

Matt Dutson

PhD Student in Computer Science at UW—Madison

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Research Interests

Computer vision, computer graphics, machine learning

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, Mohit Gupta
- 2013—2018 **Honors BS in Physics**, University of Utah
Magnum cum laude
Minors: Computer science and mathematics
Thesis: Reconstruction of Cosmic Ray Geometry Using Cherenkov Backscattering

Publications

- 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#, JavaScript, MATLAB, Perl, Rust
- Frameworks **TensorFlow, NumPy**, CUDA, MPI, OpenMP, PyTorch, scikit-learn
- Other **Linux, UNIX**, Git, LaTeX

Research Experience

- 2020—Present **Research Assistant**, UW—Madison, Mohit Gupta
Creating image and video processing algorithms for single-photon cameras (SPADs).
Exploring theory and applications of spiking and asynchronous neural networks.
- 2018—2019 **Research Assistant**, UW—Madison, Jignesh Patel and Kevin Eliceiri
Participated in the initial 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 **Max Exploration Software Intern, Esri**
Designed and implemented algorithms for high-performance viewshed analysis.
Built an integrated machine learning application for automatically detecting building features in 3D urban scenes.
- 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.

Teaching Experience

- 2019 Fall **Teaching Assistant, UW—Madison, Computer Graphics**
Instructor: Florian Heimerl
- 2017 Fall **Teaching Assistant, University of Utah, Discrete Mathematics**
Instructor: Bei Wang
- 2017 Spring **Teaching Assistant, University of Utah, General Physics II**
Instructor: Ren Pankovich
- 2016 Fall **Teaching Assistant, University of Utah, 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

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 Particle physics, quantum mechanics, special relativity, thermodynamics, classical physics

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
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