University of Basel
Department of
Biomedical Engineering

University of Basel, Department of Biomedical Engineering, Gewerbestrasse 14, 4123 Allschwil

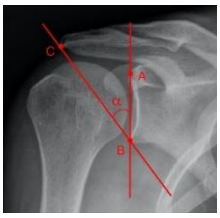
Master of Science – Biomedical Engineering
Thesis Proposal

Automatic registration of anatomical landmarks for comparison of the critical shoulder angle from x-ray and MRI - SNF ARCR prediction

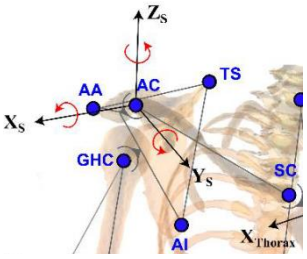
In a Swiss-wide multicentre study the outcomes of arthroscopic rotator cuff repairs of about 1000 patients are analysed. MRIs are performed routinely to get soft tissue information, while radiographs are the gold standard for measuring the critical shoulder angle (CSA). This is usually measured on an anterior-posterior oblique radiograph of the shoulder as the angle subtended by a line parallel to the glenoid and a line through the inferior-lateral edge of the glenoid and the inferior-lateral edge of the acromion. This parameter has been shown to be reproducible and significantly greater in patients with rotator cuff tears than the general population. However, information gathered from a 2D image as the radiograph might be susceptible to errors as correct positioning of patients is challenging. The aim of this study is to develop an algorithm based on deep learning to automatically register specific anatomical landmarks for the measurement of the CSA from MRI. Based on the identification of the CSA landmarks on the MRI will allow to reliably measure the CSA by correcting for the rotation of the patient. The additional identification of others landmarks will also help in an ex-vivo study involving the configuration of a shoulder simulator (ZHAW).

Nature of the Thesis
Programming: 80%
Documentation: 20%

Specific Requirements
Programming skills and deep learning knowledge



CSA



Landmarks

Supervisor
Prof. Dr. Philippe Cattin, University of Basel, Center for medical Image Analysis and Navigation CIAN
https://dbe.unibas.ch/en/research/imaging-modelling-diagnosis/center-for-medical-image-analysis-navigation/

Prof. Dr. Annegret Mündermann, University Hospital Basel, Functional Biomechanics Laboratory,
www.unispital-basel.ch/biomechanics

Collaborators
Prof. Dr. med. Andreas Müller, Dr. Cornelia Baum, Eleonora Croci M.Sc., PhD. Candidate, Jeremy Genter M.Sc., PhD Candidate, Balázs Faludi, M.Sc., PhD Candidate, Carlo Seppi, M.Sc., PhD Candidate

Contact
Prof. Dr. Philippe Cattin: philippe.cattin@unibas.ch
Eleonora Croci M.Sc., eleonora.croci@unibas.ch, Tel. 061 328 5445

University of Basel
Department of Biomedical Engineering
Gewerbestrasse 14
4123 Allschwil, Switzerland

Prof. Philippe C. Cattin
Center for medical Image Analysis and
Navigation (CIAN)
T +41 61 207 54 00
philippe.cattin@unibas.ch