

## Popular science summary of the PhD thesis

PhD student                      Astrid Engberg

Title of the PhD thesis        Quantification of Retinal Microvasculature

PhD school/Department      DTU Compute

## Science summary

\* Please give a short popular summary in Danish or English (approximately half a page) suited for the publication of the title, main content, results and innovations of the PhD thesis also including prospective utilizations hereof. The summary should be written for the general public interested in science and technology:

Some diseases related to the eyes can affect the blood vessels inside the retina. Therefore, it is of interest to study the vasculature in both healthy eyes and eyes with pathological disorders. The blood perfusion of the retina can be imaged using an imaging modality called optical coherence tomography angiography (OCTA). However, the vascular network contains complex anatomical structures and it is difficult to recognize the relevant information. In clinical studies with larger populations, an automatic way of extracting this information is needed. This can be achieved by medical image analysis.

We show that methods from medical image analysis can identify the larger blood vessels and capillaries. This offers information about the size of the vessel thickness and the location of the vasculature. In this thesis, our main contributions have been different methods to extract relevant vascular information from OCTA images, which has been used to study how the blood vessels are affected by different diseases. We were able to measure changes in patients with blood disorders who underwent medical treatment. We also conducted a large study on potential vascular changes in patients before and after cataract surgery, where we observed limited changes in the vasculature, despite an increase in the thickness of the retinal layer. Our proposed methods can be used to study many different types of eye diseases, which may provide more insight into anatomical and physiological changes that might occur in the blood vessels.