מכון ויצמן למדע

# THE WEIZMANN INSTITUTE OF SCIENCE

## FACULTY OF MATHEMATICS AND COMPUTER SCIENCE

Vision and Robotics Seminar

Room 155 ,Ziskind Building
on Thursday, Nov 28, 2019
at 12:15

PLEASE NOTE THE UNUSUAL PLACE

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## Blind Super-Resolution Kernel Estimation using an Internal-GAN

Abstract:

Super resolution (SR) methods typically assume that the low-resolution (LR) image was downscaled from the unknown high-resolution (HR) image by a fixed "ideal" downscaling kernel (e.g. Bicubic downscaling). However, this is rarely the case in real LR images, in contrast to synthetically generated SR datasets. When the assumed downscaling kernel deviates from the true one, the performance of SR methods significantly deteriorates. This gave rise to Blind-SR - namely, SR when the downscaling kernel ("SR-kernel") is unknown. It was further shown that the true SR-kernel is the one that maximizes the recurrence of patches across scales of the LR image. In this paper we show how this powerful cross-scale recurrence property can be realized using Deep Internal Learning. We introduce "KernelGAN", an image-specific Internal-GAN, which trains solely on the LR test image at test time, and learns its internal distribution of patches. Its Generator is trained to produce a downscaled version of the LR test image, such that its Discriminator cannot distinguish between the patch distribution of the downscaled image, and the patch distribution of the original LR image. The Generator, once trained, constitutes the downscaling operation with the correct image-specific SR-kernel. KernelGAN is fully unsupervised, requires no training data other than the input image itself, and leads to state-of-the-art results in Blind-SR when plugged into existing SR algorithms.