

Wolf-Dieter Vogl



Research Group: Computational Imaging Research Lab (CIR)
Department: Biomedical Imaging and Image-guided Therapy,
Ophthalmology and Optometrics

Current academic degree: Dipl.-Ing.
Previous University: Technical University of Vienna
PhD Thesis: Modeling disease development with longitudinal
medical imaging data (working title)
Project title: OPTIMA (Ophthalmic Imaging Analysis)

Project description:

In the last two decades medical image analysis became an essential tool for diagnostic radiology. Model based quantitative approaches as well as machine learning methods are used to analyse a large amount of image data in reasonable time, detect and visualize complex correlations and patterns, as well as provide objective and repeatable results, yielding in an increased accuracy of a diagnosis in many cases. Furthermore, a population-based systematic analysis of medical images leads to models describing the variations among a population, but also differences between normal and pathological populations are discovered. They may be used to detect, model and classify pathologies from medical images. Morphological, functional and physiological changes over time in pathologies, due to disease progression or applied treatment, are discovered and qualitatively and quantitatively analysed using follow-up image acquisitions. These spatio-temporal images allow to give a prognosis about individual treatment response and disease progressions. A promising area of research is the analysis of the spatio-temporal data, which covers individual disease progressions, over a whole population. Developing population-wide longitudinal models allows to investigate disease progression, treatment response, and it enables the discovery of distinct sub-groups of progression paths. In this context, the proposed thesis aims in developing spatio-temporal models over a population derived from medical image follow-ups. These models cover the spatial and temporal characteristics of disease progressions. We expect an increase of differential diagnosis accuracy, and early diagnosis, as well as new insights in yet unknown disease subgroups by explorative analysing the population wide longitudinal data.