Joseph Donato

jsdonato@umich.edu • github.com/jsdonato

Education

University of Michigan **Ann Arbor, Michigan, U.S.A.**
B.S. Mathematics, B.S. Physics, Minor in Computer Science *2018-2021*
–3.6 GPA
–Math Club
–Society of Physics Students

Competencies

Mathematics: Vector Calculus, Partial Differential Equations, Abstract Algebra, Real Analysis, Topology, Linear Optimization, Coding Theory, Combinatorics, Algebraic Geometry.
Physics: Mechanics, Electromagnetism, Non-linear Dynamics, Thermodynamics, General Relativity.
Programming Languages: C/C++, C#, Python, VBA, Mathematica, R, Matlab, AMPL, Bash, LaTeX
Operating Systems: MacOS, Linux, Windows
Spoken Languages: English, Spanish

Professional Experience

University of Michigan Computational Particle Transport Group **Ann Arbor, Michigan, U.S.A.**
Research Assistant *November 2019-Present*
–Developed and tested code fundamental to our Monte Carlo radiation transport software.
–Implemented memory-efficient data structures and high-performance algorithms in C++ for a variety of features within our code.
–Met with team members on a weekly basis to discuss progress and future plans for the codebase.
–Currently manage the geometric data structures and algorithms.

Continental AG **Troy, Michigan, U.S.A.**
Radio Frequency Intern *June 2019-August 2019*
–Conducted several forms of vehicle testing to gather data on internal systems.
–Improved the C# source code of our GUI's that were presented to upper management at FCA and Ford.
–Developed scripts in C++ and bash to analyze and visualize several large data sets gathered from vehicle testing.
–The data analysis that I conducted led to a patent that is currently in review.

GKN Driveline **Auburn Hills, Michigan, U.S.A**
Business Analyst Intern *May 2018-August 2018*
–Developed scripts in VBA that extracted data from hundreds of RfQs and assembled them into a central database.
–Developed software that sorted thousands of orders for service parts to identify net losses and minimize risk.
–Assisted in Strategic Opportunity Reviews to analyze the profitability and risk of potential clients.
–Examined part drawings to optimize packaging and logistics.
–Worked alongside the legal team to strengthen business relations with defense contractors.

Research Experience

Independent **Rochester Hills, Michigan, U.S.A.**
Researcher *September 2021-Present*
–Conducted research in gradient descent under the direction of Professor Howard Levinson.
–Studied the literature required to understand and contribute to ideas surrounding research in gradient descent.
–Analyzed and benchmarked existing gradient descent algorithms to understand their pitfalls and improve upon them.
–Developed and maintained a templated C++ library which was critical to our research.

University of Michigan Mathematics Department **Ann Arbor, Michigan, U.S.A.**
Undergraduate Researcher-Pure Math *May 2020-September 2021*
–Conducted research in Algebraic Geometry under the direction of Professor Timothy Ryan.
–Developed theorems and proofs which addressed our research question.
–Met on a weekly basis with colleagues to discuss proofs and how to effectively present them in a paper.

University of Michigan Mathematics Department **Ann Arbor, Michigan, U.S.A.**
Undergraduate Researcher-Applied Math *May 2019-Present*
–Conducted Research in the Inverse Source Problem under the direction of Professor Howard Levinson.
–Taught myself mathematical techniques used to study partial differential equations essential to our research.
–Contributed to the design of algorithms that were used to solve and address our research question.
–Managed the C++ codebase which was used to visualize results and run experimental simulations.

Publications

J.S. Donato and H.W. Levinson, "Structured Iterative Hard Thresholding with Off-Grid Applications", Accepted, *Linear Algebra and its Applications* - arXiv:2012.12783, 2020.

J.S. Donato, M. Lewis, T. Ryan, F. Udrenas, and Z. Zhang, "The Sum of the Betti Numbers of Smooth Hilbert Schemes", Accepted, *Journal of Algebraic Combinatorics* - arxiv:2012.01360, 2021.

Presentations

Joseph Donato, Zhan Jiang, Monica Lewis, Tim Ryan, Faustas Udrenas, Zijian Zhang. 2020. Hilbert Schemes and Monomial Ideals. Oral presentation: Geometry Labs United Conference.