Matthew D. Rocklin

CONTACT INFORMATION

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RESEARCH INTERESTS

My work enables scientific researchers and other semi-technical analysts to use efficient computing resources. I am broadly interested in numerical methods and accessibility through programming.

EDUCATION

University of Chicago, Chicago, IL

Ph.D, Computer Science **2013**
M.S. Computer Science **2011**

University of California, Berkeley, Berkeley, CA

B.A., Physics, Mathematics, and Astronomy **May 2007**

PROFESSIONAL EXPERIENCE

Continuum Analytics
Computational Scientist **2014 - Present**
Parallel and distributed computation

Sandia National Laboratory - Livermore, CA
Postdoctoral Researcher **2013 - 2014**
Computation and analysis of large time evolving networks

Sandia National Laboratory - Livermore, CA
Summer researcher **Summer 2010**
Clustering on graphs with multiple Similarity Metrics

Argonne National Laboratory - Chicago, IL
Givens Fellow **Summer 2009**
Uncertainty quantification and sensitivity analysis of numerical weather prediction models.

UC Berkeley Physics Department - Berkeley, CA
Staff Research Assistant **2007 - 2008**
Algorithms and software to probabilistically track intracellular movement of vesicles moving within the bodies of plant cells. Developed biophysics educational tools

Berkeley Engineering and Research/4D Imaging - Berkeley, CA
Developer **2003 - 2005**
3d scanner based on structured light techniques. Began startup engineering company. Initial sole developer of a project which eventually grew to become an independent and profitable company

SOFTWARE

I am an active contributor to libraries within Python's numeric computing software ecosystem. I am primarily known for my current work on Dask.

- Dask – *Parallel computing with dynamic task scheduling*: Dask combines a high-speed computational task scheduler with algorithms for parallel arrays, dataframes, machine learning, etc..

Historically I have been involved in the following projects:

- SymPy – *Symbolic mathematics in Python*: Core contributor. Maintains linear algebra, statistics, and logical assumptions.
- PyToolz – *Functional standard library*: Creator. Underscore.js for Python.

- Theano – *Mathematical array compiler*: Supports concurrency, GPUs, scheduling, interactions with SymPy.

A more complete list of software is available at github.com/mrocklin.

Publications

Theses

- M. Rocklin, Modular Generation of Scientific Software, 2013, a PhD dissertation.
- M. Rocklin, Uncertainty Quantification and Sensitivity Analysis in Dynamical Systems, 2011, a masters thesis

Papers

- Al-Rfou, Rami, et al *Theano: A Python framework for fast computation of mathematical expressions*, arXiv preprint arXiv:1605.02688 (2016).
- A. Meurer et al *SymPy: symbolic computing in Python*, PeerJ Computer Science 3 (2017): e103.
- M. Rocklin, A. Pinar *On Clustering on Graphs with Multiple Edge Types*, Internet Mathematics, 2012
- E. Constantinescu,V. Zavala, M. Rocklin, S. Lee, and M. Anitescu, *A Computational Framework for Uncertainty Quantification and Stochastic Optimization in Unit Commitment with Wind Power Generation.* IEEE Transactions on Power Systems, 2010.

Conference Proceedings

- M. Rocklin, *Dask: Parallel computation with blocked algorithms and task scheduling*, Proceedings of the 14th Python in Science Conference. 2015.
- M. Rocklin, *Uncertainty Modeling with SymPy Stats* SciPy 2012
- M. Rocklin, A. Pinar, *Computing an Aggregate Edge-Weight Function for Clustering Graphs with Multiple Edge Types.* Algorithms and Models for the Web-Graph, 2010
- M. Rocklin, A. Pinar, *Latent Clustering on Graphs with Multiple Edge Types* Algorithms and Models for the Web-Graph, 2011

Other

- M. Rocklin, A. Terrel: Symbolic Statistics with SymPy, Computing in Science and Engineering, vol. 14, no. 3, pp. 88-93, May-June 2012
- M. Rocklin, A Pinar, *Spectral Generation and Latent Community Structure of Multiweighted Networks*, 2010
- M. Rocklin, E. Constantinescu , *Adjoint Sensitivity Analysis for Wind Power Generation*, 2009
- US Patent 7620209: *Method and apparatus for dynamic space-time imaging system*
- M. Rocklin, *Functional Data Analysis*, Tutorial at PyData 2013, NYC