Segmentation of Articular Knee Cartilage Based on Radial Transform

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ABSTRACT

Osteoarthritis(OA) is a common chronic joint disease, which cause the thickness of the knee cartilage to become thinner gradually. Patients with OA usually require long-term observation and treatment. MRI(Magnetic Resonance Imaging), a non-invasive technology, allows doctors to have a precise examination of the articular knee cartilage, and thus become suitable for OA treatment. Accurate segmentation of the articular knee cartilage is crucial to the measurement of cartilage thickness and its clinical diagnosis and treatment. Various segmentation algorithms, such as Active Contour model, B-spline and GVF, have been presented in the literature. However, these methods are usually based on complicated computation and difficult to implement or understand.

In this paper, a cartilage segmentation method based on radial transformation is proposed. A radial transformation is the process of generating a new image, called a radial image, by resampling the original image in a radial approach. The cartilage boundary is initially determined on the radial image, and then transformed back to the original image. The cartilage boundary on the original image still requires a slight deformation for more precise results due to digitization effects. Our approach considers only one-dimensional data during the initial segmentation process, and thus simplifies the cartilage segmentation procedure. The prior knowledge about knee cartilage anatomy has been incorporated into the radial transformation to obtain better results.

Keywords : image segmentation、osteoarthritis、articular knee cartilage、radial transformation

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