“Plug-In SGD: Using Learned Priors for Large-Scale Image Formation”

Thursday, November 29, 2018 3:30-4:20 PM Room 2217 SC

Abstract: Plug-and-play priors (PnP) is a powerful framework for regularizing imaging problems by using advanced denoisers (such as those based on deep neural networks) within an iterative algorithm. Recent experimental evidence suggests that PnP algorithms achieve state-of-the-art performance in a range of imaging applications. In this talk, we introduce a new online PnP algorithm that use only a subset of measurements at every iteration. This makes the algorithm scalable to very large datasets. We present a new theoretical convergence analysis, for both traditional and online variants of PnP, for denoisers that do not necessarily correspond to proximal operators. We also present simulations illustrating the applicability of the algorithm to image reconstruction in Fourier ptychographic microscopy (FPM) and optical diffraction tomography (ODT). The results we present have the potential to expand the applicability of the PnP framework to very large and redundant datasets. This talk is based on the recent manuscript: https://arxiv.org/abs/1809.04693.

Bio: Ulugbek S. Kamilov is an Assistant Professor and the Director of Computational Imaging Group (CIG) at Washington University in St. Louis (WashU). He obtained his Ph.D. in Electrical Engineering in 2015 from École polytechnique fédérale de Lausanne (EPFL), Switzerland. From 2015 to 2017, Prof. Kamilov was a Research Scientist at Mitsubishi Electric Research Laboratories (MERL), Cambridge, MA, USA. His main research area is computational imaging with a strong emphasis on biomedical applications. He has a strong interest in signal and image processing, large-scale optimization, machine learning, and statistical inference.

Prof. Kamilov is recipient of the IEEE Signal Processing Society’s 2017 Best Paper Award (with V. K. Goyal and S. Rangan). His Ph.D. thesis was selected as a finalist for the EPFL Doctorate Award in 2016. His work on Learning Tomography (LT) was featured in Nature “News and Views” in 2015. Prof. Kamilov is a member of IEEE Technical Committee on Computational Imaging (2016-present). He has served as Computational Imaging area chair for IEEE Int. Conf. Acoustics, Speech and Signal Process. (ICASSP 2017) in New Orleans, LA, USA. He has also co-organized a special session on “Large-Scale Computational Imaging with Wave Models” at ICASSP 2017.

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