



THE WEIZMANN INSTITUTE OF SCIENCE  
FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 1 ,Ziskind Building  
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at 12:15

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## Image Restoration by Iterative Denoising and Backward Projections

Abstract:

Inverse problems appear in many applications, such as image deblurring, inpainting and super-resolution. The common approach to address them is to design a specific algorithm (or recently - a deep neural network) for each problem. The Plug-and-Play (P&P) framework, which has been recently introduced, allows solving general inverse problems by leveraging the impressive capabilities of existing denoising algorithms. While this fresh strategy has found many applications, a burdensome parameter tuning is often required in order to obtain high-quality results. In this work, we propose an alternative method for solving inverse problems using off-the-shelf denoisers, which requires less parameter tuning (can be also translated into less pre-trained denoising neural networks). First, we transform a typical cost function, composed of fidelity and prior terms, into a closely related, novel optimization problem. Then, we propose an efficient minimization scheme with a plug-and-play property, i.e., the prior term is handled solely by a denoising operation. Finally, we present an automatic tuning mechanism to set the method's parameters. We provide a theoretical analysis of the method, and empirically demonstrate its impressive results for image inpainting, deblurring and super-resolution. For the latter, we also present an image-adaptive learning approach that further improves the results.