Victor Lawrence Minden

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Education

Stanford University, Stanford, CA
Ph.D. & M.S. in Computational and Mathematical Engineering, 2017
Thesis title: *Data-sparse Algorithms for Structured Matrices*
Thesis advisor: Lexing Ying

Tufts University, Medford, MA
B.S. in Electrical Engineering and Mathematics, 2012
Graduated *summa cum laude* with highest thesis honors
Thesis title: *Improved Iterative Methods for NAPL Transport Through Porous Media*
Thesis advisor: Scott MacLachlan

Research Positions

Flatiron Institute, New York, NY
Flatiron Research Fellow, September 2017 – present
- Work with Dmitri Chklovskii and the computational neuroscience group
- Developing neurally plausible learning algorithms for online dimensionality reduction

Lawrence Berkeley National Laboratory, Berkeley, CA
Research Associate, Summer 2014
- Worked with Phil Colella and the applied numerical algorithms group
- Developed a novel algorithm for time-stepping constant-coefficient hyperbolic equations with rigorous consistency and stability results

Lawrence Livermore National Laboratory, Livermore, CA
Intern with Cyber Defenders, Summer 2012
- Worked with Van Henson and the eigensolvers group
- Analyzed spectral clustering techniques for network applications

National Security Agency, Fort Meade, MD
Intern with the Director's Summer Program, Summer 2011
- Developed algorithms in MATLAB for temporal graph analysis using novel clustering methods
- Implemented spectral graph theoretic and tensor analytic methods for investigating trends in dynamic relational data

Argonne National Laboratory, Argonne, IL
Intern, Summer 2010, Research Aide, 2010-2011
- Worked with Barry Smith and the Portable, Extensible Toolkit for Scientific Computation (PETSc) group
- Contributed GPU parallelization capabilities to PETSc, a C/C++ software library for high-performance linear algebra and scientific computation

Activities

C^2: Computational Consulting, Stanford University
President (2014-2015) and consultant in mathematics and algorithms, 2013-2017

EDGE Student Mentorship Program, Stanford University
Student mentor to two doctoral students in the Enhancing Diversity in Graduate Education (EDGE) program, 2015-2017

Programming

Python, MATLAB, C++, C, Julia, MPI, OpenMP, LaTeX

Awards

Student Leadership Award, ICME, Stanford University 2017
Ben Rolfs Memorial Award, ICME, Stanford University 2017
Stanford Graduate Fellowship, Office of Technology Licensing Fellow 2016
DOE Computational Science Graduate Fellowship 2012
NSF Graduate Research Fellowship (declined) 2012
Alpha Xi Delta Prize Scholarship, Tufts University 2012
Marshall Hochhauser Prize, Tufts University 2012
Eta Kappa Nu ECE Honor Society, Tufts University 2011
Tau Beta Pi Engineering Honor Society, Tufts University 2011
Student Chapter Certificate of Recognition, SIAM 2011
Honorable Mention (with S. Bidwell, L. Clegg), COMAP MCM 2011
INFORMS Prize (with D. Brady, L. Clegg), COMAP MCM 2010
Outstanding Winner (with D. Brady, L. Clegg), COMAP MCM 2010

Preprints

1. *V. Minden* and L. Ying, **A Simple Solver for the Fractional Laplacian in Multiple Dimensions**, in review.

Publications

1. A. Damle, *V. Minden*, and L. Ying, **Simple, Direct, and Efficient Multi-way Spectral Clustering**, to appear in Information and Inference.

2. *V. Minden*, A. Damle, K. L. Ho, and L. Ying, **Fast Spatial Gaussian Process Maximum Likelihood Estimation via Skeletonization Factorizations**, Multiscale Model. Simul. 15-4 (2017), pp. 1584-1611.

3. *V. Minden*, K. L. Ho, A. Damle, and L. Ying, **A Recursive Skeletonization Factorization Based on Strong Admissibility**, Multiscale Model. Simul. 15-2 (2017), pp. 768-796.

4. B. Lo, *V. Minden*, and P. Colella, **A Real-Space Green's Function Method for the Numerical Solution of Maxwell's Equations**, Communications in Applied Mathematics and Computational Science 11-2 (2016), pp. 143-170.

5. *V. Minden*, A. Damle, K. L. Ho, and L. Ying, **A Technique for Updating Hierarchical Skeletonization-Based Factorizations of Integral Operators**, Multiscale Model. Simul. 14-1 (2016), pp. 42-64.

6. *V. Minden*, C. Youn, and U. A. Khan, **A Distributed Self-Clustering Algorithm for Autonomous Multi-Agent Systems**, in the Proceedings of the 50th Annual Allerton Conference on Communication, Control and Computing, Monticello, IL, Oct. 2012.

7. *V. Minden*, B. Smith, and M. G. Knepley, **Preliminary Implementation of PETSc Using GPUs**, in the Proceedings of the 2010 International Workshop of GPU Solutions to Multiscale Problems in Science and Engineering, Springer, 2011.

Conference Talks

1. **Copper Mountain Conference on Iterative Methods**, Copper Mountain, CO, 2018. "A recursive skeletonization factorization based on strong admissibility".

2. **SIAM Annual Meeting**, Pittsburgh, PA, 2017. "Fast spatial Gaussian process maximum likelihood estimation".

3. **SIAM Annual Meeting**, Boston, MA, 2016. "Efficient preconditioners and hierarchical interpolative decompositions".

4. **SIAM Conference on Uncertainty Quantification**, Lausanne, CHE, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".

5. **SIAM Conference on Applied Linear Algebra**, Atlanta, GA, 2015. "Exploiting hierarchical low-rank compression for fast updating".

6. **SIAM Annual Meeting**, Chicago, IL, 2014. "Updating techniques for hierarchical factorizations".

7. **Allerton Conference on Communication, Control, and Computing**, Monticello, IL, 2012. "A distributed self-clustering algorithm for autonomous multi-agent systems".

Seminar Talks

1. **Cornell Scientific Computing and Numerics Seminar**, Ithaca, NY, 2018. "A recursive skeletonization factorization based on strong admissibility".

2. **Stanford Linear Algebra and Optimization Seminar**, Stanford, CA, 2016. "Fast algorithms exploiting low-rank structure for graph clustering and integral equations".

3. **ICME Student Seminar**, Stanford, CA, 2014. "A numerical method for solving Maxwell's equations in free-space using an approximate IVP Green's function".

4. **Tufts SIAM Student Seminar**, Medford, MA, 2010. "GPU computing for scientific computation applications".

5. **Tufts Mathematics Department Seminar**, Medford, MA, 2010. "From kills to kilometers: using centrographic techniques and rational choice theory for geographical profiling of serial kilers".

Other Talks

1. **DOE CSGF Annual Program Review**, Arlington, VA, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".

2. **Bay Area Scientific Computing Day**, Berkeley, CA, 2015. "Fast spatial Gaussian process maximum likelihood estimation".

3. **Gene Golub SIAM Summer School Speed Talk**, Delphi, GRC, 2015. "Fast computations with kernel matrices using hierarchical factorizations".

Conference Posters

Computational and Systems Neuroscience (Cosyne), Denver, CO, 2018. "Biologically plausible online PCA without recurrent neural dynamics".

Other Posters

1. **ICME Student Xpo**, Stanford, CA, 2017. "Robust and efficient multi-way spectral clustering".

2. **ICME Student Xpo**, Stanford, CA, 2016. "Fast spatial Gaussian process maximum likelihood estimation via skeletonization factorizations".

3. **DOE CSGF Annual Program Review**, Arlington, VA, 2015. "A real-space Green's function method for the numerical solution of Maxwell's equations in free space".

4. **ICME Student Xpo**, Stanford, CA, 2015. "Updating hierarchical factorizations in response to localized modifications".

5. **DOE CSGF Annual Program Review**, Arlington, VA, 2014. "Updating techniques for tree-based factorizations".

6. **DOE CSGF Annual Program Review**, Arlington, VA, 2013. "Spectral methods for seed-set expansion on graphs".

7. **LLNL Student Poster Session**, Livermore, CA, 2012. "Commute time ad related metrics for seed-set expansion".

Teaching

Projects in Applied and Computational Mathematics, Stanford University
Student Mentor, Spring 2015 & Winter 2013

CME Refresher Course: Linear Algebra, Stanford University
Instructor, September 2014

Discrete Mathematics, Tufts University
Teaching Assistant, Spring 2011

Assorted Mathematics / Computer Science, Tufts University
Tutor with the Academic Resource Center, 2009-2011