

# DRAMMS Software Flyer

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## 1 Introduction

DRAMMS is a deformable image registration software package designed for 2D-to-2D and 3D-to-3D image registrations. In the spring 2014, it has also been extended to 4D-DRAMMS (for sptail-temporal longitudinal analysis), and population-wise-DRAMMS (for unbiased atlas construction of images from a population). Figure 1 shows some typical applications, including,

- Cross-subject registration of the same organ (brain, breast, cardiac, etc);
- Mono- and Multi-modality registration (MRI, CT, histology);
- Longitudinal registration (pediatric brain growth, cancer development, etc);
- Registration under partial missing correspondences (small lesions, tumors, histological cuts).

**DRAMMS Homepage:** <http://www.cbica.upenn.edu/sbia/software/dramms/index.html>

**DRAMMS Manual:** [http://www.cbica.upenn.edu/sbia/software/dramms/\\_downloads/DRAMMS\\_Software\\_Manual.pdf](http://www.cbica.upenn.edu/sbia/software/dramms/_downloads/DRAMMS_Software_Manual.pdf)

## 2 System Requirement

**OS:** UNIX/LINUX or Mac.

**File formats:** ANALYZE 7.5 (.hdr+.img) or NIfTI-1 (.hdr+.img, .nii, .nii.gz) images.

**Datatypes:** byte, uint8, int8, short, int16, uint16, float, float32, int32.

**Memory:** DRAMMS consumes considerable amount of memory ( $\sim 50$ MB for 2D images, and  $\sim 6$ GB for a typical pair of brain MR images  $256 \times 256 \times 150$ ).

## 3 Download and Install

**Download:** <http://www.cbica.upenn.edu/sbia/software/dramms/download.html>.

**Install :** <http://www.cbica.upenn.edu/sbia/software/dramms/installation.html>. Requires CMake (version 2.8 or above) and GCC (version 4.1 or above).

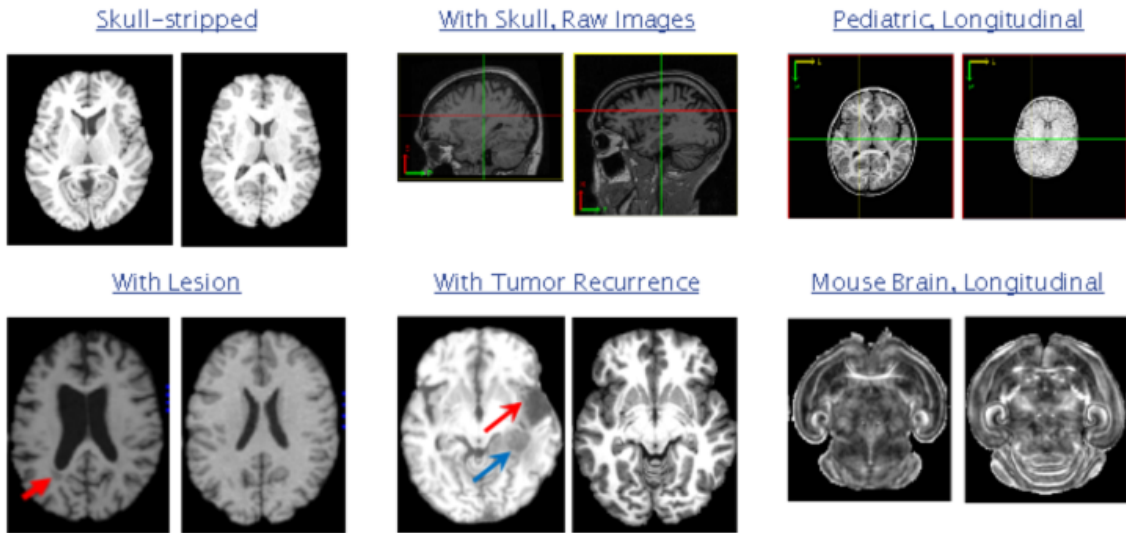
## 4 Usage

Default usage below will get reasonable results in most cases.

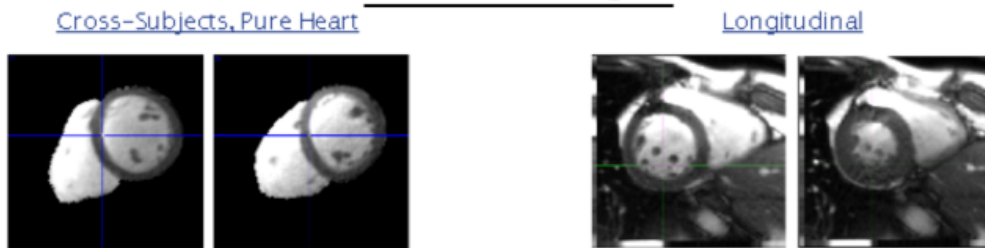
```
dramms -S ${SourceImage} -T ${TargetImage}
      -O ${RegisteredImage_S2T} -D ${Deformation_S2T}
```

More specific usage including parameter tuning in various scenarios can be found in Tutorial page <http://www.cbica.upenn.edu/sbia/software/dramms/tutorials.html>.

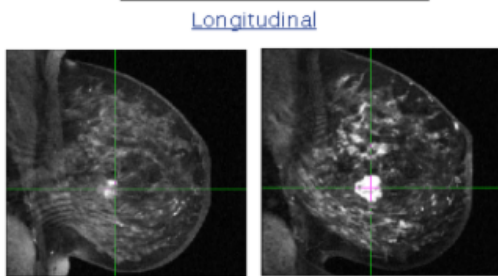
## Brain Images



## Cardiac Images



## Breast Images



## Prostate Images

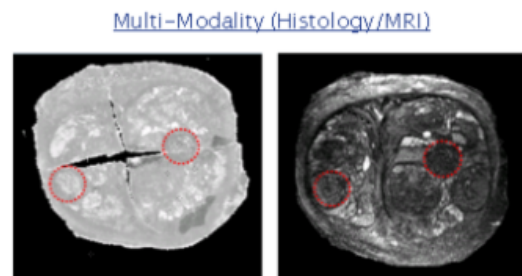


Figure 1: Some typical DRAMMS applications.

## References

- [1] Yangming Ou, Aris Sotiras, Nikos Paragios, Christos Davatzikos: DRAMMS: Deformable registration via attribute matching and mutual-saliency weighting. Medical Image Analysis 15(4): 622-639 (2011).
- [2] Yangming Ou, Hamed Akbari, Michell Bilello, Xiao Da, Christos Davatzikos: Comparative Evaluation of Registration Algorithms for Different Brain Databases with Varying Difficulty: Results and Insights. IEEE Transactions on Medical Imaging, DOI: 10.1109/TMI.2014.2330355. (2014).