

Mingjie Gao

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EDUCATION

Ph.D. in Electrical and Computer Engineering, University of Michigan, Ann Arbor, MI (Expected) Aug 2023
Thesis: Advances in Image Reconstruction for Digital Breast Tomosynthesis
Advisors: Prof. Jeffrey A. Fessler and Prof. Heang-Ping Chan

M.S. in Electrical and Computer Engineering, University of Michigan, Ann Arbor, MI Dec 2020
GPA: 4.00 / 4.00
Selected Coursework: Probability and Random Processes, Matrix Methods & Statistical Methods & Optimization
Methods for Signal & Image Processing, Machine Learning, Deep Learning for Computer Vision, Nonlinear Programming, Medical Imaging Systems

B.S.E. in Electrical Engineering, University of Michigan, Ann Arbor, MI Apr 2018
GPA: 3.99 / 4.00

B.S. in Electrical and Computer Engineering, Shanghai Jiao Tong University, Shanghai, China Aug 2018
UM-SJTU Joint Institute Dual Degree Program
GPA: 3.80 / 4.00

EXPERIENCE

Graduate Student Research Assistant, University of Michigan, Ann Arbor, MI Sep 2018 - Present

- Built a deep convolutional neural network (DCNN) and trained it with generative adversarial network for denoising digital breast tomosynthesis (DBT) images.
- Combined DCNN denoising with detector blur and correlated noise modeling for model-based iterative reconstruction of DBT.
- Built a DCNN model observer for breast lesion detection and task-based image quality assessment.
- Modeled the x-ray source motion of the DBT imaging system and developed a deep model-based non-blind deblurring network to improve image resolution.

Summer Intern, Apple Inc., Cupertino, CA May 2022 - Aug 2022

- Worked on low-light image denoising using deep learning methods in the Camera Algorithms team.
- Selected to present to Craig Federighi, Apple's senior vice president of Software Engineering.

Undergraduate Student Research Assistant, University of Michigan, Ann Arbor, MI May 2017 - Feb 2018

- Applied kernel ridge regression for estimating T_1, T_2 from MRI data.
- Optimized MRI scans by minimizing the Cramer-Rao lower bound of myelin water fraction estimation.

JOURNAL PUBLICATIONS

1. H.-P. Chan, M. A. Helvie, **M. Gao**, L. M. Hadjiyski, C. Zhou, K. Garver, K. A. Klein, C. McLaughlin, R. Oudsema, W. T. Rahman, and M. A. Roubidoux, "Deep learning denoising of digital breast tomosynthesis: Observer study of the effect on microcalcification detection in breast phantom images," *Medical Physics*, Mar 2023. Accepted.
2. **M. Gao**, J. A. Fessler, and H.-P. Chan, "Deep convolutional neural network with adversarial training for denoising digital breast tomosynthesis images," *IEEE Transactions on Medical Imaging*, vol. 40, no. 7, pp. 1805-1816, Jul 2021, DOI: 10.1109/TMI.2021.3066896.

MANUSCRIPTS

1. **M. Gao**, M. A. Helvie, R. K. Samala, L. M. Hadjiyski, J. A. Fessler, and H.-P. Chan, "Model-based deep convolutional neural network regularized reconstruction for digital breast tomosynthesis with a task-based deep network image assessment approach," Mar 2023. In preparation.

PREPRINTS

1. G. Nataraj, J.-F. Nielsen, **M. Gao**, and J. A. Fessler, “Fast, precise myelin water quantification using DESS MRI and kernel learning,” Sep 2018, on arXiv: 1809.08908.

CONFERENCE PROCEEDINGS & ABSTRACTS

1. **M. Gao**, M. A. Helvie, R. K. Samala, L. M. Hadjiyski, J. A. Fessler, and H.-P. Chan, “Deep CNN task-based image quality assessment: Application to digital breast tomosynthesis reconstruction and denoising,” in *SPIE*, 2023. Accepted. (*Oral*)
2. **M. Gao**, M. A. Helvie, R. K. Samala, J. A. Fessler, and H.-P. Chan, “Deep learning denoising and assessment of detectability of microcalcifications in digital breast tomosynthesis: A task-based image evaluation approach using CNN,” in *RSNA Annual Meeting*, Chicago, 2022. (*Poster*)
3. **M. Gao**, J. A. Fessler, and H.-P. Chan, “Deep convolutional neural network regularized digital breast tomosynthesis reconstruction with detector blur and correlated noise modeling,” in *Proceedings of SPIE*, 12031, 1203108, 2022, DOI: 10.1117/12.2611933. (*Oral*)
4. **M. Gao**, J. A. Fessler, and H.-P. Chan, “Plug-and-play reconstruction with deep learning denoising for improving detectability of microcalcifications in digital breast tomosynthesis images,” in *RSNA Annual Meeting*, Chicago, 2021. (*Oral*)
5. **M. Gao**, J. A. Fessler, and H.-P. Chan, “Digital breast tomosynthesis denoising using deep convolutional neural network: Effects of dose level of training target images,” in *Proceedings of SPIE*, 11595, 115951K, 2021, DOI: 10.1117/12.2580900. (*Oral*)
6. **M. Gao**, J. A. Fessler, and H.-P. Chan, “Training deep convolutional neural network with *in silico* data for denoising digital breast tomosynthesis images,” in *RSNA Annual Meeting*, virtual, 2020. (*Oral*)
7. **M. Gao**, R. K. Samala, J. A. Fessler, and H.-P. Chan, “Deep convolutional neural network denoising for digital breast tomosynthesis reconstruction,” in *Proceedings of SPIE*, 11312, 113120Q, 2020, DOI: 10.1117/12.2549361. (*Oral*)
8. S. T. Whitaker, G. Nataraj, **M. Gao**, J.-F. Nielsen, and J. A. Fessler. “Myelin water fraction estimation using small-tip fast recovery MRI,” in *ISMRM Annual Conference*, Montréal, 2019.
9. G. Nataraj, **M. Gao**, J.-F. Nielsen, and J. A. Fessler, “Kernel regression for fast myelin water imaging,” in *ISMRM Workshop on Machine Learning Part II*, Washington D.C., 2018. (2nd-place poster award)
10. G. Nataraj, **M. Gao**, J. Assländer, C. Scott, and J. A. Fessler, “Shallow learning with kernels for dictionary-free magnetic resonance fingerprinting,” in *ISMRM Workshop on MR Fingerprinting*, Cleveland, 2017.

PROFESSIONAL SKILLS

Computer Languages: C/C++, Python, MATLAB, R, Julia

Packages: TensorFlow, PyTorch, Keras

Environment: Linux

PROFESSIONAL SERVICE

Journal Reviews: Medical Physics, The British Journal of Radiology, Scientific Reports, Physica Medica

Conference Reviews: IEEE International Symposium on Biomedical Imaging

AWARDS & SCHOLARSHIPS

Rackham Conference Travel Grant, UM. 2019 - 2023.

Third Prize, EECS545 Machine Learning course project. Dec 2019.

Outstanding Graduate, SJTU. Jun 2018.

James B. Angell Scholar, UM. Mar 2018.

Dean’s list, UM. 2016 - 2018.

Member of Eta Kappa Nu honor society, UM EECS. Apr 2017.

The Cheng Family Scholarship, SJTU JI. Aug 2016.

Dean’s list, SJTU JI. 2014 - 2016.

Excellent Academic Scholarship, SJTU. 2014 - 2016.

Bronze medal, the University Physics Competition. Jan 2016.