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Introduction(abstract)

The study of tibiofemoral kinematics often employs three-dimensional MRI datasets to accurately capture the complex motion patterns of the knee joint [1]. Typically, these studies require a combination of static and dynamic

scans, alongside sophisticated modelling techniques and algorithms to extract kinematic parameters [2]. While this approach is comprehensive, it is time intensive; other alternatives may simplify and hasten the acquisition and analysis.

This study introduces a semi-automated pipeline designed to segment the tibia and femur during knee flexion-extension cycles from single slice CINE images in the sagittal view, and to track kinematic parameters from these segments. By bypassing the need for high-resolution static scans and complex computational approaches like machine learning, this streamlined process offers a practical, less resource-intensive alternative for conducting kinematic assessments.

Introduction(poster)

This study utilizes a novel MRI-compatible device designed to facilitate controlled, repetitive knee flexion-extension cycles [1,2]. Equipped with an optical sensor to synchronize motion data, the device enables the precise reconstruction of CINE MRI images that capture the knee during these movements, as illustrated in **Fig. 1**. Traditional kinematic analyses often rely on on manually segmenting each frame to track the tibia and femur which can be prone to inaccuracies. To address these challenges, we developed a semi-automated segmentation pipeline that segments the tibia and femur across the motion cycle with minimal manual intervention.

Methods

Results

Discussion