

PIMA-project :

Traditional or generative supervised method for MRI Restoration?

For January 2025

1 Purposed project

Magnetic resonance images (MRI) are subject to patient movements during acquisition, leading to blurry or noisy images and generating a constraint on their interpretation. This is a specific drawback for spinal cord images, where respiratory movements may hind a lesion in this particular little structure [4]. Traditional restoration methods such as support vector machine (SVM) [8, 5], face challenges in this context due to the lack of ground truth data.

Recently, deep learning approaches has been explored to restore MRI images [7] including direct restoration of spinal cord images during acquisition [1]. However, these restorations methods can still exhibit instability [2] and are primarily designed for real-time applications.

A variety of methods has already been implemented to restore images after their acquisition. Among them, Noise2Self has emerged as a prominent self supervised approach [3] and since 2014, GAN-based implementation, such as DANet, have demonstrated effectiveness in denoising images through generative processes [6].

Despite the availability of numerous new methods, a comprehensive comparison of their performance on spinal cord MRI images has not been conducted.

In this project you will implement SVM based approach and DANet [6] to restore MRI images in a traditional and generative supervised way after understanding their underlying principles. Subsequently, you will compare the results of the methods thanks to various metrics (PSNR, SSIM, etc.) [2].

2 Contact

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References

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