A System for Unsupervised Extraction of Orthopedic Parameters from CT Data

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The request for software assistance is increasingly gaining importance in the field of orthopedic surgery. In the near future more people will need implants, which have to last longer. New developments in computer assisted therapy planning promise to significantly reduce the number of revisions and increase the longevity of an implant. For example the computation of the functional outcome of a total knee replacement by prediction of kinematics may provide important guidance during surgery. Speed, accuracy and as little manual interaction as possible are the key factors that such applications find their way into clinical routine.

We present a system to make individual anatomical features readily available for therapy planning in orthopedics. This includes automatic segmentation and reconstruction of patient-specific geometrical models, especially the bony anatomy of the lower limb, as well as anatomical landmarks of the respective anatomical region. Our software assistant for decision support in orthopedic surgery based on ZIB-AMIRA, a software for scientific visualization and data analysis (see http://amira.zib.de/).

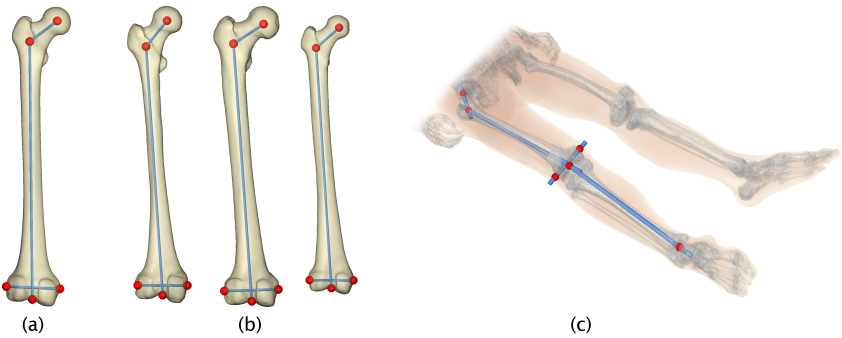

Figure 1: A statistical shape model of the femur including important landmarks (red) defined relative to the femur surface (a). Changing the shape parameters (b, T) morphs the landmark and axes geometry by means of Mean Value Coordinates (b). Adaptation of the model to image data allows for direct extraction of anatomical point landmarks and surfaces reconstructions (c).