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Engineering Management, Information, and Systems

Seminar Series

Research Seminar

**A Scale Invariant Approach for Signal and Image
Recovery**



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11:00 a.m. – 12:15 p.m.

Zoom link: <https://smu.zoom.us/j/95095343594>

Abstract: I will talk about the ratio of the L_1 and L_2 norms, denoted as L_1/L_2 , to promote sparsity. Due to the non-convexity and non-linearity, there has been little attention to this scale-invariant model. Compared to popular models in the literature such as the L_p model for $p \in (0, 1)$ and the transformed L_1 (TL1), this ratio

model is parameter free. Theoretically, we present a strong null space property (sNSP) and prove that any sparse vector is a local minimizer of the L_1/L_2 model provided with this sNSP condition. We then focus on a variant of the L_1/L_2 model to apply on the gradient. This gradient model is analogous to total variation, which is the L_1 norm on the gradient. We discuss an iteratively reweighted algorithm to minimize the proposed model with guaranteed convergence. Experiments on the MRI reconstruction and limited-angle CT reconstruction show that our approach outperforms the state-of-the-art methods.

Biography: Yifei Lou is an Associate Professor in the Mathematical Sciences Department, University of Texas Dallas, where she has been since 2014. She received her Ph.D. in Applied Math from the University of California Los Angeles (UCLA) in 2010. After graduation, she was a postdoctoral fellow at the School of Electrical and Computer Engineering Georgia Institute of Technology, followed by another postdoc training at the Department of Mathematics, University of California Irvine from 2012-2014. Dr. Lou received the National Science Foundation CAREER Award in 2019. Her research interests include compressive sensing and its applications, image analysis (medical imaging, hyperspectral, imaging through turbulence), and (nonconvex) optimization algorithms.