Semi-Automated Segmentation Improves Knee MRI

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Technology description

Magnetic resonance imaging (MRI) provides high-resolution visualization of soft tissues, allowing diseases to be diagnosed and tracked. In particular, MR images can be used to assess joint degeneration in clinical practice and osteoarthritis studies. For example, 3-D maps of knee joints help track small changes in cartilage thickness due to osteoarthritis over time. Standard X-ray technology can only identify cartilage thinning in the late stages of the disease.

A technique called segmentation is an important part of the MR process and is used to measure cartilage thickness across the knee's entire articulating surface. Traditionally, segmentation involves scrolling through stacks of images and manually identifying cartilage tissue. This approach is extremely time consuming and imprecise.

Several computer-based alternatives have been developed but all have drawbacks such as requiring pre-stored information about knee shape. As a result, such techniques are not clinically practical and are not utilized to diagnose early-stage osteoarthritis. UW–Madison researchers have developed a semi-automated segmentation technique for 3-D MRI. The technique is particularly suitable for articular joint tissues, like knee cartilage, that are tough to delineate.

With the new technique a user selects a few specific points in a medical image. The points generate image intensity profiles along linear projections, which can be used to determine the boundaries of the target tissue. The volume contours of segmented tissues may then be constructed by processing a series of image slices.
The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a faster, more accurate segmentation technique for 3-D MRI of cartilage.

Application area

Analyzing articular cartilage
Diagnosing and monitoring diseases like osteoarthritis
Post-processing MR software

Advantages

Faster segmentation
Improves accuracy and reproducibility
Simplifies user input

Institution

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