

CROSS: Cross-domain Residual-Optimization Based Structure Strengthening Reconstruction for Limited-Angle CT

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Due to the page limitation of the main paper body, we provide the simulated data reconstruction accuracy in the cone-beam geometry and the comparison between CORSS and 3D-CROSS.

A. Simulated Data Reconstruction Accuracy with Cone-beam Geometry

The 3D volume reconstructed in this paper has a size of $512 \times 512 \times 200$, and it is well-known that the FDK algorithm will lead to cone-beam artifacts. So, to overcome this problem, we only select the central 120 slices for the experiments. Fig. 1 demonstrates the Mean Absolute Error (MAE) at different slices between the origin phantom images and the images reconstructed from the full-view projection data using the FDK algorithm. It can be seen that the reconstructed slices far away from the central slice have large MAE values. This is because they are degraded with cone-beam artifacts. Noticeably, as pointed out by the red arrow, the selected 120 slices have very small MAE values which means these slices are very close to the high-quality images and also can be treated as cone-beam-artifact-free results.

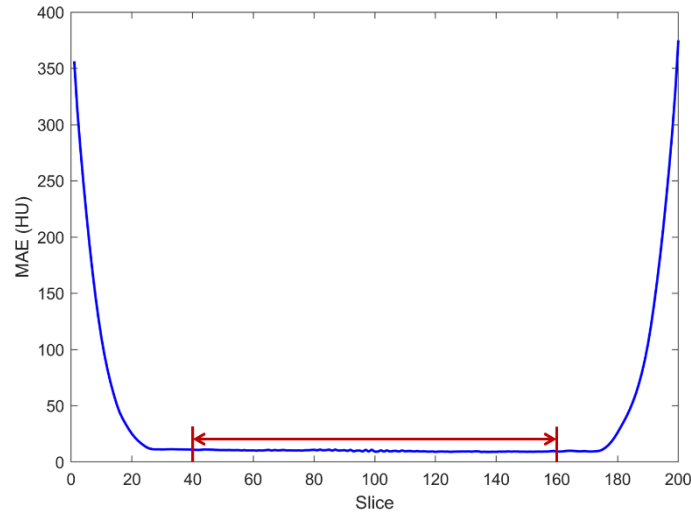


Fig. 1. MAE at different slices between origin phantom images and images reconstructed from full-view projection data.

B. Comparison between CORSS and 3D-CROSS

Fig. 2 gives the representative coronal and sagittal view of CROSS and 3D-CROSS methods. Again, the proposed CROSS method works well in artifact reduction and structure preservation. Further, the 3D-CROSS can suppress horizontal artifacts at adjacent slices.

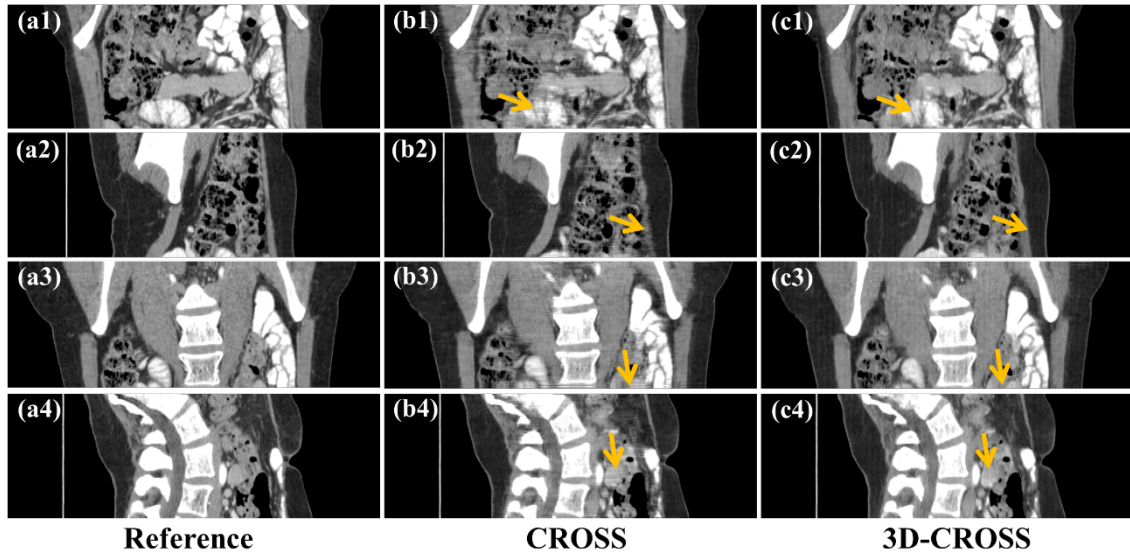


Fig. 2. Selected coronal views and sagittal views from the simulated dataset with a scanning angular range of 110° . (a1)-(a4) Reference images reconstructed by FDK algorithm from full-sampled projection data, (b1)-(b4) images processed by CROSS method, (c1)-(c4) images processed by 3D-CROSS. The display window is $[-140, 240]$ HU.