Medical Imaging

Elastography Method for Parallel Processing of Tissue Displacement Estimates

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved method of producing tissue displacement estimates for ultrasound elastography.

Overview

Ultrasonic elastography reveals disease properties of tissue that go undetected with conventional ultrasound. It accomplishes this by imaging the stiffness properties, or strain, of tissues under compression.

Elastography commonly acquires one image before a tissue is externally compressed by the ultrasound operator and a second after tissue deformation. To produce the final strain image, an analysis identifies corresponding points in the pre- and post-compression image data sets and calculates the amount of displacement between them. Ideally, this processing should occur in real-time, so that ultrasound operators receive immediate feedback on image quality and can adjust their scanning technique if necessary.

The Invention

UW-Madison researchers have developed a method to calculate the displacement between pre- and post-deformation data sets that is suited to parallel computer processing and can thus provide real-time elastographic images. The technique's fundamental innovation is that it tracks motion between pre- and post-deformation signals along columns of tissue running parallel to the ultrasound beam, rather than along rows as in previous methods. Unlike row-by-row calculations, which must occur in sequence, column-by-column computations are largely independent of one another, making parallel processing possible.

Applications

- Ultrasound elastography

Key Benefits

- Allows parallel computer processing of image data, paving the way toward real-time, 3-D/4-D elastographic imaging
- Decreases computational load of strain image formation by reducing the size of search windows and kernels used to identify corresponding points in pre- and post-deformation images
- Produces tissue displacement estimates that are less sensitive to secondary analysis parameters, such as the starting point in the region of interest
- Preliminary numerical simulations found the method yields smaller variances for displacement estimates, suggesting it may provide better spatial resolution and less noisy images
- Avoids the problem of "collisions," in which errors in calculations for individual rows of tissue are propagated within groups and produce discontinuities when the groups meet at interfaces

Additional Information

For More Information About the Inventors

- Timothy Hall

Tech Fields

- Medical Imaging : Ultrasound

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846