

Matt Dutson

PhD Student in Computer Science at UW—Madison

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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 Elceiri (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. Elceiri

Technical Skills

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

Research Experience

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

Industry Experience

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

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 **Teaching Assistant**, UW—Madison
CS 559 – Computer Graphics
Instructor: Florian Heimerl
- 2017 Fall **Teaching Assistant**, University of Utah
CS 2100 – Discrete Mathematics
Instructor: Bei Wang
- 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