

Joseph Woodworth

CONTACT INFORMATION

Graduate Student
Department of Mathematics
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RESEARCH

Research Areas :
Optimization, variational models, image processing, machine learning, compressed sensing, nonlocal operators, density estimation, networks, human behavior models

University of California, Los Angeles
Student Researcher, Applied Mathematics
Advisor : Professor Andrea L. Bertozzi

Spring 2012 to present

Los Alamos National Laboratory
Student Researcher, T5 Theoretical Division
Mentors : Rick Chartrand, Brendt Wohlberg

Summer 2013, 2014

1. Implemented efficient, massively-parallel motion-segmentation software for moving-camera video in C++ using MPI for running on large distributed platforms
2. Implemented collection of optimization routines for Dictionary Learning using the Eigen linear algebra library for C++, continuing to run test on a large distributed platform

EDUCATION

PhD, Applied Mathematics (in progress)
University of California, Los Angeles

Fall 2011 to present

- Candidacy : **November 6, 2013**
Nonlocal Crime Density Estimation Incorporating Housing Information
- Advisor : Professor Andrea L. Bertozzi

Bachelor of Science, Mathematics
University of Maryland, College Park, MD

Spring 2011

- Magna Cum Laude
- High Honors
- Minor : Computer Science
- Minor : Italian Language and Culture

JOURNAL/ CONFERENCE PUBLICATIONS

1. Cucuringu, M., Woodworth, J. *Point Localization and Density Estimation from Ordinal kNN graphs using Synchronization*, submitted January 2015, preprint : UCLA CAM report 15-05
2. Woodworth, J., Chartrand, R., *Compressed Sensing Recovery via Nonconvex Shrinkage Penalties*, submitted October 2014, preprint : UCLA CAM report 14-78

3. Woodworth, J. T., Mohler, G. O., Bertozzi, A. L., Brantingham P. J., *Non-local crime density estimation incorporating housing information* Phil. Trans. R. Soc. A:2014372 20130403;DOI: 10.1098/rsta.2013.0403.Published 6 October 2014
4. Benedetto, J., Benedetto, R., Woodworth J. *Optimal ambiguity functions and Weil's exponential sum bound*, Journal of Fourier Analysis and Applications, 18(3):471-487, 2012

CONFERENCE PRESENTATIONS/ POSTERS **NGA Academic Research Program Symposium and Workshops**
 Sep. 2014 : Presented talk "Sparsity models for spatiotemporal analysis and modeling of human activity and social networks in a geographic context"
 Presented poster "Crime Density Estimation Incorporating Nonlocal Similarities in Geospatial Data", ***Won Best Research Poster award***
 Sep. 2013 Presented poster "Nonlocal Crime Density Estimation Incorporating Housing Information"

SIAM Conference on Imaging Science, May 2014 in Hong Kong
 Presented "Nonlocal Crime Density Estimation" talk in mini-symposium "Modern Approaches for Dynamic Imaging"

TEACHING EXPERIENCE **University of California, Los Angeles**
Mentor for Applied Mathematics REU at UCLA **June 2012 to August 2012**

- Assisted a group of three students in their segmentation of microscopy peptide images project
- Presented models and numerical methods to the students
- Reviewed and provided feedback on the group's written work and oral presentations

Course Reader

- Graphs and Networks (Math 191) **Winter 2015**
 – Graded homework assignments and projects

Teaching Assistant

- Introduction to Programming (PIC 10A) **Winter 2015**
 – led discussions to review material, held office hours, graded exams
- Linear & Nonlinear Systems of Differential Equations (Math 134) **Winter 2013**
 – led discussions to review material, held office hours, graded homework and exams
- Differential Equations (Math 33B) **Fall 2012**
 – led discussions to review material, administered quizzes, held office hours, graded exams, tutored at Student Math Center

LANGUAGES & SOFTWARE Extensive experience with C++, Eigen, Matlab, LaTeX, BaSh
 Practical experience with MPI, Python, Numpy, Scipy, R
 Previous experience with C, Java, OCaml, MIPS

FELLOWSHIPS

- NSF Graduate Research Fellowship **2011-2015**
 - \$30,000-\$32,000 Stipend + Registration Fees (\sim \$12,000) per tenure year
 - tenure years 2011-2012, 2013-2014, 2014-2015
- Daniels Sweet Memorial Fellowship **Fall 2010**
 - \$2,500 stipend
 - Participated in advanced research project with Professor John Benedetto
 - Awarded by Norbert Wiener Center for Harmonic Analysis and its Applications

**REFERENCES
AVAILABLE TO
CONTACT**

References available upon request.