

Purpose:

To develop a simple and reliable method of detection of lost or reduced sensitivity elements in diagnostic ultrasound arrays through analysis of the systematic features evident in appropriately acquired cine-loops

Methods:

An algorithm was developed to detect the systematic features produced by element/channel signal loss evident in a cine-loop acquired with a random background signal: A temporal median of the cine-loop is produced followed by construction of a profile defined as the mean over depth [column-wise mean] within a horizontal strip of the median image. A modified anisotropic diffusion filter is applied to the profile to isolate outlying features from characteristic noise, and simple statistical methods are then used to identify regions of the profile which exhibit characteristics of reduced sensitivity elements such as well-defined, symmetric troughs.

With an element occluded by fishing line to simulate dropout, cine-loops were acquired with a GE-Logiq 9 scanner either by rapidly scanning a transducer over a tissue mimicking phantom or by placing the transducer in a liquid phantom composed of an agitated cornstarch and water suspension.

Results:

Analysis with the algorithm clearly revealed the occluded section of the array as well as previously unnoticed reduced-sensitivity elements. The efficacy of a simple and inexpensive method of detecting lost or reduced sensitivity elements of diagnostic ultrasound arrays was demonstrated in a confined dataset. The algorithm has been developed into an ImageJ plugin which presently handles uncompressed DICOM data containing rectangular scan regions; this should soon be made available for use by the medical ultrasound community after testing by Ultrasound Subcommittee members.

Conclusions:

Funding Support, Disclosures, and Conflict of Interest:

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