A method for improving ultrasound imaging: Multi-covariate Imaging of Sub-resolution Targets (MIST)

Value Proposition

Ultrasound imaging has a plethora of applications, both in the medical domain as a diagnostic imaging modality as well as the industrial domain for non-destructive testing. The potential benefits of ultrasound imaging, however, are often limited due to poor image quality. The ability to identify fine structures in ultrasound images can be degraded due to their characteristic speckle texture as well as artifacts arising from electronic noise and clutter-generating sources such as multiple scattering and sound speed variations. Conventional methods to generate ultrasound images often fail to adequately address the phenomena that degrade image quality.

Technology

Duke inventors have developed a method for achieving higher quality ultrasound images. This invention is intended to improve the clarity of ultrasound images for use in clinical settings. This new approach utilizes a novel coherence estimation-based approach called Multi-covariate Imaging of Sub-resolution Targets (MIST) that results in higher quality ultrasound images with smoother texture and improved contrast-to-noise ratio by imaging the statistical properties of diffuse scattering targets. MIST has experimentally demonstrated the improvement of ultrasound images collected in simulation, phantom, and in vivo liver & fetal applications compared to conventional beamforming methods.

Advantages

- Improves target detectability, maintains the native contrast of the imaging target, and improves speckle texture without a loss in resolution in ultrasound images
- Demonstrates consistent improvements in image quality across a range of noise levels and patient body areas, including fetal and liver
- Increases the diagnostic value and utility of ultrasound imaging
Publications

- Multi-covariate Imaging of Sub-resolution Targets (IEEE Transactions on Medical Imaging, 2019)