

Jacob Moorman

Applied Math Ph.D. Candidate at UCLA

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EDUCATION

Ph.D. in Mathematics	2016 - June 2021
M.A. in Mathematics	June 2018
University of California, Los Angeles (UCLA)	Los Angeles, CA
Advisors: Deanna Needell and Andrea Bertozzi	
Research focus: stochastic optimization and subgraph matching	
B.S. in Mathematical Sciences	May 2016
B.S. in Computer Science	May 2016
New Jersey Institute of Technology (NJIT)	Newark, NJ

SKILLS

Programming: Python, C++, Bash, Git, open source development

Research: graph search, network analysis, mathematical optimization, numerical linear algebra, matrix factorization

EXPERIENCE

Graduate Student Researcher	Sept 2016 – Present
University of California, Los Angeles (UCLA)	Los Angeles, CA

- Developed top performing subgraph matching algorithms for the [DARPA Modeling Adversarial Activity](#) program.
- Extended subgraph matching algorithms to knowledge graphs and noisy/inexact data.
- Showed that adaptive variants of stochastic gradient descent (SGD) enjoy accelerated convergence.
- Created open-source Python packages for subgraph matching, optimization algorithms, and more.
- Led special interest groups in SGD, matrix and tensor factorization, and Python package development.
- Completed courses in numerical analysis, statistics, optimization, and machine learning.

Computer Vision Research Intern	Summer 2019
HRL Laboratories	Malibu, CA

- Created a calibration procedure for dynamic multi-sensor systems.
- Integrated the calibration procedure into a hands-off system of sensors.
- Established benchmark tests to reliably measure calibration accuracy.

Artificial Intelligence Research Intern	Summer 2017
NovaSignal (formerly, Neural Analytics)	Los Angeles, CA

- Developed search algorithms for NovaGuide, an automatic cerebral ultrasound robot.
- Created cerebral bloodflow simulations to reduce the need to physically scan people when testing algorithms.

Software Engineering Intern	Jan 2015 – May 2016
Trillium Labs	New York, NY

- Built an interactive web application ([Surveyor Web](#)) to view full historical order book market data.
- Created an automatic outlier detection system to find anomalous market events.

Undergraduate Researcher	Jan 2014 – Dec 2014
NJIT Department of Mathematics	Newark, NJ

- Developed algorithms to simultaneously identify and track acoustic sources in passive sonar applications.
- Wrote C++ and MATLAB simulations to generate benchmark datasets for the algorithms.

Game Development Consultant	2012 - 2013
Mission Critical Studios	Farmingdale, NJ

- Designed game mechanics and prototyped levels for a video game published on Steam.

RESEARCH

Journal Publications

- **Jacob D. Moorman**, Thomas K. Tu, Denali Molitor, Deanna Needell,
"Randomized Kaczmarz with Averaging."
BIT Numerical Mathematics, Aug. 2020.
- **Jacob D. Moorman**, Qinyi Chen, Thomas K. Tu, Xie He, Andrea L. Bertozzi,
"Subgraph Matching on Multiplex Networks."
IEEE Transactions on Network Science and Engineering, to Appear, 2021.

Conference Publications

- Thomas K. Tu, **Jacob D. Moorman**, Dominic Yang, Qinyi Chen, Andrea L. Bertozzi,
"Inexact Attributed Subgraph Matching."
Proc. GTA³ 4.0 at IEEE International Conference on Big Data, Atlanta, GA, Dec. 2020.
- Zhaojun Nie, Michael O'Brien, Mina Ranjbaran, **Jacob D. Moorman**, Nic Canac, Shankar Radhakrishnan, Zsolt Garami, Robert Hamilton,
"Neural Echo Simulator (NES) for Real-Time Simulation of Transcranial Doppler Ultrasound (TCD) Signal Responses of Cerebral Hemodynamics From High-Resolution 3D Imaging Head-Models."
Proc. 24th Meeting of the Euro. Soc. of Neurosonology and Cerebral Hemodynamics, Linz, Austria, Apr. 2019.
- **Jacob D. Moorman**, Thomas K. Tu, Denali Molitor, Deanna Needell,
"Randomized Kaczmarz with Averaging."
Proc. Information Theory and Applications Workshop, La Jolla, CA, Feb. 2019.
- **Jacob D. Moorman**, Qinyi Chen, Thomas K. Tu, Zachary M. Boyd, Andrea L. Bertozzi,
"Filtering Methods for Subgraph Matching on Multiplex Networks."
Proc. GTA³ 2.0 at IEEE International Conference on Big Data, Seattle, WA, Dec. 2018.

Preprints

- Robert M. Gower, Denali Molitor, **Jacob D. Moorman**, Deanna Needell,
"Adaptive Sketch-and-Project Methods for Solving Linear Systems."
Submitted Sept. 2019.

Awards

- 2018-2019 MENTOR NSF Research Traineeship \$34,000
- 2020-2021 UCLA Dissertation Year Fellowship \$20,000

Reviewer

- Elsevier Applied Mathematics and Computation
- Elsevier Journal of Computational and Applied Mathematics
- Elsevier Linear Algebra and its Applications
- IEEE Big Data GTA³ 4.0 Workshop (Program Committee Member)
- Journal of Open Source Software
- Linear and Multilinear Algebra
- SIAM Journal on Matrix Analysis and Applications
- SIAM Journal on Scientific Computing
- Springer Calcolo
- Springer Numerical Algorithms

TEACHING

Teaching Assistant

UCLA Department of Mathematics

Sept 2016 – May 2018
Los Angeles, CA

- Math 174E: Mathematics of Finance (S'18)
- Math 171: Stochastic Processes (S'18, W'18, F'17)
- Math 155: Mathematical Imaging (W'18)
- Math 142: Mathematical Modeling (F'17)
- Math 170B: Probability Theory (S'17)
- Math 170A: Probability Theory (F'16)