

Matthew Dutson

PhD Student in Computer Science at UW—Madison

dutson@wisc.edu
mattdutson.net
github.com/mattdutson

Research Interests

Broad	Computer vision, machine learning, computer graphics
Specific	Efficient video processing, sparse neural networks, single-photon sensing

Education

2021—Present	PhD in Computer Science , UW—Madison Advisor: Mohit Gupta
2018—2020	MS in Computer Science , UW—Madison Advisors: Jignesh Patel and Kevin Eliceiri (2018-2019), Mohit Gupta (2019-2020)
2013—2018	Honors BS in Physics , University of Utah Magnum cum laude Minors: Computer science, mathematics Thesis: Reconstruction of Cosmic Ray Geometry Using Cherenkov Backscattering

Publications

2021	Event Neural Networks arXiv.org (pending formal review) Matthew Dutson , M. Gupta
2020	Fibrillar Collagen Quantification with Curvelet Transform Based Computational Methods Frontiers in Bioengineering and Biotechnology Y. Liu, A. Keikhosravi, C. Pehlke, J. Bredfeldt, Matthew Dutson , H. Liu, G. Mehta, R. Claus, A. Patel, M. Conklin, D. Inman, P. Provenzano, E. Sifakis, J. Patel, and K. Eliceiri

Technical Skills

Languages	C++, Java, Python , C, C#, MATLAB, Perl, Rust
Frameworks	NumPy, TensorFlow , CUDA, MPI, OpenMP, PyTorch, scikit-learn, SciPy
Other	Git, LaTeX, UNIX

Research Experience

2020—Present	Research Assistant , UW—Madison, Mohit Gupta
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	<p>Designing algorithms to improve the efficiency of neural networks on video and other temporally repetitive data.</p> <p>Exploring the theory and applications of sparse, asynchronous neural computation.</p>
2018–2019	<p>Research Assistant, UW–Madison, Jignesh Patel and Kevin Eliceiri</p> <p>Contributed to the design and development of Hustle, a scalable replacement for SQLite written in Rust.</p> <p>Built a Java application for generating synthetic images of biological fiber networks.</p>
2016–2018	<p>Research Assistant, University of Utah, Douglas Bergman</p> <p>Wrote C++ simulations of cosmic ray propagation and detection to test novel detection techniques.</p> <p>Operated the Telescope Array observatory in Delta, UT.</p>

Industry Experience

2019	<p>Map Exploration Software Intern, Esri</p> <p>Built an integrated machine learning application for automatically detecting building features in 3D urban scenes.</p> <p>Designed and implemented algorithms for high-performance viewshed analysis.</p>
2017	<p>Process Software Intern, IM Flash Technologies</p> <p>Improved the efficiency of wafer defect sourcing using an automated Perl pipeline.</p> <p>Reduced errors in process time estimation by 97 percent via online statistical analysis of historical data.</p>
2016	<p>Process Software Intern, IM Flash Technologies</p> <p>Created a C++ OpenCV computer vision application which successfully detected manufacturing equipment failures.</p>

Select Coursework

CS	Computer vision, computer graphics, machine learning, high performance computing, computer architecture, data visualization, nonlinear optimization, algorithms
Mathematics	Real analysis, statistics, partial differential equations, ordinary differential equations, linear algebra, calculus
Physics	Nuclear and particle physics, quantum mechanics, special relativity, thermodynamics, classical physics

Teaching Experience

2019 Fall	<p>Teaching Assistant, UW–Madison</p> <p>CS 559 – Computer Graphics</p> <p>Instructor: Florian Heimerl</p>
2017 Fall	<p>Teaching Assistant, University of Utah</p> <p>CS 2100 – Discrete Mathematics</p> <p>Instructor: Bei Wang</p>

- 2017 Spring **Teaching Assistant**, University of Utah
Physics 2020 – General Physics II
Instructor: Ren Pankovich
- 2016 Fall **Teaching Assistant**, University of Utah
Physics 2010 – General Physics I
Instructor: Orest Symko
- 2015–2016 **Private Physics Tutor**, University of Utah
Courses: General Physics I and II, Physics for Scientists and Engineers I and II,
Introduction to Quantum Theory and Relativity

Volunteer Experience

- 2019–2020 **Events Committee Chair**, UW–Madison Student ACM Chapter
Responsible for overseeing department-wide, student-organized events.
Coordinated with the CS department in planning and hosting the 2020 prospective
graduate student welcome weekend event.
- 2019 **Events Committee Officer**, UW-Madison Student ACM Chapter
- 2018 **Scratch Club Leader**, Lowell Elementary School
- 2017 **Project Judge**, Salt Lake Valley Science and Engineering Fair
- 2016 **Project Judge**, Salt Lake Valley Science and Engineering Fair