Universität Stuttgart

Master Thesis: Development of a Subvoxel Registration Approach for Volume Datesets Generated by Computed Tomography

Introduction

2D/3D image registration is widely studied in the image processing field. Generally speaking, the goal of image registration is to relate any point in image B to the reference image A. In other words, an optimal transformation should be studied which maps any point in the dynamic image sequence to the corresponding point in the reference image. In our application, the 3D image datasets are generated from a sequence of 2D X-ray images. In order to detect the subtle transformation in the object in the long period, the difference volume among the series of datasets should be investigated. Due to the fact that measurements are implemented under different conditions, e.g., at different temperatures, at different locations and etc, subvoxel registration is required to align different volumes so that voxels representing the same structure can be superimposed. The following figure depicts the difference image between the referene image a and image b. The difference image c implies an incorrect registration. However, a better registration is demonstrated in d.

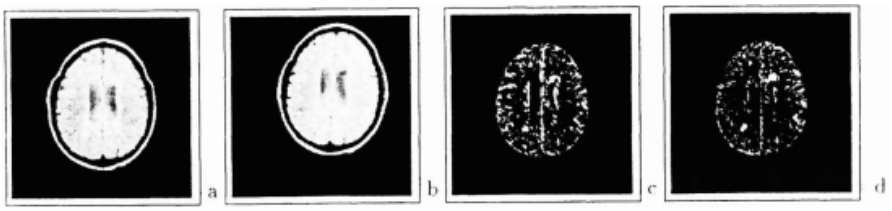

Figure 1: Difference Image after incorrect registration and correct registration.
Source: C. NIKOU, F. HEITZ, J. ARMSPACH, I. NAMERS,
"Single and multimodal subvoxel registration of dissimilar
medical images using robust similarity measures."

The main task of the thesis is to develop and implement a subvoxel registration approach aiming at tracing the transformation of the observed object.

Prerequisite

- Programming experience in C++ is required.
- Interest in image processing.
- Independent and innovative.

Contact person

Kaicong Sun
Phone: +49 711 685 88421, E-mail: Kaicong.Sun@ipvs.uni-stuttgart.de, Room: 2.020
Institute of Parallel and Distributed Systems,University of Stuttgart