

# Gauri Jagatap

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## EDUCATION

JAN 2020 -Present	Doctor of Philosophy (PhD) in ELECTRICAL ENGINEERING <b>New York University</b> (GPA: 3.89/4)
AUG 2016	Master of Science (MS) in ELECTRICAL ENGINEERING
-DEC 2019	<b>Iowa State University</b> (GPA: 3.92/4)
AUG 2010	Bachelor of Engineering (BE) in ELECTRICAL AND ELECTRONICS ENGINEERING
-MAY 2015	Master of Science (MSc) in PHYSICS <b>Birla Institute of Technology and Science, India</b> (GPA: 8.69/10)

## PROGRAMMING LANGUAGES AND FRAMEWORKS

Python, MATLAB, C, PyTorch, TensorFlow

## RESEARCH INTERESTS

Deep Neural Networks, Adversarial Attacks, Generative Models, Computational Imaging, Machine Learning

## WORK EXPERIENCE

AUG 2016 -Present	Research Assistant at <b>Iowa State University</b> and <b>New York University</b>   Advisor: Dr. Chinmay Hegde Inverse imaging: phase retrieval, compressed sensing, image super-resolution, high dynamic range imaging, compression.
MAY 2020	Data Science Research Intern at <b>Adobe Research</b> , San Jose, California.
-AUG 2020	Image compression.
MAY 2018	Research Intern at <b>Mitsubishi Electric Research Laboratories (MERL)</b> , Cambridge, Massachusetts.
-AUG 2018	Multi-modal active imaging.
JUL 2015	Project Assistant at <b>Indian Institute of Science</b> , Bengaluru, India
-JUL 2016	Axial super-resolution of ultrasound images using compressed sensing.

## JOURNAL ARTICLES

JAN 2019	<b>G. Jagatap</b> and C. Hegde, "Sample-efficient algorithms for recovering structured signals from magnitude-only measurements", <b>IEEE Transactions on Information Theory</b> , 2019. ( <a href="#">Paper</a> ).
AUG 2019	<b>G. Jagatap</b> , Z. Chen, S. Nayer, C. Hegde and N. Vaswani, "Sample efficient Fourier ptychography for structured data", <b>IEEE Transactions on Computational Imaging</b> , 2019. ( <a href="#">Paper</a> )

## SELECTED CONFERENCE PUBLICATIONS

MAY 2020	<b>G. Jagatap</b> and C. Hegde, "High dynamic range imaging using deep image priors", Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2020. ( <a href="#">Paper</a> ).
DEC 2019	<b>G. Jagatap</b> and C. Hegde, "Algorithmic guarantees for inverse imaging with untrained network priors", Adv. in Neural Information Processing Systems (NeurIPS), 2019. ( <b>Acceptance rate: 21.18%</b> ). ( <a href="#">Paper</a> ).
JUL 2019	<b>G. Jagatap</b> and C. Hegde, "Linearly convergent algorithms for learning shallow residual networks", Proc. of IEEE International Symposium on Information Theory (ISIT), 2019. ( <a href="#">Paper</a> ).
JUN 2018	<b>G. Jagatap</b> and C. Hegde, "Towards sample-optimal methods for solving random quadratic equations with structure", Proc. of IEEE International Symposium on Information Theory (ISIT), 2018. ( <a href="#">Paper</a> ).
APR 2018	<b>G. Jagatap</b> , Z. Chen, C. Hegde and N. Vaswani, "Sub-diffraction imaging using Fourier ptychography and structured sparsity", Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2018 ( <b>Oral presentation</b> ). ( <a href="#">Paper</a> ).
DEC 2017	<b>G. Jagatap</b> and C. Hegde, "Fast, sample-efficient algorithms for structured phase retrieval", Adv. in Neural Information Processing Systems (NIPS), 2017. ( <b>Acceptance rate: 20.93%</b> ). ( <a href="#">Paper</a> ).

## PREPRINTS

JUN 2020	<b>G. Jagatap</b> , A. Chowdhury, S. Garg and C. Hegde, "Adversarially robust learning via entropic regularization", 2020.
JUN 2020	T. Nguyen, <b>G. Jagatap</b> and C. Hegde, "Provable compressed sensing with generative priors via langevin dynamics", 2020.

## RESEARCH PROJECTS

- Building adversarially robust neural network using entropy regularization.
  - Devised a new algorithm for training neural networks robust to adversarial perturbation, with better generalization properties, using entropy and stochastic gradient langevin dynamics.
- Provable inverse imaging using deep generative priors.
  - Introduced a new provably convergent algorithm for solving inverse problems such as compressed sensing with pre-trained generative priors using stochastic gradient langevin dynamics.
- Inverse imaging using deep untrained neural network priors. [[code](#)]
  - Used deep untrained CNNs as priors for inverse imaging problems such as compressed sensing, phase retrieval and HDR imaging, showed superior empirical performance. Provided theoretical guarantees for convergence of gradient descent based solution.
- Inverse imaging from magnitude-only measurements using structured sparsity priors. [[code](#)]
  - Phase retrieval using structured sparsity: used underlying structure (such as block and tree sparsities) in images to develop fast and memory efficient algorithms to reconstruct images from absolute-valued measurements with theoretical guarantees.
- Image and video super-resolution via ptychography. [[code](#)]
  - Developed algorithms for super-resolution of multiplexed microscopic images by using sparsity and low rank priors.

## GRADUATE COURSES

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### Iowa State University

Deep Machine Learning, Data Analytics, Convex Optimization, Nonlinear Programming, Detection and Estimation Theory, Steganography and Digital Image Forensics

### New York University

Machine Learning, Advanced Machine Learning, Digital Signal Processing, Medical Imaging

## GRADUATE COURSE PROJECTS

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### Iowa State University

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| MAY 2017 | Sparse PCA using truncated and inverse power methods; non-negative matrix factorization using orthogonal gradient method and successive projection method for topic extraction from text. |
| MAY 2018 | Image in-painting for engineering datasets via deep projection models.  |
| MAY 2019 | ResNets for classifying natural and CGI images using Sensor Pattern Noise.  |

### New York University

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| MAY 2020 | Designing adversarial attacks on Inception Network. |
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## SCHOLARSHIPS AND AWARDS

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| 2017 - 19  | Travel Awards for NIPS 2017, WiML 2017, ISIT 2019, NeurIPS 2019, WiML 2019       |
| AUG 2016 - | Research Assistant, <b>Iowa State University</b> and <b>New York University</b>  |
| 2011 - 15  | INSPIRE Scholarship, <b>Department of Science and Technology, Govt. of India</b> |

## TEACHING ASSISTANTSHIPS

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| SPRING 2018 | EE 525: DATA ANALYTICS FOR ECE, <b>Iowa State University</b>                                 |
| SPRING 2014 | BITS C386: QUANTUM INFORMATION & COMPUTING, <b>Birla Institute of Technology and Science</b> |
| FALL 2012   | PHY F110: PHYSICS LABORATORY, <b>Birla Institute of Technology and Science</b>               |

## REVIEWING

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### Journal articles:

- IEEE Transactions on Image Processing (TIP), 2020.  
Elsevier Neural Networks, 2020.  
IEEE Signal Processing Letters (SPL), 2019.  
IEEE Transactions on Information Theory (TIT), 2018.  
IEEE Transactions on Signal Processing (TSP), 2018.

### Conference articles:

- International Conference on Learning Representations (ICLR), 2020.  
International Conference on Machine Learning (ICML), 2020.  
Conference on Neural Information Processing Systems (NeurIPS), 2019.  
International Conference on Signal Processing and Communications (SPCOM), 2018.  
Women in Machine Learning (WiML) Workshop, 2017, 2019.

## COMPLETE LIST OF CONFERENCE PUBLICATIONS

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| MAY 2020 | <b>G. Jagatap</b> and C. Hegde, "High dynamic range imaging using deep image priors", Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2020. ( <a href="#">Paper</a> ).  |
| DEC 2019 | <b>G. Jagatap</b> and C. Hegde, "Algorithmic guarantees for inverse imaging with untrained network priors", Adv. in Neural Information Processing Systems (NeurIPS), 2019. ( <b>Acceptance rate: 21.18%</b> ). ( <a href="#">Paper</a> ).  |
| DEC 2019 | <b>G. Jagatap</b> and C. Hegde, "Phase retrieval using untrained neural network priors", NeurIPS Workshop on Solving Inverse Problems with Deep Networks, 2019. ( <a href="#">Paper</a> ).   |
| JUL 2019 | <b>G. Jagatap</b> and C. Hegde, "Linearly convergent algorithms for learning shallow residual networks", Proc. of IEEE International Symposium on Information Theory (ISIT), 2019. ( <a href="#">Paper</a> ).  |
| OCT 2018 | <b>G. Jagatap</b> , Z. Chen, C. Hegde and N. Vaswani, "Model corrected low rank ptychography", Proc. of IEEE International Conference on Image Processing (ICIP), 2018. ( <a href="#">Paper</a> ).   |
| JUN 2018 | <b>G. Jagatap</b> and C. Hegde, "Towards sample-optimal methods for solving random quadratic equations with structure", Proc. of IEEE International Symposium on Information Theory (ISIT), 2018. ( <a href="#">Paper</a> ).   |
| APR 2018 | <b>G. Jagatap</b> , Z. Chen, C. Hegde and N. Vaswani, "Sub-diffraction imaging using Fourier ptychography and structured sparsity", Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2018 ( <b>Oral presentation</b> ). ( <a href="#">Paper</a> ). |
| APR 2018 | Z. Chen, <b>G. Jagatap</b> , S. Nayer, C. Hegde and N. Vaswani, "Low rank Fourier ptychography", Proc. of IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP), 2018. ( <a href="#">Paper</a> ).   |
| DEC 2017 | <b>G. Jagatap</b> and C. Hegde, "Fast, sample-efficient algorithms for structured phase retrieval", Adv. in Neural Information Processing Systems (NIPS), 2017. ( <b>Acceptance rate: 20.93%</b> ). ( <a href="#">Paper</a> ).   |