Xiyang Luo

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Education

University of California, Los Angeles — Los Angeles, CA
Ph.D. Candidate in Applied Mathematics — *2013 – present*
Developing new algorithms for graph-based models with applications in machine learning and image processing. Expected to graduate in June 2018. Advisor: Prof.Andrea Bertozzi.

Zhejiang University — Zhejiang, China
Bachelor's Degree in Mathematics — *2009 – 2013*
Graduated with honors. Two times first-class scholarship winner.

Summary of Skills

Technical Knowledge: Research level expertise in image processing, sparse representation of signals, and graph-cut models for clustering. Solid knowledge in convex optimization, machine learning, data analysis, data structures and common algorithms.

Programming Languages: MATLAB, C++ *(Proficient)*, Python *(Knowledge)*.

Research Experience

Convolutional Sparse Coding with Applications in Image Processing
Los Alamos National Laboratory — *June '15 – Sept.'15*
- Incorporated non-local smoothing term to remedy deficiencies in the traditional L^1 regularizer. Devised efficient implementations using ADMM and Nystrom Extension.
- Improved performance on image inpainting and dictionary learning. Joint paper with my mentor Dr.Wohlberg to be submitted.
- Used **MATLAB** for testing, **Python** for more structured coding style to build a usable package.

Topic Modeling on Geotagged Tweets
University of California, Los Angeles — *July '14 – Aug.'14*
- Preprocess text data in Twitter by filtering out stop-words using TF-IDF, and removing over-active users.
- Explored efficient implementations of Non-negative Matrix Factorization(NMF) using ideas from compressed sensing.
- Compared the uniformity of geo-locations between tweets of a certain topic. Modeled self-exciting point process on certain topics over time.
- Used **MATLAB** for testing, **Python** for preprocessing text data.

Analysis on the Convergence for Phase-Field Models on Graphs
University of California, Los Angeles — *March '15 – present*
- Analyzed convergence properties of an approximate solver for graph cut problems. Project is a continuation of the work from my advisor Prof.Bertozzi to apply ideas from Partial Differential Equations to problems on non-local image graphs and social network graphs.
- Proved convergence of a variety of schemes and analyzed practical performance of the method. Joint paper to be submitted.
- Used **MATLAB** for small scale tests, **C++** for experiments on Hyperspectral imaging. Used scikit-learn package in **Python** for comparisons against off-the-shelf algorithms.

Courses

Mathematics: Convex Optimization(MATH273, EE236C), Pattern Recognition and Machine Learning(STAT231), Scientific Computing(MATH270A-C), Probability(MATH275A-C), Advanced Numerical Analysis(MATH 269A-C)

Papers to be Submitted

- **Convergence Analysis of Graph Allen-Cahn Scheme** X.Luo, A.Bertozzi (to be submitted)
- **Convolutional Laplacian Sparse Coding** X.Luo, B.Wohlberg (to be submitted)