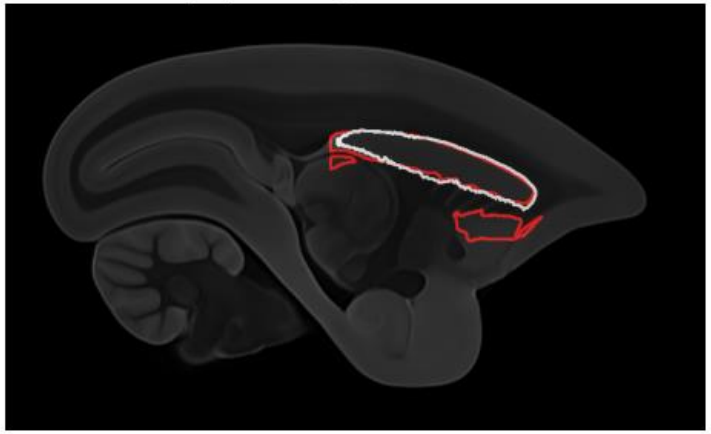
SAM majority-vote segmentation results



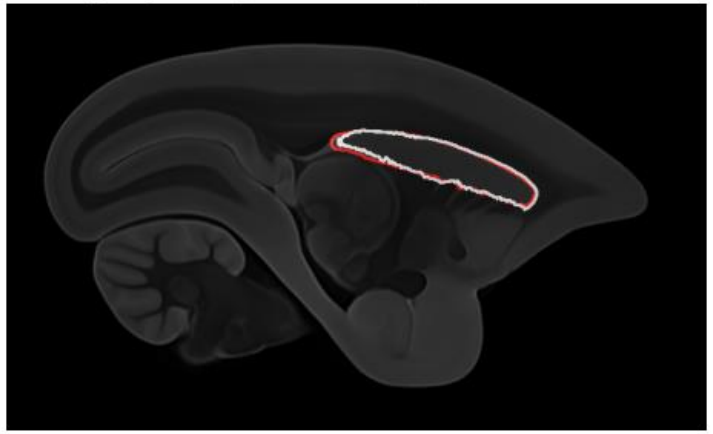
Atropos results



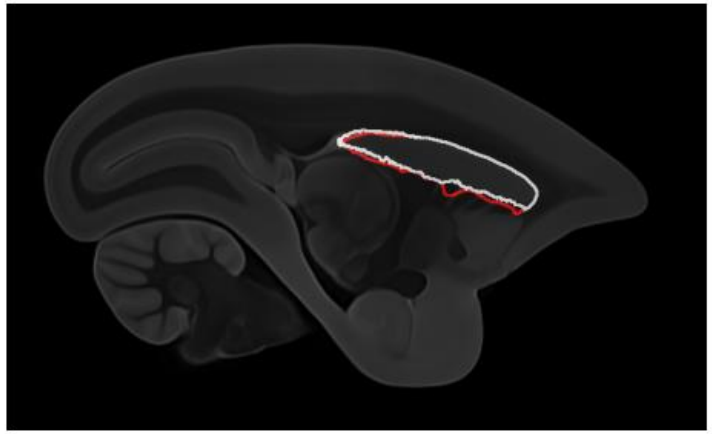
Fuzzy spatial segmentation results



Majority voting for all the segmentation results



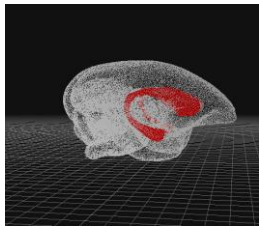
Old labels results



UNIVERSITY OF AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

SCIENCE

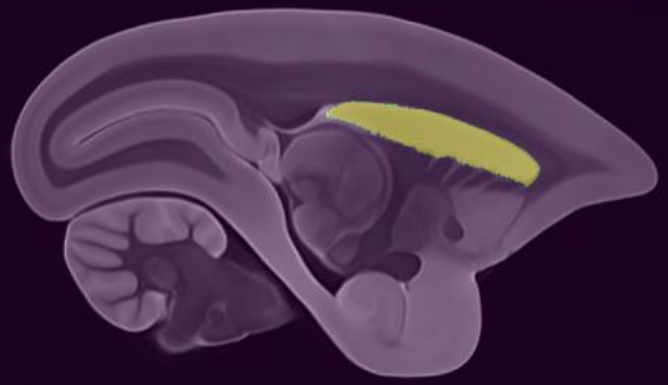
sym_avg_mri_2023_50mu.nii
sagittal axis, slice-380

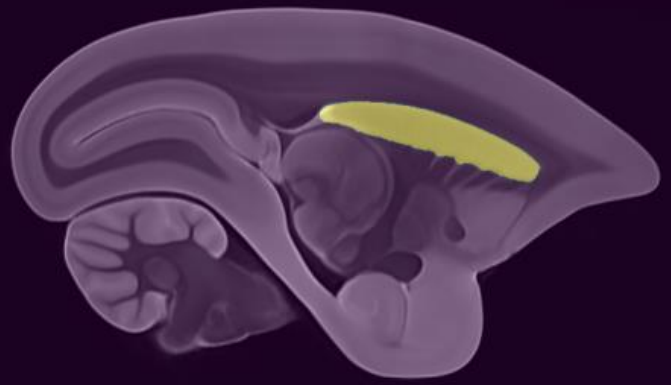


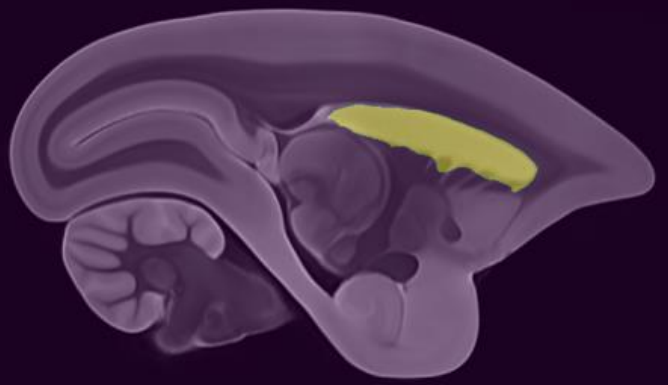
ground-truth

new label

old label

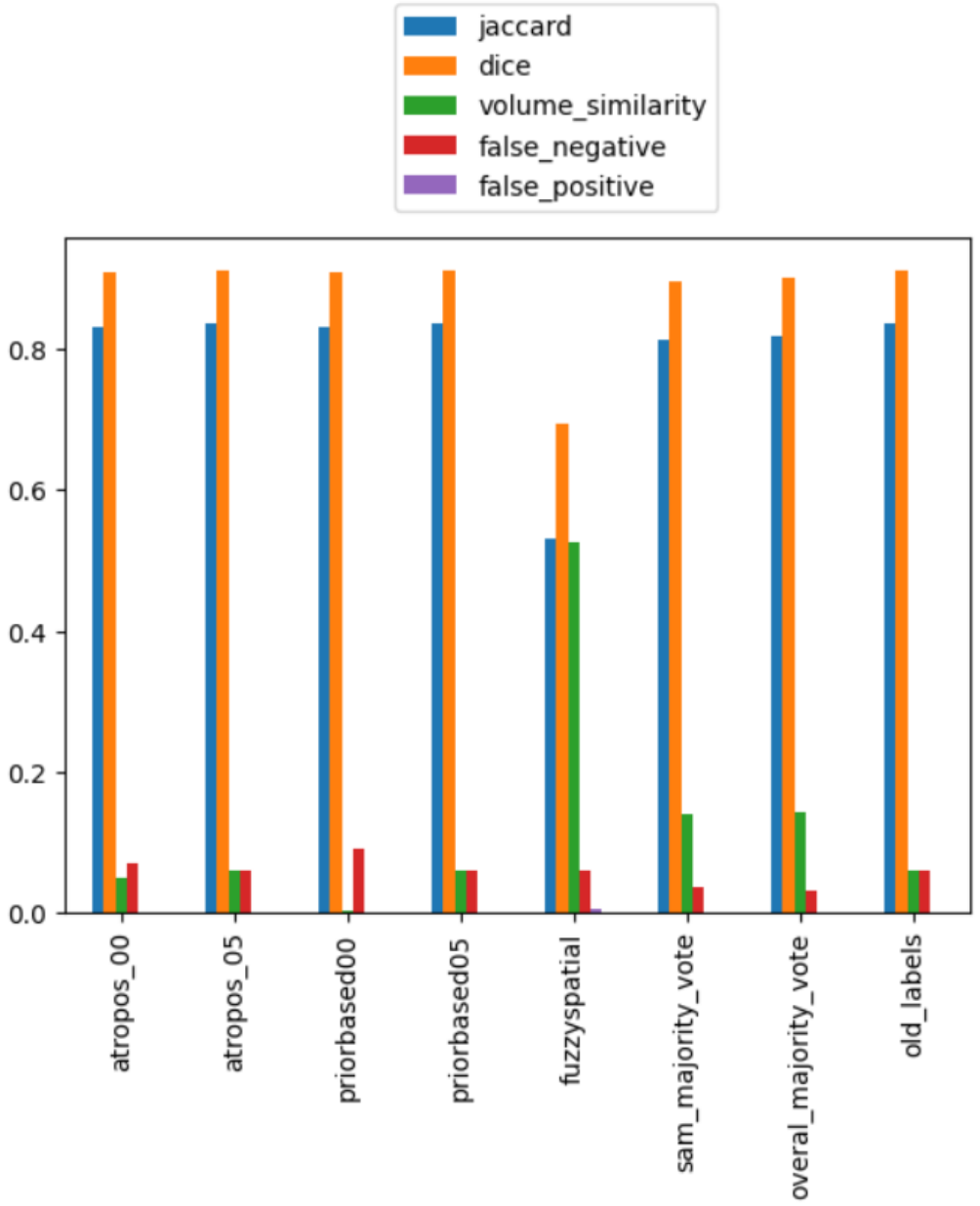






Overlap measures and Volume similarity

	jaccard	dice	volume_similarity	false_negative	false_positive
atropos_00	0.831	0.908	0.048	0.070	0.001
atropos_05	0.837	0.911	0.060	0.061	0.001
priorbased00	0.831	0.908	0.004	0.091	0.001
priorbased05	0.837	0.911	0.060	0.061	0.001
fuzzyspatial	0.531	0.694	0.526	0.059	0.004
sam_majority_vote	0.812	0.896	0.140	0.036	0.001
overal_majority_vote	0.818	0.900	0.142	0.031	0.001
old_labels	0.837	0.911	0.060	0.061	0.001



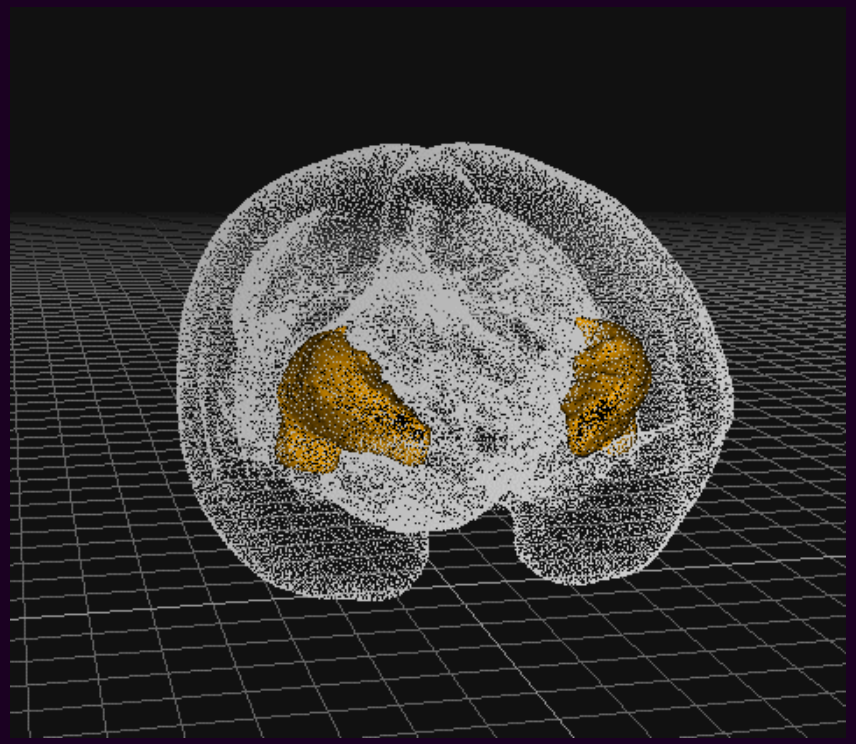
UNIVERSITY OF AUCKLAND
Waipapa Taumata Rau
NEW ZEALAND

SCIENCE

Surface distance measures

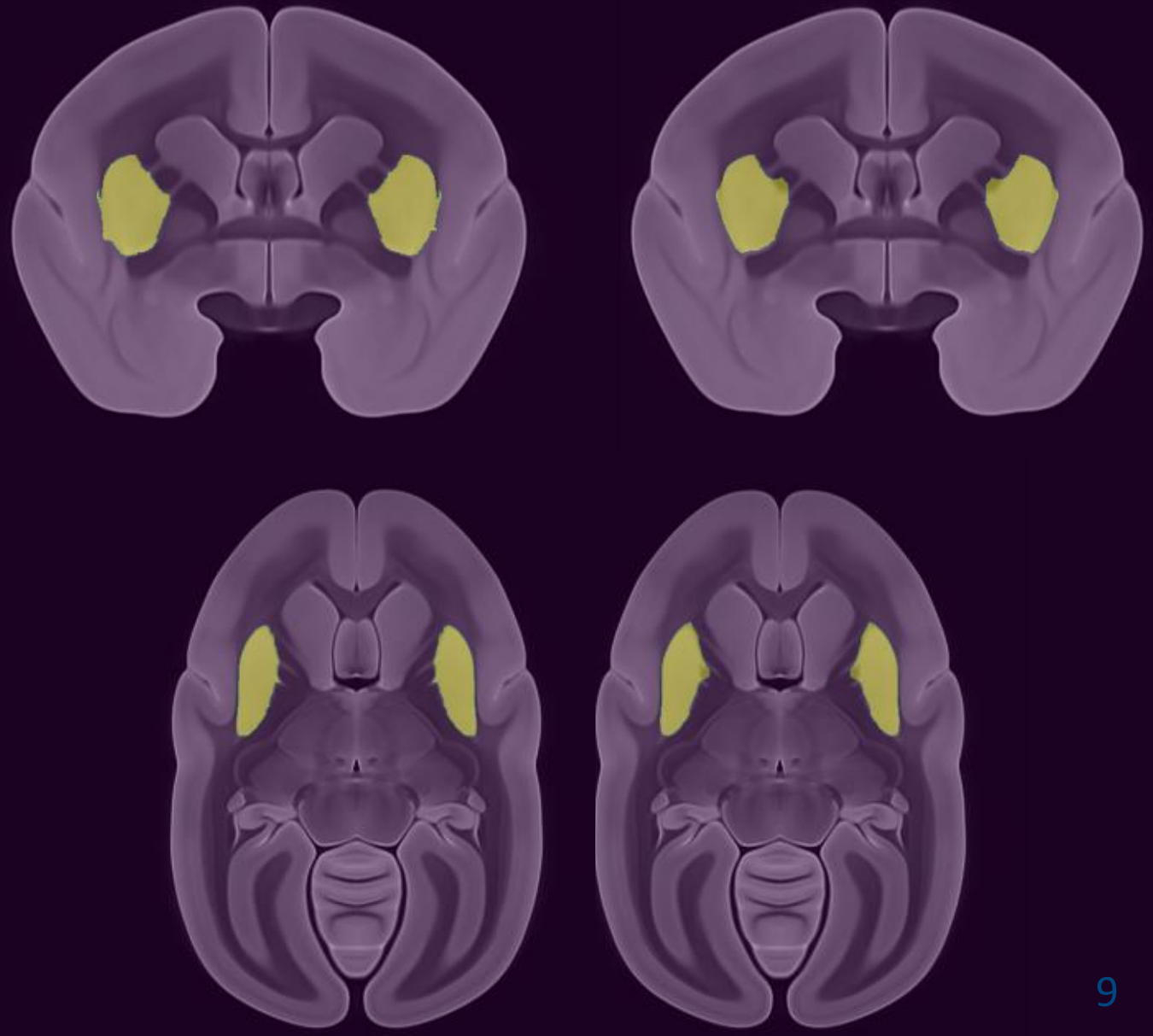
	hausdorff_distance	mean_surface_distance	median_surface_distance	std_surface_distance	max_surface_distance
atropos_00	0.636	0.072	0.050	0.094	0.636
atropos_05	0.642	0.071	0.000	0.099	0.642
priorbased00	0.618	0.070	0.050	0.083	0.618
priorbased05	0.642	0.071	0.000	0.099	0.642
fuzzyspatial	2.502	0.344	0.150	0.429	2.502
sam_majority_vote	0.921	0.079	0.050	0.092	0.921
overal_majority_vote	0.879	0.075	0.050	0.091	0.879
old_labels	0.642	0.071	0.000	0.099	0.642

234-Putamen

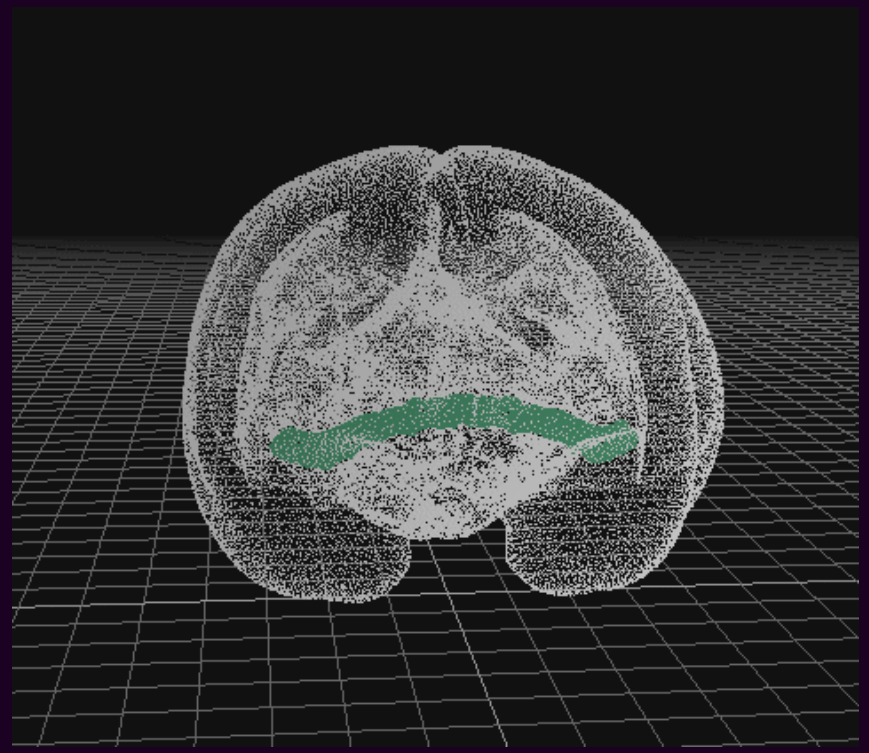


new label

old label



663-Anterior Commissure



new label

old label