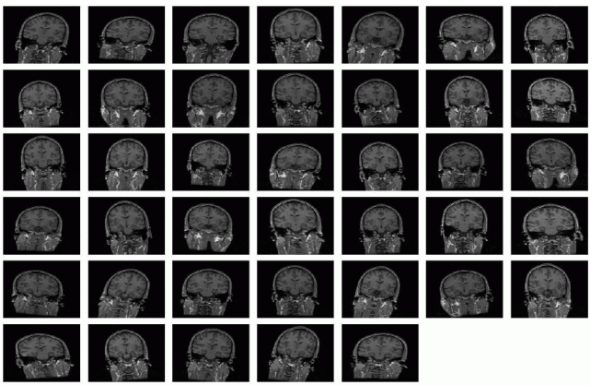
# Master/Diploma Thesis: Simultaneous Deformation of Medical Images

The registration – spatial alignment – of images is of great interest for medical image processing and general computer vision tasks. Often, not just the registration of two images, but the registration of multiple images is needed. An example is the creation of a medical brain atlas, for which a number of brain volumes have to be aligned. Since the human brains vary significantly, a deformable registration or warping between the images is necessary to correctly align the images. The following images (courtesy of L. Zöllei) show 40 brain volumes before and after alignment.

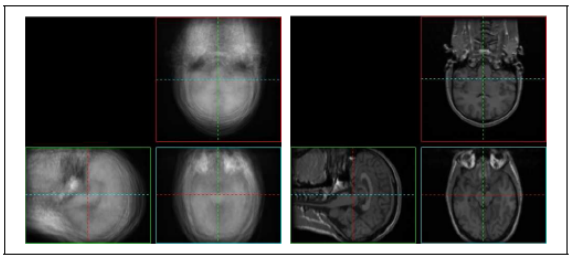


Before Alignment

After Alignment

The registration of the images is necessary for the atlas construction, which basically corresponds to the calculation of the mean. On the image following image the mean before and after the alignment is shown. One can clearly see the improvement and clarity of structures after the alignment.

In the scope of this master or diploma thesis we want to implement a simultaneous deformable registration algorithm. For this purpose, the open source registration toolkit (ITK) will be used, which already provides a huge set of functionalities. This project is matter of current research and of high interest for the research community.



Before Alignment After Alignment

The student should have experience working with C++ and image processing. Moreover, basic mathematical skills are necessary for understanding the underlying theory. This thesis will jointly be supervised by Tom Vercauteren (Mauna Kea Technologies, Paris, France).

Please contact Christian Wachinger (http://campar.in.tum.de/Main/ChristianWachinger , wachinge@in.tum.de) for further information.