Compressed Sensing MRI Reconstruction using a Generative Adversarial Network with a Cyclic Loss

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Abstract

Instead of using the Compressed Sensing MRI (CS-MRI) which provided the theoretical foundation of accelerating the tie consuming MRI, they proposed a deep learning based GAN which is RefineGAN for fast and accurate CS-MRI reconstruction which employs deeper generator and discriminator networks with cyclic data consistency loss for interpolation of given under sampled k-space data.

Introduction

Magnetic Resonance Imaging (MRI) is widely used due to its non-intrusive, high-resolution, and safe to living organisms, but its long acquisition time causes discomfort to patients.

CS-MRI primarily focused on applying predefined universal sparsifying transforms, such as the discrete  
Fourier transform (DFT), discrete cosine transforms (DCT), total variation (TV), or discrete wavelet transform (DWT)

The proposed method builds upon several state-of-the-art deep neural networks, such as convolutional autoencoder, residual networks, and generative adversarial networks (GANs), with novel *cyclic loss* for data  
consistency constraints that promotes accurate interpolation of the given under sampled *k*-space data

Survey

They assume that the target MRI data type is static and radial sampling masks are applied. Additional data preparation steps such as data range normalization and imaginary channel concatenation are also required.