Qichen Xu

qichenxu@uchicago.edu • +1 206-530-5922 • github.com/PeterXQC

Education

University of Chicago — Chicago
Ph.D. in Computational and Applied Mathematics — *Sep 2023-Present*

University of Washington — Seattle
B.S. Double Majoring in Applied Mathematics & Mathematics — *Sep 2019-Jun 2023*

Cum Laude; Departmental Honors in Mathematics.

Dean Honor List 2019-2022; Thesis Mentored by Prof. Krzysztof Burdzy.

Research

Light Field Super-Resolution and Denoising — May 2023 - Present

Research Assistant at Tsinghua University, Supervised by Sen Wan

Engaged in the research and development of an advanced deep learning-based super-resolution and denoising pipeline for light field images to improve the performance of existing schemes and assembling a new light field image processing pipeline to enhance the usability and performance of light field cameras. The improved pipeline aims to facilitate various applications, such as creating a detailed 3D volume/mesh of an object or generating a single image with ultra-high resolution. The project involves the extensive use of PyTorch, Python, and MATLAB. Outcomes of the project will be instrumental in pushing the boundaries of light field imaging technology.

Pysindy library for nonlocal interactions — Nov 2021 - Present

Research Assistant at AI Institute for Dynamic Systems, Supervised by Dr. Zachary Nicolaou

Implement a nonlocal SINDy library that enables pysindy packages to leverage sparse optimization to identify systems with nonlocal interactions. With our library, Pysindy can be applied to models like Boltzmann's equation, integro-differential equations, and nonlocal reaction-diffusion equations to solve problems in physics, neuroscience, and engineering.

Error Bounds For Block Lanczos Matrix Function Approximation — Nov 2021 - Feb 2023

Supervised by Prof. Tyler Chen

Analyze the performance of the Block Lanczos function approximation algorithm in approximating a given matrix function. Analytically construct an error bound that serves as a practical stopping criterion of the numerical method, and numerically evaluate the performance and behavior of the bound with python programs. Perform analytical research and write a public research paper (submitted to ETNA). Analytical result and some numerical experiments are summarized in arXiv: 2211.15643.

Hypergraphs from Network Data for Cybersecurity — Oct 2022 - Present

Mentored by Dr. Bill Kay and Stephen Young, Washington Experimental Mathematics Lab

Analyze network data in an open cybersecurity dataset to distinguish hypergraph features that signal anomalous network activities using tools from hypergraph visualization package (HypernetX) and scientific computing packages like Network X, Neo4j, and NumPy.

Washington Directed Reading Program (WDRP) — Sep 2021 - Dec 2021

Groups and Graphs Mentor by Paige Helms

Embark quarter-long directed reading into the fundamental structure of groups and graphs. Deliver two formal presentations on related topics over the quarter. Host Q&A sessions after each presentation to help my cohort understand the topic.

UW Campus Tour Routing Project — Jun 2021 - Sep 2021

Implement Python Code and lead the writing of the report.

Improve the routing for the UW Campus tour to offer a customized touring experience that allows visitors to visit locations they are interested in while fulfilling their time budget. Request from Google's API to obtain distance information. Create a scoring system on UW campus locations and offer recommendations to visitors based on their interests. Use discrete optimization to solve the traveling salesman problem to present the shortest path to visitors. Write a project report on the subject, and present it to the class. Obtained the highest grade in the class in both the project report and presentation.

Curse of Dimensionality and Dimensionality Reduction in Data Mining — Mar 2021 - Jun 2021

Supervised by Prof. Dami Lee

Analyze the curse of dimensionality from a mathematical standpoint. Explain the formation of such behavior analytically and numerically. Propose various strategies to perform dimensionality reduc- tion. Compare and analyze the effectiveness and fidelity of such strategies.

Experience

HEARO Mentorship Program — Seattle

Mentor — Oct 2022 - Present

Hold weekly meetings with community college students in Washington states to bridge the gap be- tween UW's curriculum and community colleges' course setup. Introduce UW's resources to community college students to help them reach academic success. Offer suggestions in their career sssssplanning and answer their academic questions.

UW Aeronautics & Astronautics CubeSat Team — Seattle

Software Developer — May 2020 - Sep 2021

Develop Magnetorquer flight control software to control the satellite in space using C, C++, and read hardware status from Arduino. Visualized GitHub data for effective collaboration. Document and test the software and write code to create applications that either stand-alone or boost access to servers and services. Use various source debuggers and visual development environments to modify, write and debug soft- ware for applications.

Jilin Heyuan Medicine Co., Ltd — Jilin

Data Analyst Intern — Jun 2021 - Sep 2021

Use mathematics model to predict inventory in the upcoming months to improve procurement plan. Analyze data and aggregations of multiple warehouses to perform rotation and ensure supply. Develop an inventory model to predict regional demand during the COVID-19 pandemic, and update the model using retrospective data.

Skills & Hobbies

Proficient in performing rigorous mathematical analysis, numerical methods, high performance computing (OpenMP, MPI, CUDA) with C++, and programming languages including Python, Java, MATLAB, and SQL.

Hobby Piano (14+ years), and Badminton (9+ years).