

Multi-view Self-supervised Disentanglement for General Image Denoising

Hao Chen¹, Chenyuan Qu¹, Yu Zhang², Chen Chen³, Jianbo Jiao¹

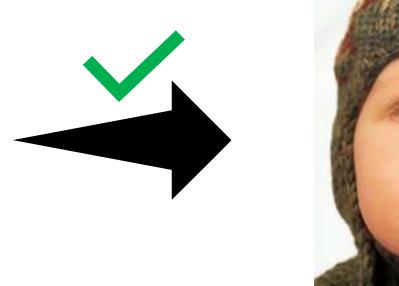
¹University of Birmingham, ²Shanghai Jiao Tong University, ³University of Central Florida



Existing Methods

Seen distribution

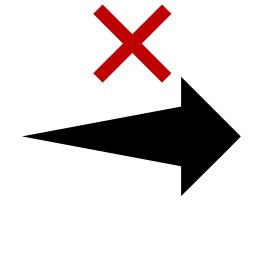






Unseen distribution

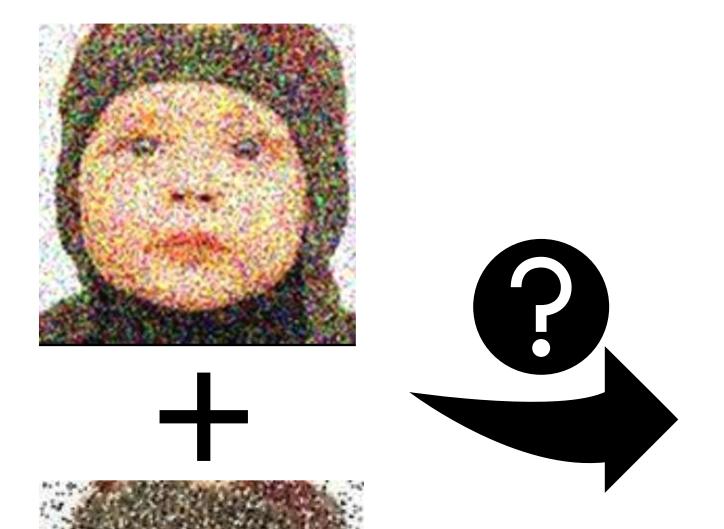


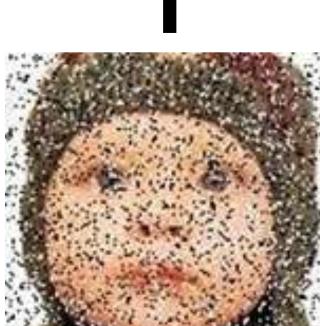




Motivation

Different noisy views share the same clean latent









23.68/ 0.2967

Noisy Image from SIDD (ISO800)



28.58/ 0.6081

N2S [4]

PSNR/SSIM

Ground Truth

Performance

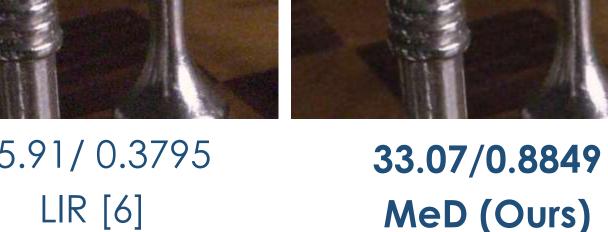


31.38/ 0.8912

R2R [5]



30.19/ 0.7449



29.60/ 0.7053

N2N [3]

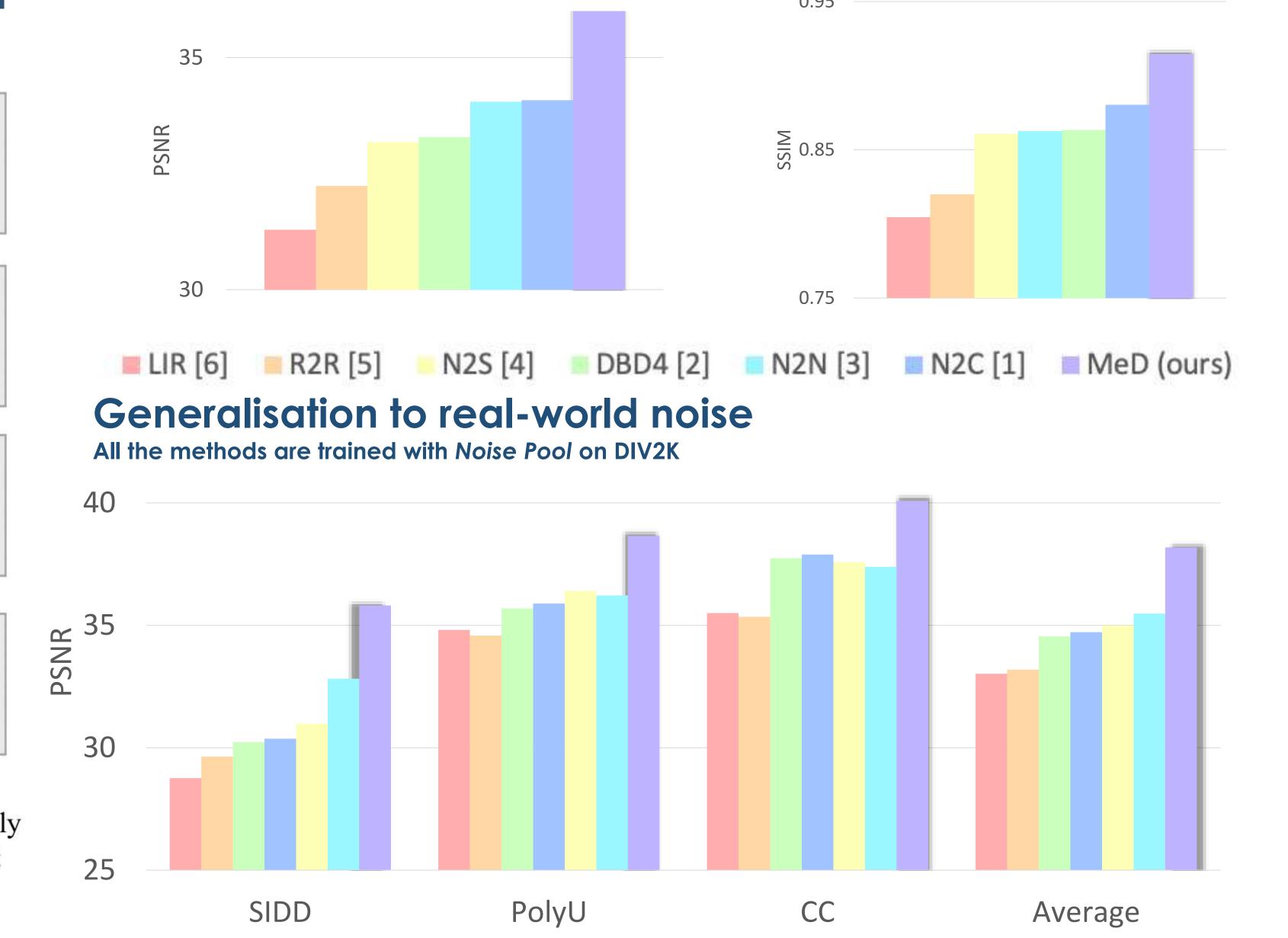
MeD (Ours)

Overview

Image Reconstruction Representation Learning Noise Reconstruction Loss $||(y_1^k-\eta_1^k)-y_2^k||
ightarrow \left\|\left(lacksquare -lacksquare -la$ Bernoulli Manifold Scene Reconstruction Loss **Noise Pool** Gaussian Speckle Salt and Pepper Local Variance Gaussian Cross Compose Loss Mix Scene Reconstruction Loss \bigcirc From y_1^k \bigcirc From y_2^k Noise Task

Noise Pool on CBSD68

All the methods are trained with randomly drawn noise from the Noise Pool



References

- [1] Liu, Ze, et al. "Swin transformer: Hierarchical vision transformer using shifted windows." ICCV. 2021.
- [2] Godard, Clément, Kevin Matzen, and Matt Uyttendaele. "Deep burst denoising." ECCV. 2018.
- [3] Lehtinen, Jaakko, et al. "Noise2Noise: Learning image restoration without clean data." arXiv preprint arXiv:1803.04189 (2018).
- [4] Batson, Joshua, and Loic Royer. "Noise2self: Blind denoising by selfsupervision." ICML. 2019.
- [5] Pang, Tongyao, et al. "Recorrupted-torecorrupted: Unsupervised deep learning for image denoising." CVPR. 2021.
- [6] Du, Wenchao, Hu Chen, and Hongyu Yang. "Learning invariant representation for unsupervised image restoration." CVPR. 2020.