



Conformal 2D Registration

Project Management and Software Development
for Medical Applications

General Info

Project Title: Conformal 2D Registration

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Project Abstract,

Using conformal maps for 2D image registration of histological images.

Background and Motivation

2D registration of images is a well-known problem in many medical applications. Established solutions exist for both rigid and deformable cases. However, modeling deformations usually requires a large number of parameters. With this project we aim at studying the applicability of conformal maps, which require a reduced number of parameters, for deformable registration of 2D images. Images of study will be histological slices.

Student's Tasks Description

Students involved in this project will learn about:

- Applying mathematical concepts to medical applications, in particular, conformal maps to image registration.

- Dealing with big (histological) images (opening, visualizing, interpolating, transforming, etc)

- Basics of optimization

The expected outcome is a program that:

- applies a conformal transformation to an image.

- given point correspondences, finds the transformation between two images

-iteratively register images that have undergone deformations.

Technical Prerequisites

Knowledge of Matlab and a strong mathematical background are required

C/C++, and openCV and knowledge in registration and optimization are a plus

Administrative Info

Working Time: 6-8WSW

Project Location: wherever, but we will set up at least one weekly meeting.

Required Equipment: Computer

Timeline and Milestones

28 Oct – Literature Review

12 Nov – Basic transformations implemented

30 Jan – 2D Registration implemented

References

http://www.irisa.fr/prive/barillot/Presentations/IPMI01/DeformableRegistration_fichiers/v3_document.htm

<http://www.youtube.com/watch?v=JX3VmDgiFnY>

<http://www.johno.dk/mathematics/moebius.pdf>

<http://images.math.cnrs.fr/Applications-conformes.html>

Please send the completed document to us (Ralf.stauder@tum.de) before the project proposal deadline, September 30th. Please note that this proposal will be evaluated by the BMC coordinators and will be assigned to a student only in the case of acceptance.