# MaLGa COLLOQUIA

Monday 17th April, 16:00
Room 704 @ DIMA, Via Dodecaneso 35

## Fast unrolled proximal algorithms to design stable and efficient neural network architectures


## Abstract

Deep learning has revolutionized many image processing tasks including inverse problems. However, it remains a gap between the black-box deep learning approaches and the more recently unrolled deep learning techniques proposed to bring the physics of the model and standard variational approaches into the network design. In this talk, we explore the possibility to integrate knowledge about proximal algorithms, especially fast procedures, in order to design more efficient and robust neural network architectures. We place ourselves in the classical framework of image denoising and we study four unrolled architectures designed from forward-backward iterations in the dual, FISTA in the dual, Chambolle-Pock, and Chambolle-Pock exploiting the strong convexity. Performance and stability obtained with each of these networks will be discussed. A comparison between these architectures and state-of-the-art black-box approaches is also provided.


## Speaker


### Nelly Pustelnik

**CNRS, ENS de Lyon**


Nelly Pustelnik completed a PhD in Signal and Image Processing, at Université Paris-Est in Marne-la-Vallée in 2010. She is a CNRS researcher scientist at the Physics department of Ecole Normale Supérieure de Lyon since 2011. She was a visiting professor between 2019 and 2022 at the Mathematical Engineering department of UCLouvain. She serves as an Associate Editor for IEEE TIP and is senior AE for IEEE SPL since 2021. She has been involved in EURASIP and IEEE committees dedicated to Machine Learning and Signal Processing. Her current research interests include image analysis including inverse problem solving, change point detection, and texture segmentation. An important part of her research interests is dedicated to non-smooth optimization, proximal algorithms, and more recently deep unfolded schemes. Beyond theoretical developments, Nelly Pustelnik shows a strong interest into real-world applications, recently dedicated to physics including astrophysics.

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