

Real-Time 3-D Elastography

Published date: March 14, 2017

Technology description

Elastography is a type of imaging technique that reveals the stiffness of tissues. It commonly is used to detect tumors and other abnormalities that cause changes in local tissue stiffness. Measurements can be output as values or displayed as an image.

The stiffness values or maps produced in this way can be utilized to monitor radiofrequency (RF) or microwave ablation. During ablation—when an electrode is inserted into tissue to kill tumor cells—ultrasound data can be used to produce 3-D elasticity images of the hardened lesion. However, the process can be time-consuming, especially when multiple images must be obtained at each location.

UW–Madison researchers previously developed a reconstruction technique, dubbed SOUPR, for rapid 3-D elasticity imaging using limited data (see WARF reference number P130117US01). In their technique, a probe sends an ultrasonic beam of energy into tissue and receives echoes from the displaced material. Ultrasound data is acquired over a set of planes. A computer receives the ultrasound data, determines elasticity and generates a 3-D reconstruction. The researchers have now developed an enhancement to their technique that works especially well with a 2-D ultrasound array to provide real-time 3-D imaging. The improvement derives from a new reconstruction scheme that uses sparse data.

The new scheme imposes two key requirements – interpolation and smoothing. Essentially, raw ultrasonic echo data is acquired over many imaging planes. Then, an efficient algorithm tracks frame to frame displacement of the underlying tissue at each pixel in the imaging plane. Mechanical properties such as strain can be estimated by a calculation along the ultrasound scan line direction. The 3-D reconstruction algorithm rapidly reconstructs a complete 3-D visualization from a sparse collection of scattered data points.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method for rapidly acquiring 3-D elasticity reconstructions for use in ablation therapy.

Application area

Elastography software; especially suited for 2-D ultrasound arrays

Interventional procedures like RF ablation

Vascular imaging

3-D visualization of other important tissue properties (e.g., shear wave velocity, shear stiffness, Young' s modulus, temperature, etc.)

Advantages

Works in real time, even for 3-D grids with millions of grid points

Enables fast imaging in specific regions of interest, rather than waiting until all the data is collected

Solves a complete 3-D visualization problem in one sweep

Institution

[Wisconsin Alumni Research Foundation](#)

Inventors

[Atul Ingle](#)

[Tomy Varghese](#)

联系我们



叶先生

电话 : 021-65679356

手机 : 13414935137

邮箱 : yeyingsheng@zf-ym.com