

JEFFREY KAM

hykam@uwaterloo.ca

INTERESTS

I am interested in graph theory and its applications, with a particular interest in structural graph theory and graph algorithms. In addition, I am also keen on topics related to discrete optimization.

EDUCATION

University of Waterloo

Sep 2017 - Present

Currently in 4th year

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

Relevant Courses

Taken already / Expected before Summer 2021.

G = Graduate Course

- Graph-theoretic Algorithms - CS762 [G]
- Algorithms for Graph Minors - CO749 [G]
- Algebraic Graph Theory - CO444 [G]
- Network Flow Theory - CO351
- Introduction to Graph Theory - CO342
- Introduction to Optimization - CO250

Relevant Projects

- **Bounded Queue-number in Planar Graphs (CS762)** - [Project Page](#)
Explore a recent proof by Dujmović et al [1] for a 20-year old conjecture on whether the queue-number of planar graph is bounded.
- **Tangles are Decided by Weighted Vertex Sets (CO749)** - [Project Page](#)
Explore a partial solution by Elbracht et al [2] to an open problem by Diestel, who asked whether we can find a vertex subset X that can definitively characterize a tangle by seeing which side of a low order separation has more vertices in X .

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 - Symbolic Computation Group

May 2020 - Sep 2020

Undergraduate Research Assistant

Supervised by Armin Jamshidpey

Waterloo, Canada

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

BlackBerry - Security Research Group

January 2020 - April 2020

Security Research 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
- Designed a universal import framework for Anchore Engine to extend our scanning capabilities
- 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

WORK EXPERIENCE

GTS

Sep 2020 - Present

Software Engineering Intern

New York, US

- Working on performant C++ and Python code for the core trading engine

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 skills, such as factory and observer pattern

AWARDS

- First place in HackSeq 2017 bioinformatics competition in UBC
- Honourable mention in Canadian Computing Competition Hong Kong 2017

SKILLS

Programming Tools

Python, C++, SAGE, Scheme
Git, C++ tools (i.e. GCC, GDB, Valgrind), Docker, Linux, 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).