

INSTALLATION INSTRUCTIONS:

All these instructions have been compiled and tested in ubuntu 10.04, 11.04 and 12.04, most methods should be adaptable to other platforms. In order to do this, the code provided includes cmakeLists files that can be used by the cmake cross platform compilation tool. As for the code provided by external authors, platform dependent instructions should be found in the references mentioned.

0) Previous installation:

In order to compile some of the code included, you should have a working itk installation:

<http://www.itk.org/>

Detailed installation instructions for windows and linux can be found at:

<http://www.itk.org/CourseWare/Training/GettingStarted-I.pdf>

Notice: The code provided has been compiled with Itk 3.xxx , preliminary tests have also been carried out with itk 4.

In order to install itk, you will also need to install cmake:

<http://www.cmake.org/>

KNOW ISSUES:

Notes:

- For some reason, the cxx compiler g++ is not installed by default in some ubuntu distributions. Fix this with :

```
sudo apt-get install g++
```

- Also itk needs the uuid tool but does not say so, you can install it from the ubuntu software center , then you will also need the development files so you also have to run:

```
sudo apt-get install uuid-dev
```

- When configuring itk with cmake (after having made the binary directory as stated in the instructions above), you need to set two flags (press "t" to see the flags and set "ITK_USE_OPTIMIZED_REGISTRATION" and "ITK_USE_REVIEW" to "ON").

- Data formats. All tests have been run using the .nii (NIFTI) format. If you need to perform conversions from nifty, you might want to use the " dcm2nii" tool (can be found in the ubuntu software centre).

1) REGISTRATION METHODS:

1.1) Itk Based methods:

These methods are basically part of the insight toolkit and have been mostly adapted from the examples there. They can be compiled using the cmake.txt file included and executed using the scripts provided in the “testScripts” folder. These methods are:

- Rigid.
- Affine (and the combination Rigid + Affine)
- Bsplines
- Demons
- Diffeomorphic demons, as downloaded from <http://www.insight-journal.org/browse/publication/154>

- Basically in this case you need to compile the code. Call cmake . in the directory where the code is and just set the itk dir variable to its correct value (details for this can be found in ITK's installation guide under “using ITK from an external project”).

1.2) External code:

The code in this section is provided by its respective authors and all we do here is provide some pointers to make it easier to access it.

- Nifty reg

Bsplines based, with the possibility of hardware acceleration in CUDA for faster computation (not used in the scripts). Download: <http://sourceforge.net/projects/niftyreg/?source=dlp> and installation manual: http://heanet.dl.sourceforge.net/project/niftyreg/install_NiftyReg_macLinux.pdf and http://www0.cs.ucl.ac.uk/staff/M.Modat/Marcs_Page/install.html

Please notice how (as stated in the final part of the instructions) you have to modify your .bashrc file in order for the code to find nifty.

- SyN

Symmetric diffeomorphisms. One of the methods obtaining best results. Detailed instructions on compilation, other resources and examples can also be found in the same webpage. <http://brianavants.wordpress.com/2012/04/13/updated-ants-compile-instructions-april-12-2012/>

- DRAMMS

The only method included in the study not purely based on pixel intensity (paper link: <http://www.sciencedirect.com/science/article/pii/S1361841510000940>). Word of advice in the download. When I downloaded it, the form in the authors page did not work so well and it took me quite a lot of tries to get the code. Seems to have been fixed afterwards.

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

Installation: <http://www.rad.upenn.edu/sbia/software/dramms/installation.html>

Manual: <http://www.rad.upenn.edu/sbia/software/dramms/manual.html>

- IRTK

For this method we could only get binaries. Bsplines based.

Download page: <http://www.doc.ic.ac.uk/~dr/software/>

- ART

Part of the NITRC project, Download: <http://www.nitrc.org/projects/art>

- SMP8

This matlab-based software package includes two methods used in the study, SPM DARTEL and SPM HDW.

Download for SPM: <http://www.fil.ion.ucl.ac.uk/spm/software/download.html>

Documentation: <http://www.fil.ion.ucl.ac.uk/spm/doc/>

Also be aware that this software has a very active distribution list where it is possible to get very good support: <http://www.fil.ion.ucl.ac.uk/spm/support/>

2) EXECUTION SCRIPTS

Bash test scripts are included in order to execute the methods and also compute difference images and store deformation fields. Find them in the “testScripts” folder. This scripts also include some of the parameters used for registration in the study presented in the paper. For those not present (mainly number of iterations and MR levels, default values where 1000 and 4, respectively).

3) UTILITY CODE

Image stats, deformation field stats, image difference and some further code for storing transformations in itk format are also provided and are compiled together with ITK based methods. For examples on their usage, see test scripts.

