MADHURI NAGARE

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Summary

- Proficiency in Camera Imaging, ISP, Machine Learning, Inverse Problems
- Skilled in implementing deep learning framework: convolutional nets, generative models
- 8 years of experience in industry and academia leading to publications and patents
- Highly adept at collaborating with interdisciplinary and cross-cultural teams

Education

May 2024	Ph.D. in Electrical and Computer Engineering Advisor: Dr. Charles A. Bouman | CGPA: $3.93/4$ | Purdue University, West Lafayette, USA
June 2015	Master of Technology in Geoinformatics and Natural Resources Engineering CGPA: $9.86/10$, **Silver Medalist** | Indian Institute of Technology (IIT) Bombay, Mumbai, India
June 2013	Bachelor of Technology in Electronics and Telecommunication Engineering CGPA: $9.44/10$, **Gold Medalist** | College of Engineering, Pune (COEP), Pune, India

Technical Skills

Programming Languages:	Python, C, Matlab, Bash, Swift
Libraries:	TensorFlow, Keras, OpenCV
Key Courses:	Computer Vision, Model-Based Image Processing, Machine Learning, Optimization Methods, Probability, Estimation Theory, Real Analysis

Work Experience

Feb. 2024-present — **Apple, Cupertino, USA**
Camera Algorithms Engineer

- Developed and debugged auto exposure algorithms for various Apple products
- Collaborated with multi-functional teams to deliver optimized camera solutions

Oct. 2015-Aug. 2018 — **NEC Corporation, Tokyo, Japan**
Assistant Researcher

- Developed techniques to remove thin clouds and their shadows from a multispectral image while accommodating for variability in a cloud spectrum
- Boosted cloud removal accuracy of the state-of-the-art method by **22%**
- Increased accuracy of cloud shadow removal by **5%**
- Implemented codes in C for NEC's atmospheric correction software module

Deep Learning & Medical CT Experience

Sep. 2018-Feb. 2024 (Ph.D. Thesis) — **Bias Reducing Methods for Enhancement of X-ray Computed Tomography (CT) Images**
Research Assistant & Ph.D. Candidate | Advisor: Dr. Charles A. Bouman | Purdue University

- Analyzed a limitation of deep learning (DL) based denoising and deblurring methods of producing over-smooth (highly biased) images lacking texture
- Designed algorithms to operate at user-specified points on the bias-variance trade-off curve, thereby to retain and produce clinically important texture in CT images
- Implemented end-to-end DL pipeline with convolutional nets and generative models
- **Collaborated** with **interdisciplinary** teams of researchers, engineers and clinicians
- Delivered **12% higher Likert score** in clinical evaluations

May 2019-Aug. 2019 — **Deep Learning Based Solutions for X-ray Computed Tomography (CT) Reconstruction**
Ph.D. Intern | GE Healthcare, Waukesha, USA

- Studied concepts of medical imaging and reconstruction algorithms
- Improved robustness of a DL based reconstruction method by adding noise while training
- Achieved on an average **1.5 dB** higher peak signal-to-noise ratio

Selected Publications

- **M. Nagare**, J. Tang, O. Rahman, B. Nett, R. Melnyk, K. D. Sauer, and C. A. Bouman. A noise preserving sharpening filter for CT image enhancement. In *ICIP - IEEE Int. Conf. Image Process.*, 2022
- **M. Nagare**, R. Melnyk, O. Rahman, K. D. Sauer, and C. A. Bouman. A bias-reducing loss function for CT image denoising. In *ICASSP - IEEE Int. Conf. Acoust., Speech, Signal Process.*, 2021
- **M. Nagare**, E. Kaneko, M. Toda, H. Aoki, and M. Tsukada. Cloud shadow removal based on cloud transmittance estimation. In *IGARSS - IEEE Int. Geoscience and Remote Sens. Symp.*, 2018
- **M. Nagare**, H. Aoki, and E. Kaneko. A unified method of cloud detection and removal robust to spectral variability. In *IGARSS - IEEE Int. Geoscience and Remote Sens. Symp.*, 2017

Selected Patents

- *Texture matching generative adversarial network*: USPTO Application Number 63/410,486 (Filed Sept. 2022)
- *Resolution recovery of CT images*: USPTO Application Number 17/807,779 (Filed Jun. 2022)
- *Denoising of CT images*: US 2022/0375038 A1 (Published Nov. 2022)

Machine Learning Research

Jul. 2014- Jun. 2015 (Master's Thesis)

Decision Tree Classifiers (DTC) for Satellite Images

Research Assistant & Master's Candidate | *Advisor: Dr. B. Krishna Mohan* | *IIT Bombay*

- Designed a DTC optimized with a genetic algorithm to extract nonlinear class boundaries in a feature space by utilizing a unique set of a classifier and features at each node
- Improved accuracy for land use classification compared to conventional DTC

Leadership

Apr. 2021- Apr. 2022 — **International Student Ambassador** | International Students and Scholars, Purdue University
- Led onboarding of incoming international students during weeks-of-welcome

Jul. 2019- Dec. 2019 — **Treasurer** | Indian Graduate Students at Purdue, Purdue University
- Secured funding from the Student Organization Grant Allocation Board for cultural events

Oct. 2016- May 2017 — **Group leader** | Machine Learning Reading Group, NEC Corporation
- Built and managed a group to learn concepts and advances in machine learning

Jun. 2014- Jun. 2015 — **Executive Member** | Graduate Academic Council, IIT Bombay
- Led a team of 15 coordinators to organize an onboarding event for 1300+ graduate freshmen

Jul. 2013- Jun. 2014 — **Graduate Cultural Coordinator** | Graduate Cultural Council, IIT Bombay
- Coordinated with 10 members to organize a cultural fest for 3500+ students

Professional Service

- Reviewer for IEEE Transactions on Computational Imaging, IEEE International Conference on Image Processing, Journal of Medical Imaging, Journal of the Indian Society of Remote Sensing
- Member of IEEE Eta Kappa Nu (HKN)

Awards

- Won honorable mention for poster presentation at Purdue Engineering Graduate Showcase 2021
- Secured **Rank 4** in 2009 Maharashtra Health & Technical Common Entrance Test among 200K+ students
- Awarded with scholarship for undergraduate study (2009 - 2013) by the Govt. of Maharashtra

Extracurricular

- Contributed to the Guinness World Record of 'Most people solving Rubik's Cube'
- Cleared two exams of classical Kathak Nrutya Dance