PNN: FROM PROXIMAL ALGORITHMS TO ROBUST UNFOLDED IMAGE RESTORATION

NELLY PUSTELNIK

A common approach to solve inverse imaging problems relies on finding a maximum a posteriori (MAP) estimate of the original unknown image, by solving a minimization problem. In this context, iterative proximal algorithms are widely used, enabling to handle non-smooth functions and linear operators. Recently, these algorithms have been paired with deep learning strategies, to further improve the estimate quality. In particular, proximal unfolded neural networks (PNNs) have been introduced, obtained by unrolling a proximal algorithm as for finding a MAP estimate, but over a fixed number of iterations, with learned linear operators and parameters.
In this presentation, I will focus on proximal unfolded primal-dual algorithms with variations when considering either a denoising task or a restoration one. The robustness (Lipschitz property) is also investigated. Additionally, I will discuss the performance of proximal unfolded primal-dual methods for studying circumstellar environment within high-contrast imagery, offering insights into their adaptability and effectiveness across different levels of complexity.