

F-VarNet: Fast Variational Network for MRI Reconstruction

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Abstract : Magnetic resonance imaging (MRI) is a long medical scan that stems from a long acquisition time. This length is mainly due to the traditional sampling theorem, which defines a lower boundary for sampling. However, it is still possible to accelerate the scan by using a different approach, such as compress sensing (CS) or parallel imaging (PI). These two complementary methods can be combined to achieve a faster scan with high-fidelity imaging. In order to achieve that, two properties have to exist: i) the signal must be sparse under a known transform domain, ii) the sampling method must be incoherent. In addition, a nonlinear reconstruction algorithm needs to be applied to recover the signal. While the rapid advance in the deep learning (DL) field, which has demonstrated tremendous successes in various computer vision task's, the field of MRI reconstruction is still in an early stage. In this paper, we present an extension of the state-of-the-art model in MRI reconstruction -VarNet. We utilize VarNet by using dilated convolution in different scales, which extends the receptive field to capture more contextual information. Moreover, we simplified the sensitivity map estimation (SME), for it holds many unnecessary layers for this task. Those improvements have shown significant decreases in computation costs as well as higher accuracy.

Keywords : MRI, deep learning, variational network, computer vision, compress sensing

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