Deliang Wei

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EDUCATION

East China Normal University   Shanghai, China
B.Sc. in Mathematics and Applied Mathematics;   *Sep 2015 – Jun 2019*
Ph.D. candidate in Mathematics; under the supervision of Prof. Fang Li;   *Sep 2019 – Present*

Chinese University of Hong Kong   Hong Kong, China
Research Assistant in Mathematics; under the supervision of Prof. Tieyong Zeng;   *Dec 2022 – Feb 2023*

RESEARCH INTERESTS AND EXPERIENCES

School of mathematics   East China Normal University
Ph.D. candidate   *Sep 2019 – Present, Full-time*

- Interested in plug-and-play algorithms for image processing, and second-order methods for differential games. Implemented various image processing tasks, including denoising, deblurring, super resolution, and medical imaging. Conducted a general review on convex analysis, first-order optimization methods, monotone operator theory, and staying updated on the state-of-the-art iterative image processing methods, specially the plug-and-play (PnP) methods with deep denoisers and convergence guarantee.
- Developed a convergent PnP method based on an adaptively averaged Douglas-Rachfold splitting method for Rician noise removal and Cauchy noise removal.
- Developed a convergent PnP algorithm (DeepSPIM) based on a semi-proximal ADMM framework and gradient step denoiser assumption for sparse-view CT reconstruction. Applied for an invention patent.
- Proposed a new convergent PnP method with weaker assumptions (pseudo-contractiveness) on the deep denoisers. Developed a special training strategy based on holomorphic transformation and functional calculi to ensure the assumptions while not compromising network performance. The paper is accepted by the International Conference on Machine Learning (ICML 2024).
- Participated in the project '*Intelligent Basic Model Based on Harmonic (Symplectic) Game Dynamics*', and developed an efficient second-order method with predictions for differential games like GANs.

PUBLICATION LIST

- Wei D, Chen P, Li F. Learning pseudo-contractive denoisers for inverse problems[J]. *arXiv:2402.05637,* 2024. Accepted by International Conference on Machine Learning (ICML) 2024, to appear.

- Wei D, Li F, Shen X, Zeng T. DeepSPIM: Deep Semi-Proximal Iterative Method for Sparse-View CT Reconstruction with Convergence Guarantee[J]. *CSIAM Transactions on Applied Mathematics,* 2024. To appear.

- Wei D, Weng S, Li F. Nonconvex Rician noise removal via convergent plug-and-play framework[J]. *Applied Mathematical Modelling,* 2023, 123: 197-212. https://doi.org/10.1016/j.apm.2023.06.033

- Wei D, Li F, Weng S. Cauchy Noise Removal via Convergent Plug-and-Play Framework with Outliers Detection[J]. *Journal of Scientific Computing,* 2023, 96(3): 76. https://doi.org/10.1007/s10915-023-02303-5

- Wei D, Chen P, Li F, et al. Efficient second-order optimization with predictions in differential games[J]. *Optimization Methods and Software,* 2023: 1-26. https://doi.org/10.1080/10556788.2023.2189715

INVENTION PATENT

- A semi-proximal based low dose electronic computed tomography imaging method. Under review.

SKILLS

Languages:	Chinese, English
Technologies:	MATLAB, Pytorch, Linux
Teaching:	Teaching assistant for the real analysis class
	Organizer of the monotone operator seminar