AbstractID: 8349 Title: An automatic region detection algorithm for analyzing Module 1 of the ACR CT accreditation phantom

Purpose: A region identification algorithm has been developed to facilitate the automatic analysis of Module 1 of the ACR CT accreditation phantom.

Method and Materials: The ACR CT accreditation phantom was scanned using a GE Lightspeed QX/i scanner, and a preliminary algorithm was developed to identify the centers of the air and bone-mimicking areas in Module 1 of the phantom. The air and the "bone" regions in the CT image were first isolated by binarizing the image with a threshold of −500 and 800 HU, respectively. Next, a Canny edge detector was applied to the air-only binary images to detect the edges, and the center of the phantom was then identified using a Hough-based circular object detection algorithm. Lastly, the edge of the phantom was removed and the center of the air-only region is subsequently detected. A similar procedure was used to identify the center of the "bone" region.

Results: To assess the algorithm, the CT image from Module 1 of the ACR CT phantom was computationally rotated to various orientations. The centers of the air and "bone" regions were then located using the preliminary algorithm. The resulting averages for both regions were very reproducible (within 1 HU).

Conclusions: The preliminary results above have demonstrated that the algorithm can robustly identify the centers of the air and bone regions. Once the centers of these two regions are located, the required ROIs can be extracted from the original CT image, and the required statistics computed. Since the phantom is a rigid object, this implies that the other areas of interest in Module 1 can be easily identified. This will be demonstrated in the presentation.