Project Proposal

Validation of vessel width quantification program on various types of fundus images.

1. Introduction

Fundus image is a direct optical capture of the human retina, including landmarks like the optic disk, the macula and, most importantly, the retinal circulation system. The simple and low-cost image acquisition offers great potential for the retina images to be used in large-scale screening programs and relative statistical analysis. Many clinical studies on retinal vascular changes reveal that retinal vessel caliber (width) is significantly associated with the progression of diabetic retinopathy, glaucoma, hypertension and other cardiovascular diseases.

A vessel width measurement program, which is based on the Geodesic Active Contour method, was developed by the RetinaCheck team of the BMIA group. While the robustness and stability of this program have not been validated yet. In clinic, various types of fundus camera were installed, each of which has different imaging modalities, different field of views and different resolutions. Furthermore, due to technical reasons, each image acquired by the same photographer, same camera and on the same subject might still be different from each other. Therefore, before we apply the vessel width measurement program to a large-volume of dataset, where the images were acquired by various fundus cameras, its robustness and repeatability must be validated.

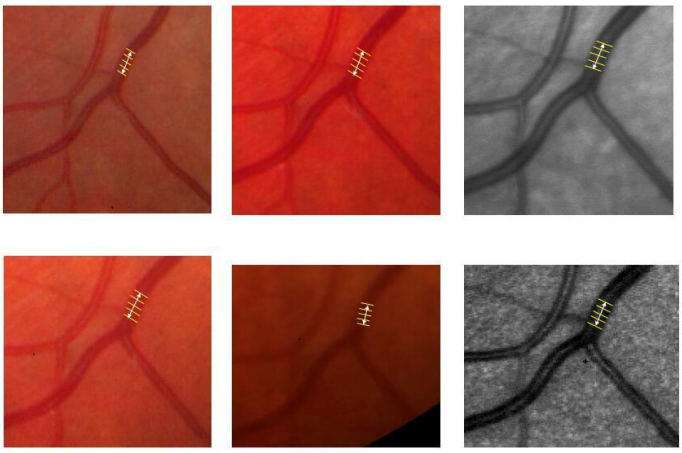

Fig 1. Same retina captured by 6 different fundus cameras.

2. Project Goal

This project is focused on the validation of the vessel width measurement program. During the project, the students will learn the knowledge of retinal image analysis, the knowledge of Geodesic Active Contour method, the skill of Mathematica programming. Additionally, they will acquire data using 6 fundus camera for their research. They will learn and understand the vessel width measurement program, modify it and improve it. They will study the robustness and repeatability of the program. Finally, they will learn how to write a short scientific report independently and give an oral presentation for their works.

3. Student Profile

- Enthusiastic student with background in electrical engineering, biomedical engineering, computer science, or a related field.
- Proficient understanding of Mathematica programming language.
- Sufficient understanding of basic writing skill that can write a short scientific report independently.
- Knowledge of medical image analysis.
- Knowledge of basic mathematics and linear algebra.

4. Contact

For project details, please contact Mr. Fan Huang, MSc..

Room: Gemini-Zuid 3.02, BIOMIM laboratory.

Email: f.huang@tue.nl.