AbstractID: 10220 Title: A Novel Boundary Tracking Method for Metal Artifact Suppression in Helical CT Imaging

Purpose: One of the major challenges for metal artifact suppression in CT lies in the accurate detection of metal regions either in image space or projection space. In this work, we proposed a novel, semi-automatic boundary tracking scheme based on dual-front active contour models and boundary mapping strategy to detect the metal regions on reformatted projection data, and to effectively suppress metal artifacts on reconstructed images. **Methods and Materials:** We first created reformatted projections from multi-slice helical scan by combining data at the same angle view over the full longitudinal scan range. The shapes, locations, and number of metal objects can be easily identified from every single reformatted projection. Since the shape of the metal projections only changes slightly between adjacent projections, the segmented boundary from the first reformatted projections can be mapped to the next projection, and used as the initialization of the dual-front active contour model to find the actual metal object boundary in the current projection within only a couple of iterations with an automatic stop criterion. After detecting the metal implants on all the reformatted projections, a Delaunay triangulation was applied to fill the metal shadows. Finally, the image was reconstructed using commercially available reconstruction algorithms for multi-slice helical CT. **Results:** Patient studies were performed to evaluate the proposed method. Four cases were corrected, including three abdominal exams with hip prosthesis, and one musculoskeletal exam with shoulder prosthesis. The results demonstrated that the proposed method can suppress metal artifacts efficiently and effectively. **Conclusions:** A novel boundary tracking method was proposed for metal artifact suppression in multi-slice helical CT. This method incorporates the information of shape and location of metal implants into the boundary tracking procedure, which can handle multiple metal implants with various sizes and shapes, and can improve the segmentation accuracy and artifact suppression.