

Jeffrey Kam

Waterloo, Ontario
Canada
hykam@uwaterloo.ca

INTERESTS

I am interested in the intersection of mathematics and computer science. In particular, this includes the study of graph structures, graph algorithms, and discrete optimization.

EDUCATION

University of Waterloo

Sep 2017 - Present

Currently in fourth year

- Double Major in Combinatorics & Optimization and Computer Science
- Minor in Pure Mathematics
- Term Dean's Honours List

Relevant Courses

- Graduate: graph-theoretic algorithms, algorithms for graph minors
- Undergraduate: algebraic graph theory, network flow theory, coding theory, introduction to graph theory, neural networks, algorithms

Relevant Projects

- **Bounded queue-number in planar graphs**

I explored a recent proof by Dujmović et al [1] for a 20-year old conjecture on whether the queue-number of planar graphs is bounded. I also wrote lecture notes and made a lecture video on the topic.

- **Deciding tangles with weighted vertex sets**

I wrote a report on Elbracht et al.'s fractional solution [2] to an open problem about finding a vertex subset that characterizes a tangle by a majority vote. In addition, I also explored Oum and Seymour's paper [3] on certifying large branch-width in polynomial time with tangle-kits.

PUBLICATIONS

- **UBCIS: Ultimate Benchmark for Container Image Scanning**,
with Shay Berkovich and Glenn Wurster
Published in 13th USENIX Workshop on Cyber Security Experimentation and Test (CSET 20).
<https://www.usenix.org/conference/cset20/presentation/berkovich>
- **bioSyntax: Syntax Highlighting For Computational Biology**,
with A. Babaian, et al.
Published in BMC Bioinformatics 19, 303 (2018).
<https://doi.org/10.1186/s12859-018-2315-y>

RESEARCH EXPERIENCE

University of Waterloo

May 2021 - present

Undergraduate Research Fellow

Supervised by Shane McIntosh

Waterloo, Canada

- To be filled

University of Waterloo - Symbolic Computation Group

May 2020 - present

*Undergraduate Research Assistant (Part-time)**Supervised by Armin Jamshidpey*

Waterloo, Canada

- Investigate new efficient methods of finding normal bases in \mathbb{F}_{p^n} and revisited various topics in abstract algebra and Galois theory
- Researched different methods to find Smith Normal Form over \mathbb{Z}_{p^2} efficiently, such as experimenting with probabilistic algorithms and utilizing J -ideal

BlackBerry - Security Research Group

January 2020 - April 2020

*Security Researcher Intern**Supervised by Shay Berkovich and Glenn Wurster*

Waterloo, Canada

- Researched and designed a universal benchmark to quantitatively measure the effectiveness and accuracy of container image scanners
- Analyzed techniques of image inspection and vulnerability scanning through open source technologies
- Researched on utilizing machine learning for fuzzing algorithmic complexity vulnerabilities (ACV) by reading multiple security-related journals and conference papers
- Presented to the security research group on current developments of ML-based fuzzing and fuzzing techniques for ACVs, along with potential problems, experiments, and optimizations

PROFESSIONAL EXPERIENCE

GTS

Sep 2020 - Dec 2020

Software Engineering Intern

New York, US

- Worked on high-performance C++ and Python code for the core trading engine. (details undisclosed)

Zenefits

May 2019 - Aug 2019

Software Engineering Intern

Vancouver, Canada

- Developed new permission services in Python to guard against unauthorized review editing
- Designed a sequential document update service using a distributed message queue system

Horizn

May 2018 - Aug 2018

Software Developer Intern

Toronto, Canada

- Wrote automation scripts in Python to scrape data from files and database into JSON files
- Learned foundational object-oriented programming concepts, such as factory and observer pattern

AWARDS AND SCHOLARSHIPS

University of Waterloo

May 2021

Undergraduate Research Fellowship

- Awarded for research excellence

University of Waterloo

Dec 2020

Frank Lun Scholarship for Excellence

- Awarded based on academic performance and leadership abilities

University of Hong Kong and University of Waterloo

Mar 2017

Honourable Mention in Canadian Computing Competition Hong Kong

- Awarded based on performance in the programming contest

TECHNICAL SKILLS

Programming	Python, C++ (Boost), SAGE, Scheme, L ^A T _E X
Tools	Git, C++ tools (i.e. GCC, GDB), Docker, Linux, PLY Jupyter

References

- [1] Vida Dujmovic et al. “Planar Graphs have Bounded Queue-Number”. In: *2019 IEEE 60th Annual Symposium on Foundations of Computer Science (FOCS)* (2019). DOI: [10.1109/focs.2019.00056](https://doi.org/10.1109/focs.2019.00056).
- [2] Christian Elbracht, Jakob Kneip, and Maximilian Teegen. “Tangles are Decided by Weighted Vertex Sets”. In: *Advances in Combinatorics* (July 2020). DOI: [10.19086/aic.13691](https://doi.org/10.19086/aic.13691).
- [3] Sang-il Oum and Paul Seymour. “Certifying Large Branch-Width”. In: *Proceedings of the Seventeenth Annual ACM-SIAM Symposium on Discrete Algorithm*. SODA '06. Miami, Florida: Society for Industrial and Applied Mathematics, 2006, pp. 810–813. ISBN: 0898716055.