

Comparison of Reconstruction Algorithms for Spiral Scan Echo Planar Imaging (SEPI)

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Purpose: Recently lots of research and development activities have been focused on MR fast imaging techniques such as echo planar imaging and spiral scan imaging. Since the trajectory of the spiral scan in k-space is the spiral, reconstruction of the spiral scan is not as straight forward as the Fourier imaging technique where the sampling points are on the rectangular grids. Originally the reconstruction of the spiral scan imaging was proposed based on the convolution backprojection algorithm used in CT with a shift terms¹, however, some other reconstruction techniques have also been tried by remapping sampling points from spiral trajectory to Cartesian grids. In this paper, the two reconstruction algorithms with some variations are investigated with simulation data and their reconstruction performances are compared. Accuracy of the reconstruction based on the different algorithms will be addressed.

Results: Two reconstruction algorithms and their derivatives are investigated to evaluate their accuracies in the reconstruction in terms of full width at half maximum, mean square error, and signal-to-noise ratio.

Conclusion: To what extent the accuracy of the reconstruction is dependent on the algorithm will be addressed.

[1] C.B. Ahn, J.H. Kim, and Z.H. Cho, "High-speed Spiral-scan Echo Planar NMR Imaging-I," IEEE Trans. Med. Imag., Vol. 5, pp. 2-7 (1986).