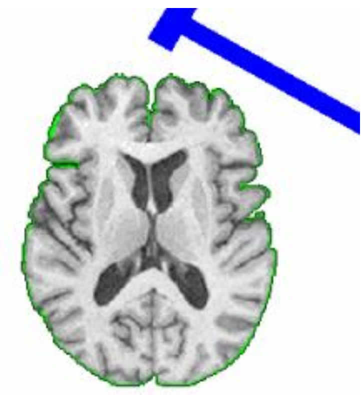
HAMMER: Hierarchical Attribute Matching Mechanism for Elastic Registration



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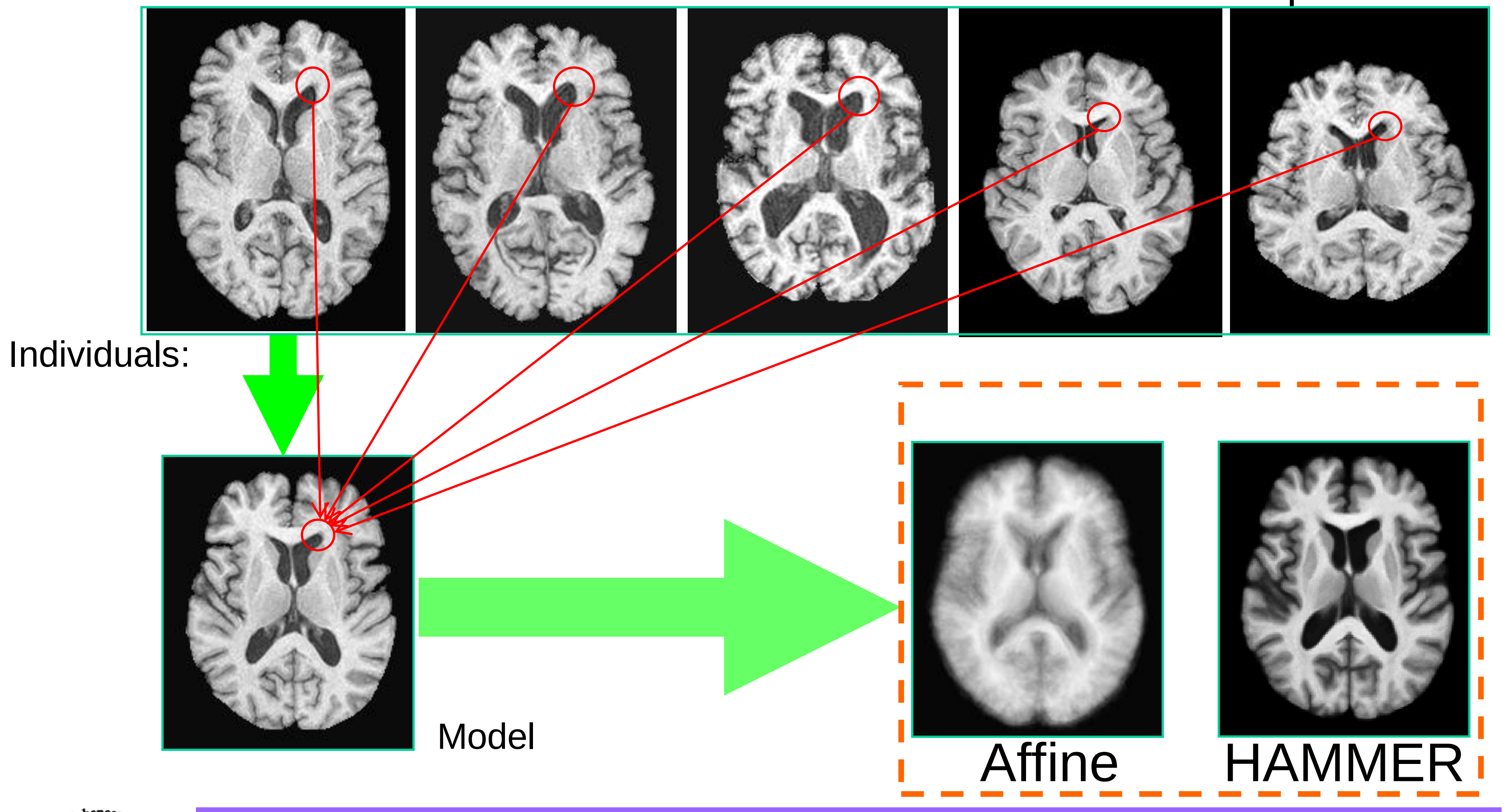
HAMMER: Background

- The goal of deformable registration of brain images

--- Establish the anatomical correspondence

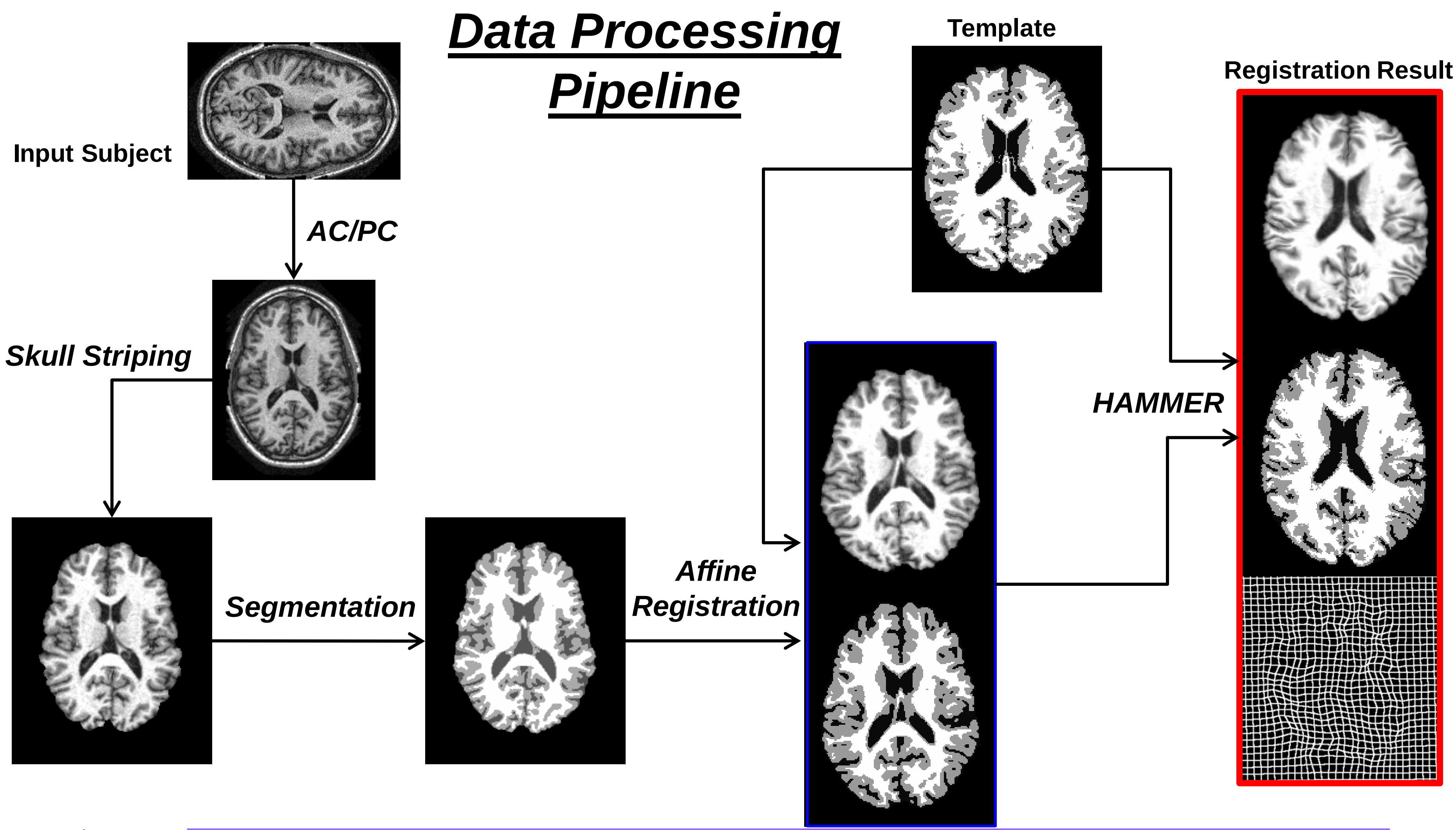


HAMMER: Background

- Clinical applications:
    - † Spatial normalization of functional images, *for group analysis*.
    - † Measurement of structure, *by deforming a model to individual*.
    - † Image data mining *in lesion-deficit studies*.

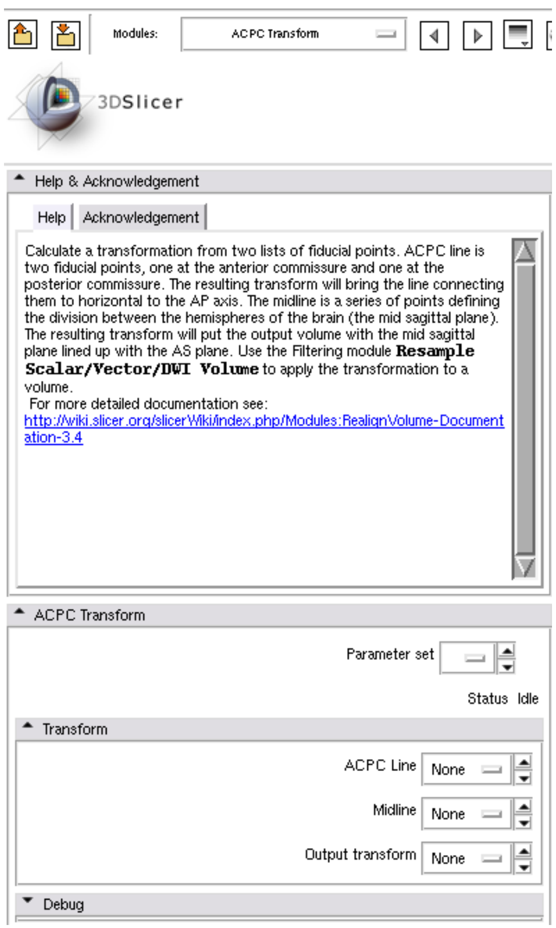
- HAMMER has been used to align over 8,000 brains image since 2002.
- HAMMER paper has received the 2006 Best Paper Award for IEEE Signal Process Society.

HAMMER: Guidance in Slicer3

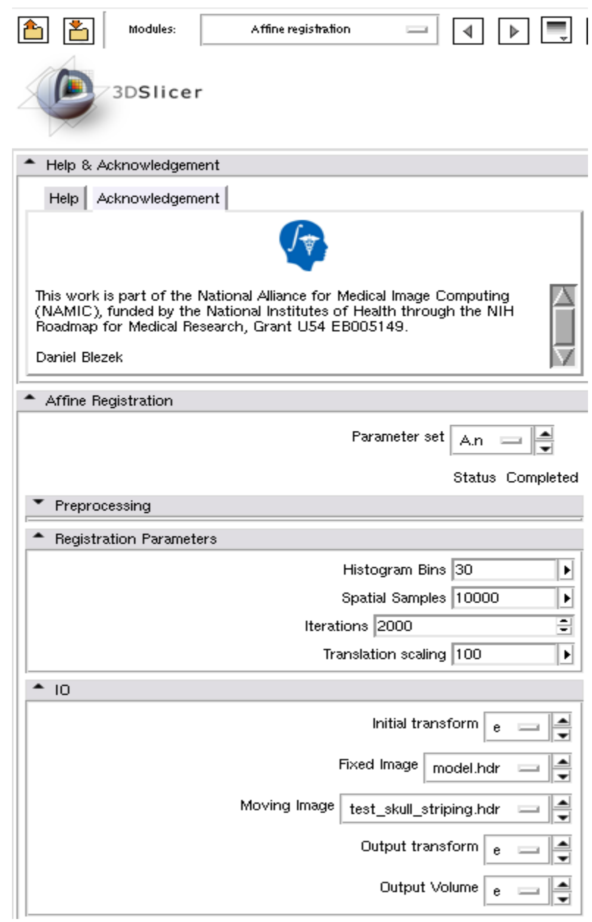


HAMMER: Guidance in Slicer3

Step 1: AC/PC Correction

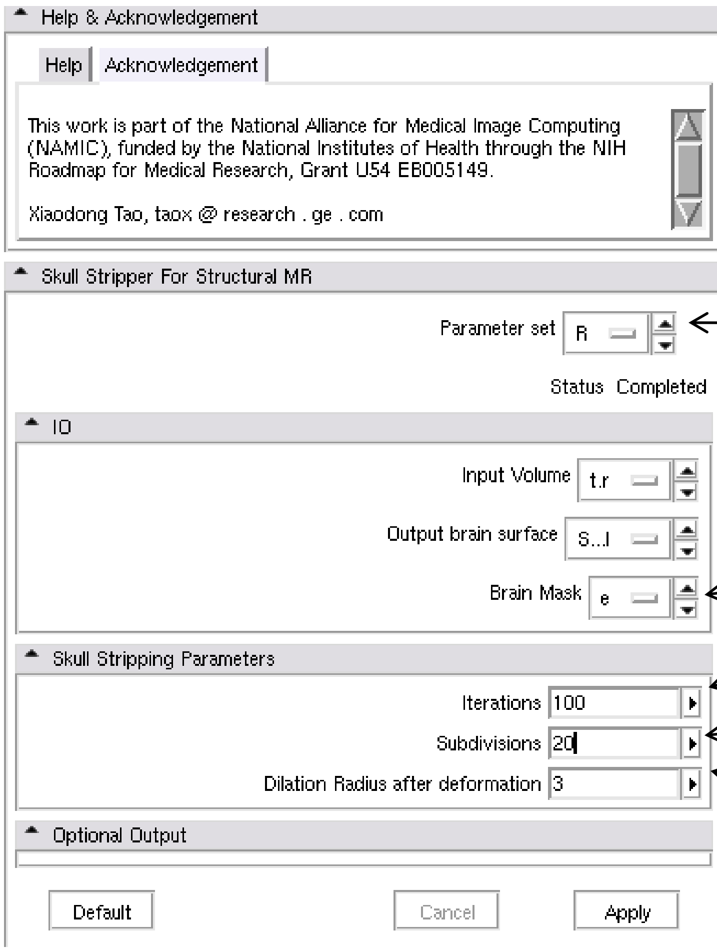


or



HAMMER: Guidance in Slicer3

Step 2: Skull Striping



Default parameter set

Input file name

Output brain surface file name

Brain mask file

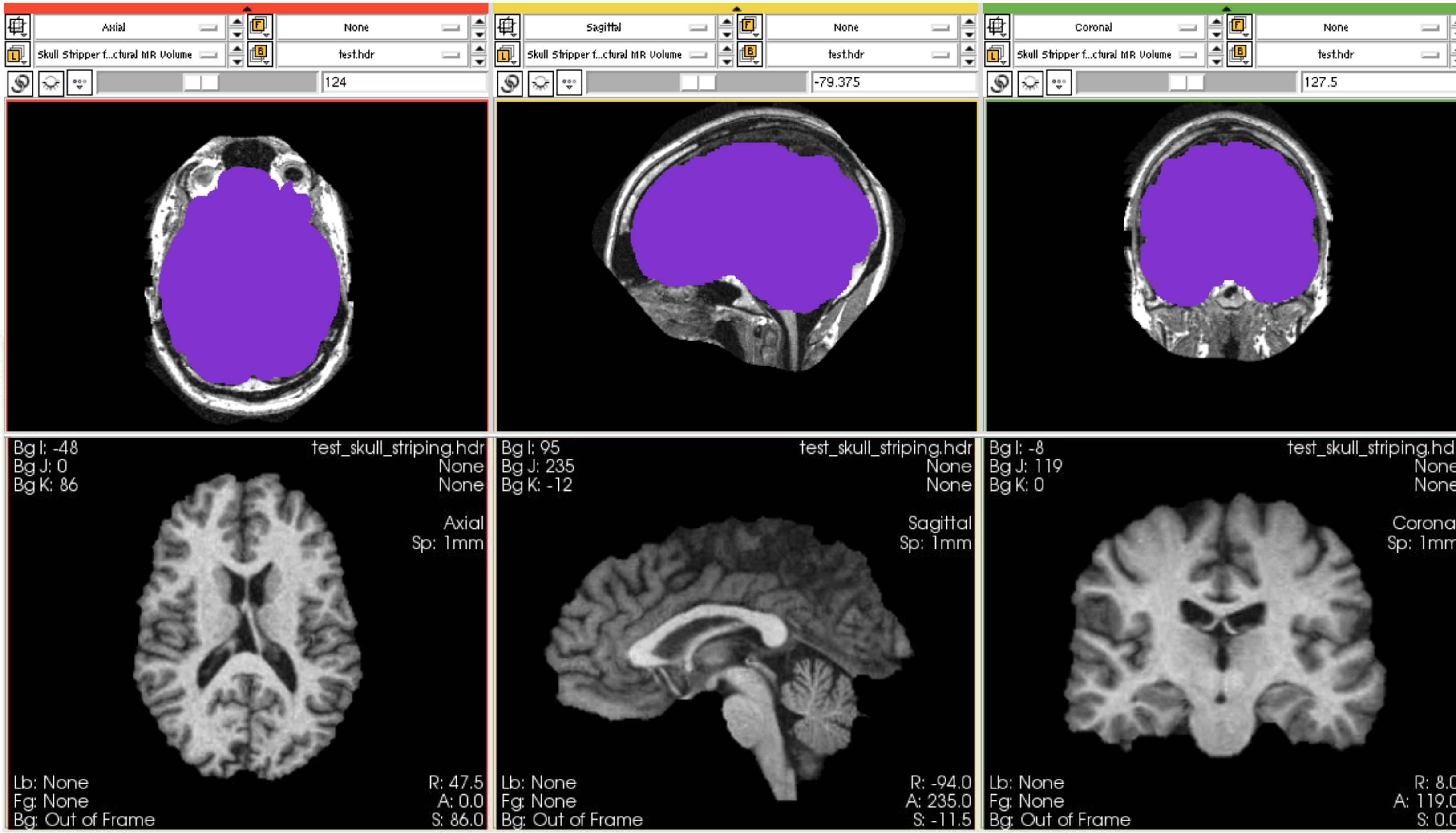
Iterations used in skull stripping

The number of sub-divisions

The dilation radius after deformation

HAMMER: Guidance in Slicer3

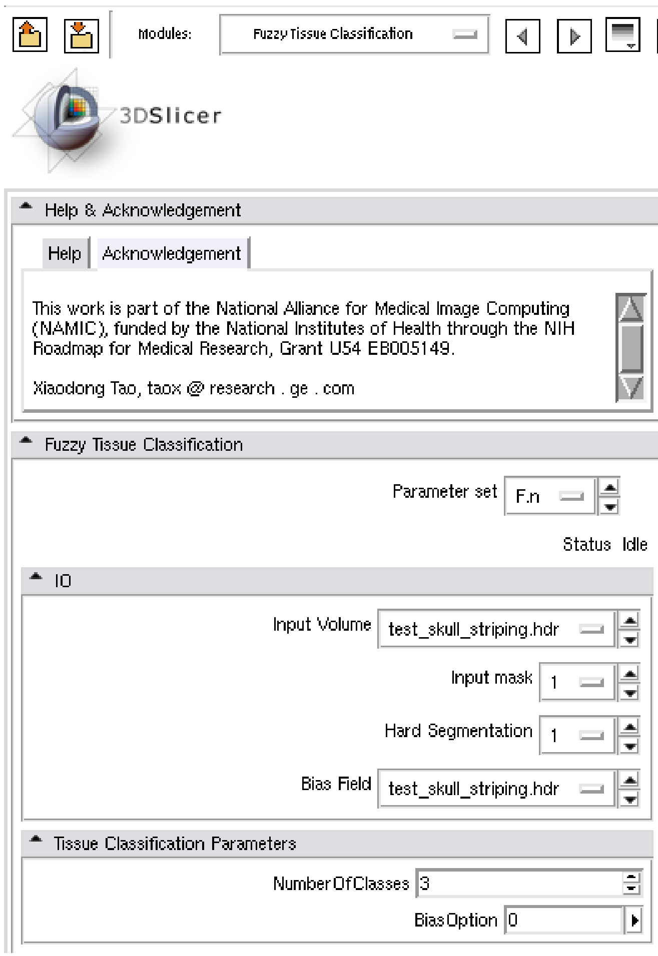
Skull Striping Result



HAMMER: Guidance in Slicer3

Step 3: Tissue Segmentation

Segmentation and bias correction with ‘Fuzzy Tissue Classification’ in Slicer3



Input file name

Input Mask file name

Output hard segmentation result

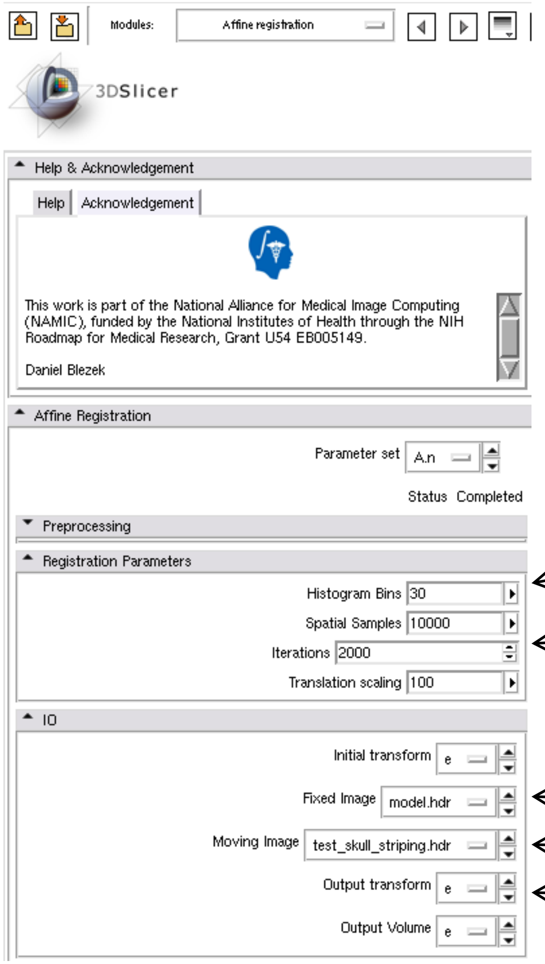
Output bias field result

The number of tissue types

The option for bias correction

HAMMER: Guidance in Slicer3

Step 4: Affine Registration



The number of histogram bins

The number of iterations

Fixed Image

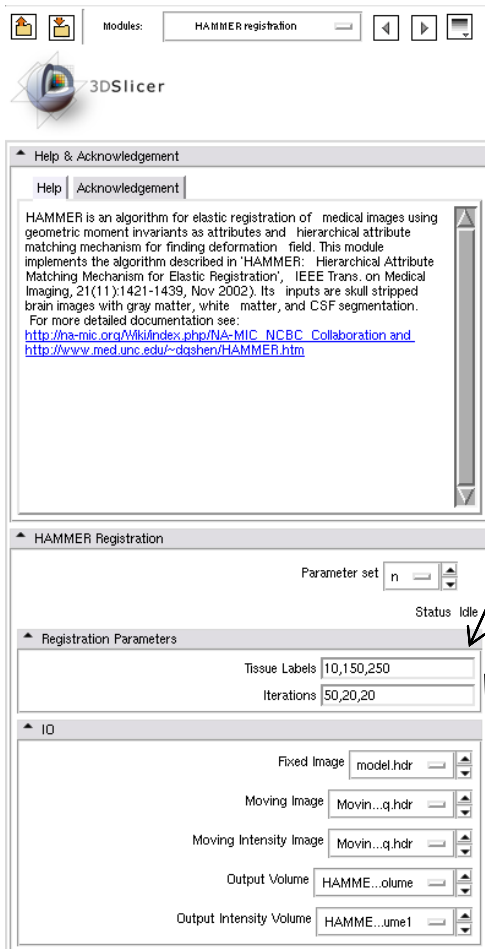
Moving Image

Output transformation

Output affine registration result

HAMMER: Guidance in Slicer3

Step 5: HAMMER Registration



The labeling of WM, GM, and CSF in HAMMER

The number of iterations in each resolution

Fixed image

Moving segmented image

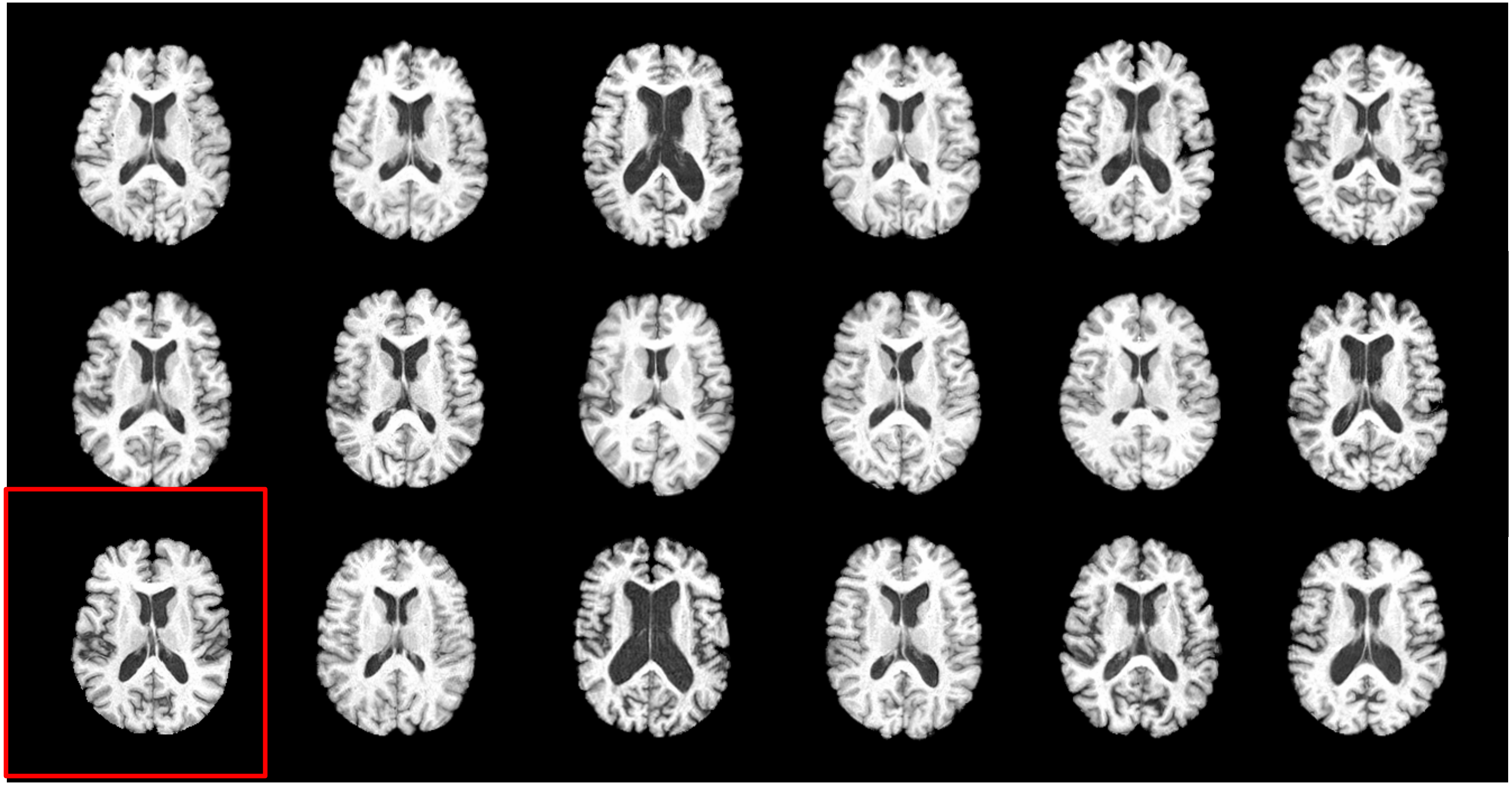
Moving intensity image

Output segmented image

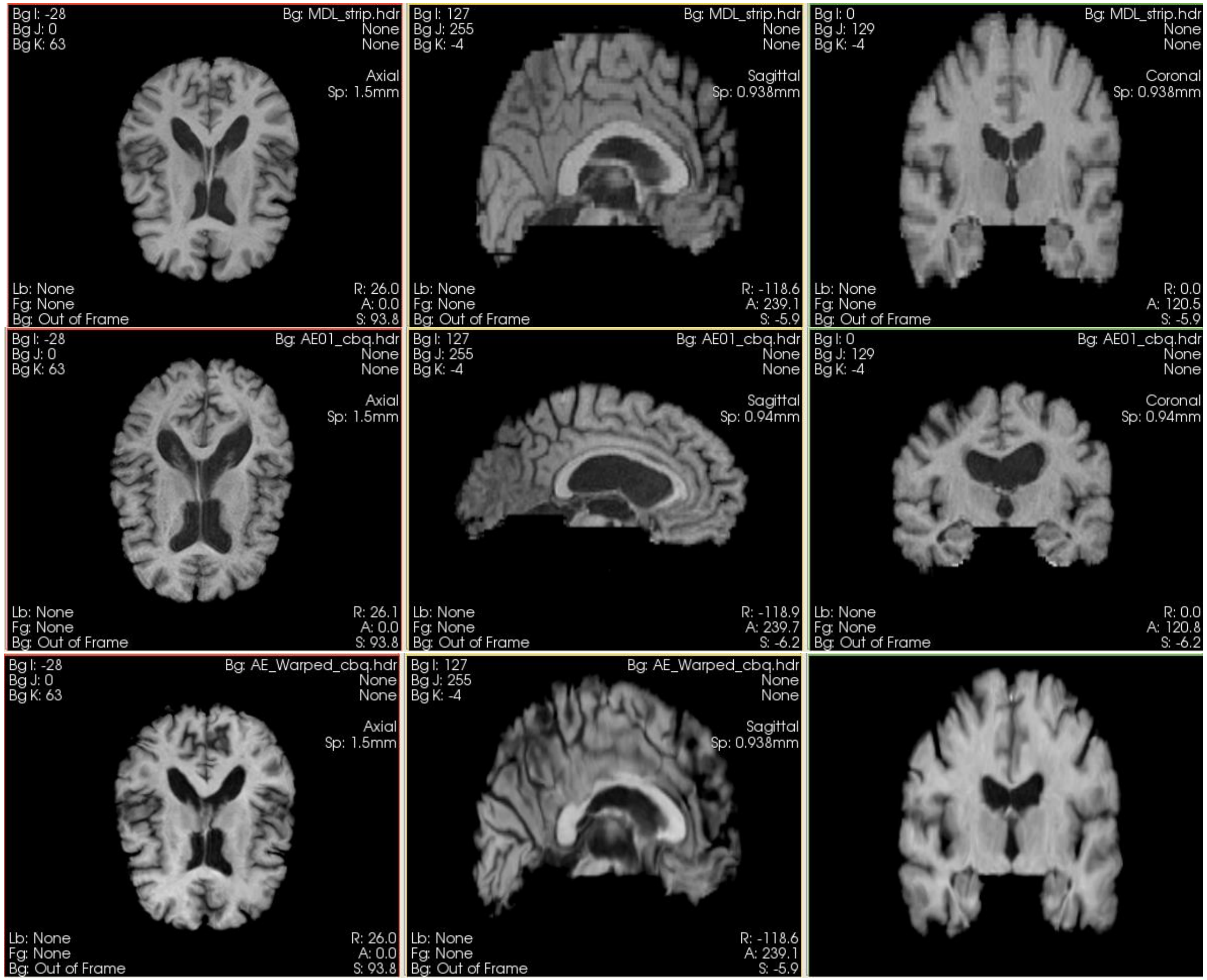
Output intensity image

HAMMER: Results

Experiment 1: 18 Elder Brains From BLSA Dataset



HAMMER: Results

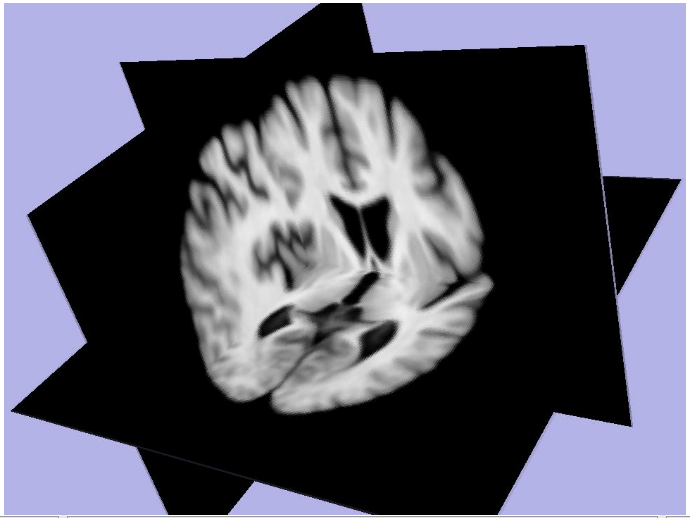


Template

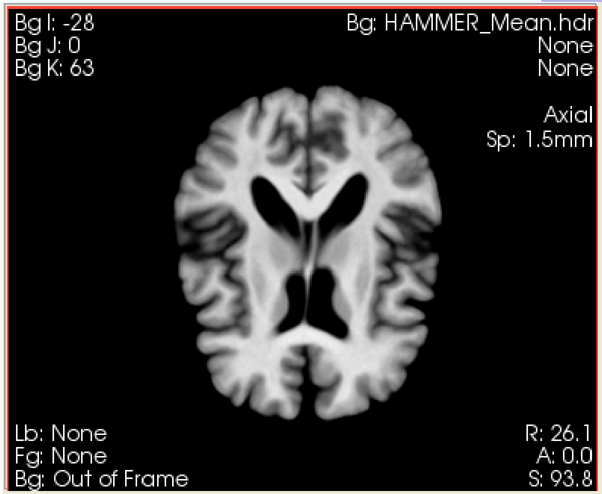
Subject

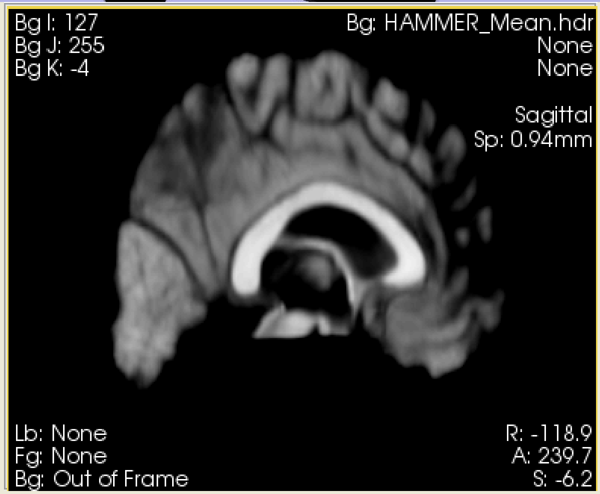
Registration result by HAMMER

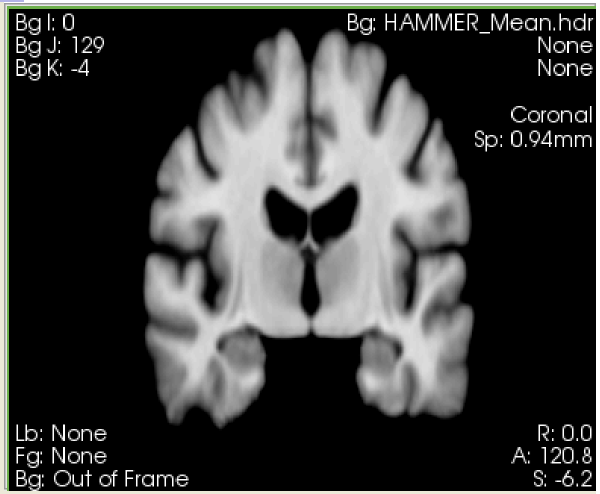
HAMMER: Results



Average Image







HAMMER: Results

40 LONI Dataset with 54 manually labeled RIOs

Laboratory of Neuro Imaging

Enter search keyword | Search

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LONI >

LONI Atlases

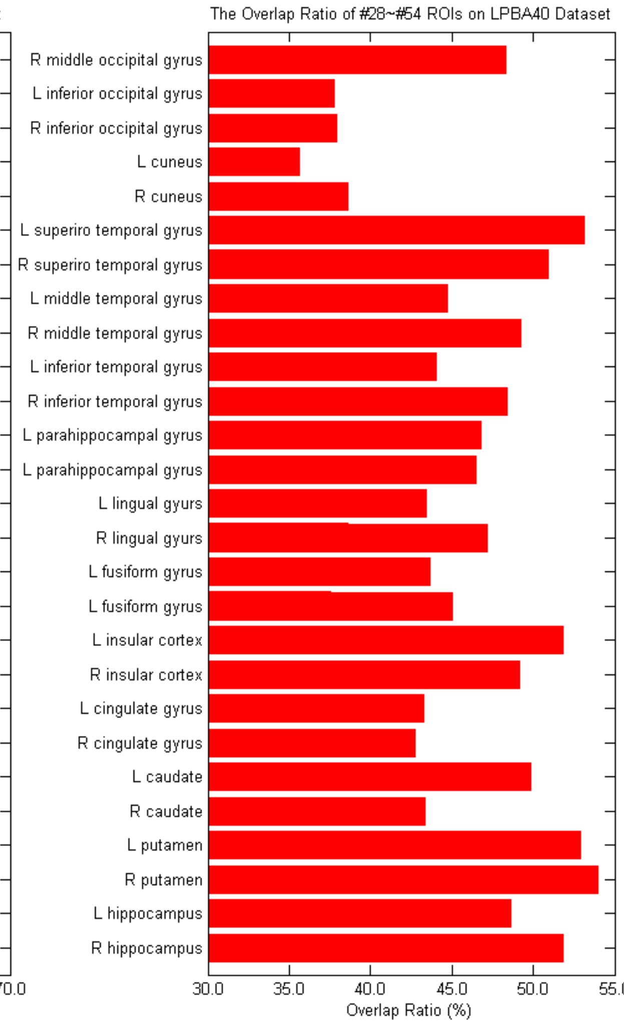
An atlas of the brain allows us to define its spatial characteristics. Where is a given structure; relative to what other features; what are its shape and characteristics and how do we refer to it? Where is this region of functional activation? How different is this brain compared with a normal database? An atlas allows us to answer these and related questions quantitatively.
Brain atlases are built from one or more representations of brain. They describe one or more aspects of brain structure and/or function and their relationships after applying appropriate registration and warping strategies, indexing schemes and nomenclature systems. Atlases made from multiple modalities and individuals provide the capability to describe image data with statistical and visual power.
An atlas can take on many forms, from descriptions of structure or function of the whole brain to maps of groups or populations. Individual systems of the brain can be mapped as can changes over time, as in development or degeneration. An atlas enables comparison across individuals, modalities or states. Differences between species can be catalogued. But in most cases, the value added by brain atlases is the unique and critical ability to integrate information from multiple sources. The utility of an atlas is dependent upon appropriate coordinate systems, registration and deformation methods along with useful visualization strategies. Accurate and representative atlases of brain hold the most promise for helping to create a comprehensive understanding of brain in health and disease.

IN THIS SECTION:

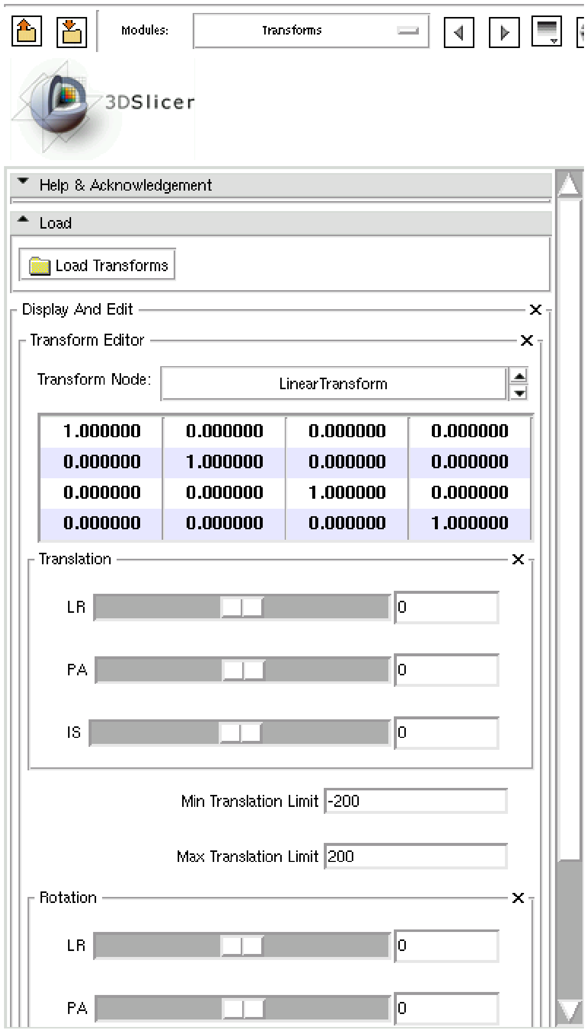
Available Atlases

- Alzheimer's Disease Template
- Human Atlas
- ICBM 452 T1 Atlas
- ICBM DTI-81 Atlas
- ICBM Probabilistic Atlases
- ICBM T2 Atlas
- ICBM Template
- LPBA40
- Monkey Atlas
- Mouse Atlas
- Mouse Minimum Deformation Atlas (MDA)
- Neonatal (P0) Mouse Nissl Brain Atlas
- Neonatal (P0) MRI Mouse Brain Atlas
- Rat Atlas

HAMMER: Results



Thanks!


Modules:
Transforms
3DSlicer
Help & Acknowledgement
Load
Load Transforms
Display And Edit
Transform Editor
Transform Node:
LinearTransform
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0.000000 1.000000 0.000000 0.000000
0.000000 0.000000 1.000000 0.000000
0.000000 0.000000 0.000000 1.000000
Translation
LR 0
PA 0
IS 0
Min Translation Limit -200
Max Translation Limit 200
Rotation
LR 0
PA 0