– FENGLEI FAN –

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RESEARCH EXPERIENCE

2021.09 - present   Postdoctoral Associate, Prof. Fei Wang's Lab, Department of Population Health Science, Weill Cornell Medicine, *Cornell University*, New York, NY, US

2020.01 – 2020.08   Research Intern, Dr. Dimitry Krotov's Group, *MIT-IBM Watson AI Lab*, Cambridge, MA, US

2017.09 – 2021.09   Research Associate, Prof. Ge Wang's Lab, Department of Biomedical Engineering, *Rensselaer Polytechnic Institute*, Troy, NY, US

2016.09 – 2017.06   Research Associate, Prof. Jian Liu's Lab, School of Precisive Instrument, *Harbin Institute of Technology*, Harbin, Heilongjiang, China

2016.06 – 2016.08   Visiting Student, Prof. Jean Michel Nunzi's Lab, Department of Physics, *Queen's University*, Kingston, Ontario, Canada

2015.01 – 2015.06   Visiting Student, Prof. Chin-Wen Weng's Group, Department of Applied Mathematics, *National Chiao Tung University*, Hsinchu, Taiwan, China

EDUCATION

2017.09 – 2021.07   Ph.D. in Biomedical Engineering, advisor: Prof. Ge Wang (AAAS&OSA&IEEE Fellow)
Rensselaer Polytechnic Institute, Troy, NY, US

2013.09 – 2017.06   Bachelor's in Electrical Engineering,
Harbin Institute of Technology, Harbin, Heilongjiang, China

WORK EXPERIENCE

2019.05 – 2019.08   Summer Intern, mentor: Dr. Sangtae Ahn, *GE Global Research Center*, Niskayuna, NY, US

RESEARCH INTEREST

Machin learning: deep learning methodology, theoretical deep learning

Healthcare big data: medical imaging, bioinformatics, precision medicine

HONORS AND AWARDS

2019   IBM AI Horizon Fellowship, IBM (a major fellowship covering tuition and living expenses until the end of PhD)

2016	Congxin Scholarship, Harbin Institute of Technology (awarded to only two undergraduates annually)
2015	People's Scholarship, Harbin Institute of Technology
2014	Fujixerox Scholarship, Harbin Institute of Technology

PUBLICATIONS

1) Zhang SQ, Wang F, and **Fan FL***: Neural Network Gaussian Processes by Increasing Depth. arXiv preprint arXiv:2108.12862, 2021 (corresponding author, to appear in *IEEE Transactions on Neural Networks and Learning Systems*).

2) Niu C, Cong W, **Fan FL**, Shan H, Li M, Liang J, & Wang, G: Low-dimensional Manifold Constrained Disentanglement Network for Metal Artifact Reduction. *IEEE Transactions on Radiation and Plasma Medical Sciences*.

3) **Fan FL**, Wang D, Guo H, Zhu Q, Yan P, Wang G and Yu H: On a Sparse Shortcut Topology of Artificial Neural Networks. *IEEE Transactions on Artificial Intelligence*.

4) **Fan FL**, Xiong J, & Wang G: On Interpretability of Artificial Neural Networks: A Survey. *IEEE Transactions on Radiation and Plasma Medical Sciences*, 2021.

5) Li M, **Fan FL**, Cong W, Wang G: EM Estimation of the X-ray Spectrum with a Genetically Optimized Step-wedge Phantom. *Frontiers in Physics*, 9, 239, 2021

6) **Fan FL**, Li M, Teng Y, Wang G: Soft Autoencoder and Its Wavelet Adaptation Interpretation. *IEEE Transactions on Computational Imaging*, 6:1245-57, 2020.

7) **Fan FL**, Xiong J, & Wang G: Universal approximation with quadratic deep networks. *Neural Networks*, 124, 383-392, 2020.

8) Teng Y, Qi S, Han F, Yao Y, **Fan FL**, Lyu Q, & Wang, G: A framework for least squares nonnegative matrix factorizations with Tikhonov regularization. *Neurocomputing*, 387, 78-90, 2020.

9) **Fan FL**, Ahn S, De Man B, Wangerin KA, Wollenweber SD, Abbey CK, & Kinahan, PE: Deep learning-based model observers that replicate human observers for PET imaging. (*Oral presentation*) In *Medical Imaging 2020: Image Perception, Observer Performance, and Technology Assessment*, 2020.

10) **Fan FL**, Wang G: Fuzzy logic interpretation of quadratic networks. *Neurocomputing*, 2019.

11) **Fan FL**, Shan H, Kalra M K, Singh R, Qian G, Getzin M, Teng Y, Hahn J, and Wang G: Quadratic Autoencoder (Q-AE) for Low-dose CT Denoising. *IEEE Transactions on Medical Imaging*, 39(6):2035-50, 2019.

12) Teng Y, Yao Y, Qi S, Li C, Xu L, Qian W, **Fan FL**, & Wang, G: A novel framework for the NMF methods with experiments to unmixing signals and feature representation. *Journal of Computational and Applied Mathematics*, 362, 205-218, 2019.

13) Cheng YJ, **Fan FL**, Weng C (alphabetical order): An extending result on spectral radius of bipartite graphs. *Taiwanese Journal of Mathematics*, 22(2): 263-274, 2018.

14) **Fan FL**, Cong W, and Wang G: A new type of neurons for machine learning. *Int. J. for Number. Method. in Biomed. Eng.*, 34.2, e2920, 2018.

15) **Fan FL**, Cong W, & Wang G: Generalized backpropagation algorithm for training second-order neural networks. *Int. J. for Number. Method. in Biomed. Eng.* 34.5, e2956, 2018.

16) **Fan FL**, Weng C: A characterization of strongly regular graphs in terms of the largest signless Laplacian eigenvalues. *Linear Algebra and its Applications*, 506: 1-5, 2016.

PREPRINTS

17) **Fan FL**, Lai RJ, Wang G: Quasi-Equivalency of Width and Depth of Neural Networks. arXiv preprint arXiv:2002.02515, 2020 (major revision in *Journal of Machine Learning Research*).

18) Niu C, **Fan FL**, Wang G Noise2Sim--Similarity-based Self-Learning for Image Denoising. arXiv preprint arXiv:2011.03384, 2020.

19) **Fan FL**, Li M., Wang F., Lai R. and Wang G, Expressivity and Trainability of Quadratic Networks. arXiv preprint arXiv:2110.06081, 2021 (under review in *IEEE Transactions on Neural Networks and Learning Systems*).

20) Wang D*, Fan FL*, Hou BJ, Zhang H, Lai R, Yu H, Wang F Manifoldron: Direct Space Partition via Manifold Discovery. arXiv preprint arXiv:2201.05279, 2022 (*co-first author, submitted to IJCAI*).

21) Wang D, **Fan FL**, Wu Z, Liu R, Wang F, & Yu H, CTformer: Convolution-free Token2Token Dilated Vision Transformer for Low-dose CT Denoising. arXiv preprint arXiv:2202.13517, 2022.

PRESENTATION & TALKS

1) Invited talk at Harbin Institute of Technology, April 2022.

2) Invited talk at SCF-YSSEC, November 2021 (http://scf.cc.ac.cn/yssec2021/).

3) Invited talk at FDA, May 2021.

4) Invited job talk at Weill Cornell Medicine, Cornell University, January 2021.

5) Invited job talk at Department of Mathematics, Duke University, December 2020.

6) Poster presentation at fully3D 2019, Philadelphia, PA, June 2019.

7) Poster presentation at Graduate Symposium of Department of Biomedical Engineering, RPI, in January 2019.

8) Speaker for the Deep Recon Workshop 2017, RPI (the 1st deep learning based tomographic reconstruction conference in the world).

9) Invited Student Speaker at ICIPTMA 2017 (International Conference on Image Processing: Theory, Method and Applications), Harbin, China (only two students were selected from the university to make oral presentation).

REVIEWER

IJCAI, International Journal of Numerical Methods in Biomedical Engineering,

IEEE Transactions on Medical Imaging, IEEE Transactions on Neural Networks and Learning System,

Computerized Medical Imaging and Graphics, IEEE Transactions on Fuzzy Systems.

OUTREACH

I lead a team of graduate students and post-docs from Peking University, California Institute of Technology, Vanderbilt University, National University of Singapore, etc. to operate a WeChat Blog named "**Authentic Scholars Create Miracles (纯真学者出神入化)**" to popularize science and knowledge to undergraduates and graduates with an emphasis on artificial intelligence theory and applications. Up to now, we have published 150 original articles, attracted 6,000 followers, and recorded over 70,000 full-text views.