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**

| Year | Position                  | Company                        | Responsibilities                                                                                                                                 |
|------|---------------------------|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 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**

| Year   | Position                  | Institution                   | Courses                                                                                       |
|--------|---------------------------|-------------------------------|------------------------------------------------------------------------------------------------|
| 2019 Fall | Teaching Assistant, UW—Madison, Computer Graphics |                              | Computer Graphics (instructor: Florian Heimerl)                                               |
| 2017 Fall | Teaching Assistant, University of Utah, Discrete Mathematics |                              | Discrete Mathematics (instructor: Bei Wang)                                                     |
| 2017 Spring | Teaching Assistant, University of Utah, General Physics II |                              | General Physics II (instructor: Ren Pankovich)                                                   |
| 2016 Fall | Teaching Assistant, University of Utah, General Physics I |                              | General Physics I (instructor: Orest Symko)                                                      |
| 2015—2016 | Private Physics Tutor, University of Utah |                              | General Physics I and II, Physics for Scientists and Engineers I and II, Introduction to Quantum Theory and Relativity |

**Coursework**

| Subject | Courses                                                                 |
|---------|-------------------------------------------------------------------------|
| 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**

| Year       | Position                                      | Institution                                    | Responsibilities                                                                                                                                 |
|------------|-----------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 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