

OCT IMAGE SEGMENTATION

Amsterdam UMC, Univ. of Amsterdam, Location Academic Medical Center,
Dept. of Biomedical Engineering and Physics, www.amc.nl/bmep

STUDENT PROJECT

Background

Optical Coherence Tomography is a high-resolution imaging technique that creates 3D structural images based on refractive index changes in the material. Using near-infrared light that penetrates into materials, OCT enables the visualization of structures and layers beneath the surface up to 2 mm in depth. Therefore, OCT is a powerful non-destructive and non-contact tool to image irreplaceable materials in the medical and cultural heritage field.

However, to draw conclusions or determine diagnosis based on OCT images, further processing of the OCT data is needed. A crucial step in data processing is the segmentation of features and layers of interest. To facilitate processing of large data sets, it is required to automatize the segmentation of layers and features.

Research descriptions

Within the collaboration of the Amsterdam UMC and the Rijksmuseum, OCT data has been collected from invaluable paintings of the Dutch Old Masters: Rembrandt and Vermeer. In order to address the question from the art conservators and historians about the imaged paint and varnish layers (e.g. topology and layer thickness) a semi-automated segmentation pipeline has been developed. However, a systematic optimization of the pipeline and input parameters is lacking. The internship involves 1) optimization of the pipeline, 2) review of/comparison to existing segmentation algorithms, 3) processing and segmentation of OCT-data sets to address either art-historical or medical questions dependent on the interest of the student.

Requirements

Bachelor/Master student (physics or engineering sciences) with interest in light tissue interaction, signal analysis, programming. The internship duration can be adjusted according to the curriculum.

Learning outcome

The student will gain knowledge in the field of OCT, light tissue interaction, image segmentation, and programming in Matlab. Furthermore, the student will gain academic competences such as scientific writing, presenting and collaborating in interdisciplinary research.

Contact

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