

Gregory J. Ongie

CONTACT INFORMATION	gongie@umich.edu https://gregongie.github.io
RESEARCH INTERESTS	<p>Exploring the interface of machine learning and compressed sensing for large-scale problems arising in imaging, especially in the case of missing, noisy, or corrupted data. Learning low-complexity models for image reconstruction, and the design, analysis, and implementation of efficient optimization algorithms to do so.</p> <p>Applications to image reconstruction in biomedical imaging, including accelerated dynamic and functional magnetic resonance imaging, limited angle and low-dose computed tomography, and super-resolution microscopy.</p>
EDUCATION	<p>University of Iowa, Iowa City, IA</p> <p>Ph.D., Applied Mathematical and Computational Sciences, July 2016</p> <ul style="list-style-type: none">• Thesis Topic: <i>Off-the-grid Compressive Imaging</i>• Advisor: Mathews Jacob, Ph.D. <p>M.S., Mathematics, Aug 2011</p> <p>Coe College, Cedar Rapids, IA</p> <p>B.S., Mathematics and Physics, May 2008</p>
RESEARCH EXPERIENCE	<p>Postdoctoral Fellow Sept. 2016 to present Department of Electrical Engineering and Computer Science, University of Michigan Supervisors: Laura Balzano, Ph.D & Jeff Fessler, Ph.D.</p> <ul style="list-style-type: none">• Learning non-linear models with missing data• Algebraic variety models for matrix completion• Online algorithms for image reconstruction in MRI• Adaptive sampling for low-rank plus sparse models• Efficient optimization algorithms for large-scale imaging problems <p>Research Assistant Jan 2013—July 2016 Department of Electrical and Computer Engineering, University of Iowa Supervisor: Mathews Jacob, Ph.D.</p> <ul style="list-style-type: none">• Continuous domain compressed sensing with applications in MRI• Multi-dimensional super-resolution imaging• Efficient algorithms for structured low-rank matrix completion• Extensions of total variation image regularization for inverse problems in imaging• Non-convex optimization methods for image reconstruction in medical imaging
TEACHING EXPERIENCE	<p>Guest Lecturer Nov 2017 University of Michigan</p> <ul style="list-style-type: none">• Gave two lectures in a graduate-level matrix methods course for engineers on the topic of low-rank matrix completion. <p>Research Experience for Undergraduates (REU) Mentor June–Aug 2011 University of Iowa Supervisor: Palle Jorgensen, Ph.D.</p> <ul style="list-style-type: none">• Led a group of four upper-level undergraduate students on an image processing research project <p>Teaching Assistant Aug 2010—Dec 2013</p>

Multivariable Calculus for Engineers
Calculus I & II
Calculus I for Biology Students

JOURNAL
PUBLICATIONS

1. **G. Ongie**, N. Murthy, L. Balzano, J. Fessler. "A Hybrid Proximal Frank-Wolfe Primal-Dual Algorithm for Memory-Efficient Convex Optimization." 2017. *In preparation.*
2. **G. Ongie** and M. Jacob. "Convex Recovery of Continuous Domain Piecewise Constant Images from Non-Uniform Fourier samples." *IEEE Transactions on Signal Processing*, 66(1), 236-250, 2018.
3. **G. Ongie** and M. Jacob. "A Fast Algorithm for Convolutional Structured Low-Rank Matrix Recovery." *IEEE Transactions on Computational Imaging*, 3(4), 535-550. 2017.
4. **G. Ongie** and M. Jacob. "Off-the-grid Recovery of Piecewise Constant Images from Few Fourier Samples." *SIAM Journal of Imaging Sciences*, 9(3), 10041041. 2016.
5. **G. Ongie** and M. Jacob. "Recovery of Discontinuous Signals Using Group Sparse Higher Degree Total Variation." *Signal Processing Letters*, 22(9), 1414-1418. 2015.
6. Y. Moshin, **G. Ongie**, and M. Jacob, "Iterative Shrinkage Algorithm for Patch Smoothness Regularized Medical Image Recovery." *IEEE Transactions on Medical Imaging*. 2015.
7. **G. Ongie***, Y. Hu*, S. Ramani, M. Jacob. "Generalized Higher Degree Total Variation." *IEEE Transactions on Image Processing*, 23(6), 2423-2435. 2014. **equal authorship*

CONFERENCE
PUBLICATIONS

1. **G. Ongie**, D. Hong, D. Zhang, L. Balzano. "Enhanced Online Robust PCA via Adaptive Sensing" *Asilomar Conference on Signals, Systems, and Computers*. Pacific Grove, CA. 2017.
2. D.L. Pimentel-Alarcon, **G. Ongie**, L. Balzano, R. Willett, R. Nowak. "Low Algebraic Dimension Matrix Completion" *Allerton Conference on Communication, Control, and Computing*. Urbana-Champaign, IL. 2017.
3. **G. Ongie**, S. Dewangan, J. Fessler, L. Balzano. "Online Dynamic MRI Reconstruction via Robust Subspace Tracking." *IEEE Global Conference on Signal and Information Processing (GlobalSIP)*. Montreal, Canada. 2017.
4. **G. Ongie**, R. Willett, R. Nowak, L. Balzano. "Algebraic Variety Models for High-Rank Matrix Completion." *International Conference on Machine Learning (ICML)*. Sydney, Australia. 2017.
5. **G. Ongie**, J. Shi, & J. Fessler. "Efficient Computation of Regularized Field Map Estimates in 3D." *IEEE International Symposium on Biomedical Imaging (ISBI)*. Melbourne, Australia. 2017.
6. **G. Ongie**, S. Biswas, & M. Jacob. "Structured Low-rank Recovery of Piecewise Constant Signals with Performance Guarantees." *IEEE International Conference on Image Processing (ICIP)*. Phoenix, AZ. 2016.

7. A. Balachandrasekaran, **G. Ongie**, & M. Jacob. “Accelerated Dynamic MRI Using Structured Low Rank Matrix Completion.” IEEE International Conference on Image Processing (ICIP). Phoenix, AZ. 2016.
8. **G. Ongie** and M. Jacob. “A Fast Algorithm for Structured Low-Rank Matrix Recovery with Applications to Undersampled MRI Recovery.” IEEE International Symposium on Biomedical Imaging (ISBI). Prague, Czech Republic. 2016.
9. **G. Ongie** and M. Jacob. “Recovery of Piecewise Smooth Images from Few Fourier Samples.” Sampling Theory and Applications (SampTA). Washington, D.C. 2015.
10. **G. Ongie** and M. Jacob. “Super-resolution MRI Using Finite Rate of Innovation Curves.” IEEE International Symposium on Biomedical Imaging (ISBI). Brooklyn, NY. *Best student paper award winner*.
11. **G. Ongie**, Y. Hu, M. Jacob. “Higher Degree Total Variation for 3-D Image Recovery.” International Symposium on Biomedical Imaging (ISBI). Beijing, China. 2014.
12. Y. Moshin, **G. Ongie**, M. Jacob. Accelerated MRI Using Iterative Non-local Shrinkage. Annual Conference of the Engineering in Medicine and Biology Society (EMBC). Chicago, IL. 2014.

AWARDS

- Small Groups funding at the Alan Turing Institute: “Theoretical and computational aspects of super-resolution in higher dimensions,” with A. Eftekhari, J. Tanner, and H. Tyagi, 2017.
- SPS Travel Grant for IEEE International Conference on Image Processing (ICIP), 2016.
- Best Student Paper Award: “Super-resolution MRI using finite rate of innovation curves,” IEEE/EMBS International Symposium on Biomedical Imaging, 2015.
- Presidential Fellowship, University of Iowa. 2008–2013
 - Five year fellowship, including three full years of financial support.
- Phi Beta Kappa Membership, Coe College. 2008.

PRESENTATIONS

Invited Talks

- “Matrix Completion with Non-Linear Models,”
CMO-BIRS workshop: “Beyond Convexity”, Oaxaca, Mexico. Oct 2017
- “Enhanced Online Robust PCA via Adaptive Sensing,”
Asilomar Conference on Signals, Systems, and Computers Oct 2017
- “Learning Non-linear Models with Missing Data”
Alan Turing Institute, London, UK. Sept 2017
- “Low Algebraic Dimension Matrix Completion”
Numerical Analysis Seminar, Oxford University, Oxford, UK. Sept 2017
- “Nonconvex Optimization and Variety Models
for Matrix Completion,” SIAM Conference on Optimization. May 2017
- “Off-the-grid Compressive Imaging,”
Applied Math Seminar, Michigan State University, East Lansing, MI. Aug 2016
- “Improved Multi-dimensional MRI with Co-prime Sampling,”
Co-Prime Sensing Basic Research Challenge Program Review. May 2015
George Mason University, Fairfax, Virginia.
- “Off-the-grid Compressive Imaging,”
CSP Seminar, University of Michigan, Ann Arbor, MI. April 2016
- “Off-the-grid Compressive Imaging,”
ICES Seminar, University of Texas, Austin, TX. March 2016

Conference Talks

- Global Conference on Signal and Information Processing (GlobalSIP).
Montreal, Quebec. Nov 2017
- International Conference on Machine Learning (ICML).
Sydney, Australia. Aug 2017
- International Conference on Image Processing (ICIP).
Phoenix, AZ. Sept 2016
- SIAM Imaging Sciences (SIAM IS16).
Albuquerque, NM. May 2016
- International Symposium on Biomedical Imaging (ISBI).
Prague, Czech Republic. April 2016
- Sampling Theory and Applications (SampTA),
Washington, D.C. May 2015
- International Symposium on Biomedical Imaging (ISBI).
Brooklyn, NY. May 2015
- International Symposium on Biomedical Imaging (ISBI).
Beijing, China. May 2014

Poster Presentations

- SAMSI Workshop on the Interface of Optimization and Statistics
Duke University. Feb 2017
- IMA Workshop on Optimization and Parsimonious Modeling.
University of Minnesota. Jan 2016
- Co-Prime Sensing Basic Research Challenge Program Review.
George Mason University, Fairfax, Virginia. May 2015

Public Outreach Talks

- Lindsay Seminar. Coe College, Cedar Rapids, IA. May 2012 & 2013.

PROFESSIONAL ACTIVITIES

Conference special sessions:

- Co-organizer with S. Ravishankar & J. Fessler: “Smart Imaging Systems”. International Symposium on Biomedical Imaging (ISBI), 2018.
- Co-organizer with L. Balzano: “Structured and Covariance Matrix Recovery”. Asilomar Conference on Signals and Systems, 2017.

Technical paper reviewer:

- Applied and Computational Harmonic Analysis
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- IEEE Transactions on Medical Imaging
- IEEE Signal Processing Letters
- IEEE Access
- Magnetic Resonance in Medicine,
- Information Processing Letters, Elsevier
- PLOS ONE
- Conference Proceedings of the International Symposium on Biomedical Imaging, 2015 & 2016.

SERVICE

- Heartland Talks Liaison Oct 2011—Feb 2012
 - Coordinated graduate student talks at nearby universities.
- Graduate and Undergraduate Student Seminar Co-chair Jan 2011 – Dec 2011
 - Organized a student-run seminar to engage undergraduates in advanced mathematics.