

JONATHAN PARLETT

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EDUCATION

Drexel University

Expected Graduation 2025

B.S. in Mathematics

B.S. in Computer Science with Concentrations in Intelligent Systems and Theory & Computation

Relevant Coursework: Enumerative Combinatorics, Algebraic Combinatorics, Abstract Algebra, Algorithmic Number Theory, Advanced Data Structures & Algorithms, AI & Machine Learning

Current GPA: 3.77

RESEARCH INTERESTS

Algebraic and Enumerative Combinatorics, Algebra, Number Theory, Cryptography, Graph Theory.

RESEARCH EXPERIENCE

Towson University

Number Theory REU: Long Paths in Polynomial Divisor Graphs, June - July 2024

A divisor graph, $D(n)$ contains vertices $\{1, 2, \dots, n\}$ and an edge between two vertices, u and v , if $u|v$ or $v|u$. Previous work by Pollington, Pomerance, Tenenbaum, and Saias has studied the length of the longest path in $D(n)$ establishing upper and lower bounds of order $\frac{n}{\log n}$. We studied the analogous question for monic polynomials over a finite field \mathbb{F}_q and established a lower bound of order $\frac{q^n}{n}$. We are close to establishing an upper bound of the same order. See [presentation](#) given at YMC 2024. Preprint coming soon.

Drexel University

MCMC Algorithms: Research Internship, March - September 2023

In this work various Markov Chain Monte Carlo (MCMC) algorithms were applied to the problem of inferring a function describing the force acting on the well studied Lorenz system. Various MCMC algorithms were considered, to include, Metropolis Hastings, Preconditioned Crank-Nicholson (pCN), multi-proposal pCN, and Hamiltonian Monte Carlo. Utilizing previous results in the field concerning convergence rates of these algorithms we show a geometric rate of convergence in our studied problem. Mathematical analysis was supported by computational experiments. This research was advised by Dr. Cecelia Mondaini, and supported by her grant pertaining to research of MCMC algorithms.

Subnet Communicability: Structure Function Coupling in the Human Connectome, June 2022 - March 2023

Communication models attempt to explain the dynamics of signal propagation in the brain. In this work we proposed a novel communication model, Subnet Communicability, and performed computational experiments showing it explained dynamics better than the current state of the art model. This research was advised by Dr. Yusuf Osmanlioglu. It was supported by a mini-grant from Drexel, and resulted in a poster presented at the Week of Undergraduate Excellence, and a paper accepted for oral presentation at CDMRI 2023, a MICCAI workshop.

TEACHING EXPERIENCE

Drexel University

Course Assistant June 2022 - Jan 2024

Data Structures: Created presentations on memory semantics and C programming to prepare students to implement data Structures in C. Graded all written and programming assignments which covered implementations, and introductory algorithmic problem solving, and analysis. Held offices hours, and recitations to assist students in understanding course material

Programming Language Concepts: Created scripts to automate grading of students programming assignments. Held offices hours to assist students in understanding course material, to include, functional programming in haskell, scheme interpreter implementation, and program testing

Algorithmic Number Theory & Cryptography: Held offices hours to assist students in understanding course material, as well as, administer make up quizzes. Graded all assignments which covered analysis, implementation, and breaking of various cryptosystems

Math Tutor Jan 2024 - March 2024

Held offices hours to assist students with problem solving in 1st year math courses, and to help students develop good learning, strategies, and habits.

PROFESSIONAL EXPERIENCE

SRI International

March - September 2022

Intern, Data Analysis and Software Engineering

Princeton, NJ

- Worked under Principal Research Engineer Norman Hurst, to develop a technology to allow for recovery of time from video streams, robust against framerate conversions
- Conducted statistical analysis of system performance to facilitate improvement and validation of functionality, as well as develop methods to further improve accuracy of this system

United States Marine Corp

October 2015 - February 2020

Data Systems Administrator

Camp Pendleton, CA

- Configured and maintained information systems networks to facilitate communication between military units in remote locales
- Trained peers and subordinates in essential occupational skills

PUBLICATIONS

2023 [Subnet Communicability: Diffusive Communication Across the Brain Through a Backbone Subnetwork](#), joint with Abhishek Jeyapratap, Ali Shokoufandeh, Birkan Tunc, and Yusuf Osmanlioglu

PRESENTATIONS/TALKS

2024 At YMC 2024 hosted by Ohio State University on [Long Paths in Polynomial Divisor Graphs](#), joint with Kayla Traxler.

2023 At CDMRI 2023 [Subnet Communicability: Diffusive Communication Across the Brain Through a Backbone Subnetwork](#), joint with Abhishek Jeyapratap.

2023 At Drexel week of undergraduate excellence [Subnet Communicability: Diffusive Communication Across the Brain Through a Backbone Subnetwork](#).

AWARDS

Outstanding Undergraduate Teaching Assistant Award, Spring 2024

Yilin Yang Undergraduate Math Research Award, Spring 2024

Undergraduate Research Mini-Grant, Winter 2023

Deans list, Drexel University

Navy, and Marine Corp Achievement Medal, United States Marine Corp 2018,2020

MEMBERSHIPS

Computer Science Theory Reading Group (2022-Present)

Institute of Electrical and Electronics Engineers (IEEE) (2020-Present)

Mathematics Student Organization (2022 - Present)