Master of Science – Biomedical Engineering
Thesis Proposal

Automated Detection of Trochlea Dysplasia in Knee MRI Images Using Deep Learning

The University Children's Hospital Basel (UKBB) is a world leading hospital in the treatment of trochlea dysplasia (TD) – a malformation of the femur.

This thesis at the Center for medical Image Analysis and Navigation (CIAN) in collaboration with the UKBB aims to develop a machine learning model capable of automatically detecting landmarks in knee MRI images to measure TD, specifically focusing on the trochlear angle in a first step. The project will involve

creating algorithms that can accurately identify and mark three critical points on the trochlea to calculate the angle, an important metric in diagnosing the severity of dysplasia. This automation seeks to improve diagnostic accuracy and speed, potentially assisting in the clinical setting for better patient outcomes. DICOM raw datasets are available and ready to work with (3D Axial PD MRI Volumes).

If working robustly, further indication measurements of TD are possible, especially in 3D. This would directly assist the surgeons today in their diagnosis and preoperative planning workflow.
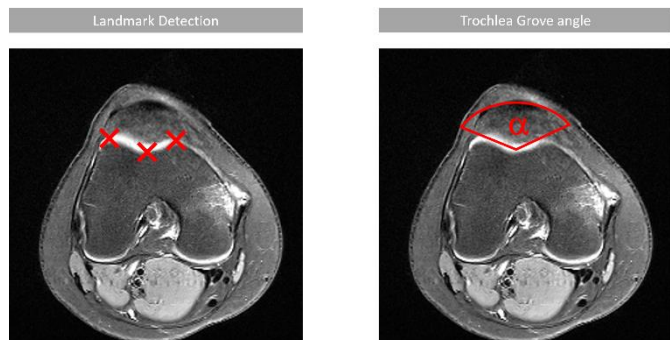
Nature of the Thesis
Programming: 80%, Documentation: 20%

Specific Requirements
Proficiency in Python, experience with machine learning frameworks (e.g., TensorFlow, PyTorch), and familiarity with medical image processing (Lecture Advanced Methods in Medical Imaging can come in handy).

Group Leader / Supervisor
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Collaborators
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