JEFFREY KAM

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INTERESTS

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

EDUCATION

University of Waterloo   Sep 2017 - Present
Currently in term 4A

· Candidate for BMath. Combinatorics & Optimizations and Computer Science
· Minor in Pure Mathematics
· Term Dean's Honours List

Relevant Courses

· Graph-theoretic Algorithms - CS762
· Algorithms for Graph Minors - CO749
· Algebraic Graph Theory - CO444
· 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 conjectjure 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 Assisstant
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　　　　　　　　　　　Janurary 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 sequeitial document update service using a distributed messsage 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 competiton in UBC
- Honourable mention in Canadian Computing Competition Hong Kong 2017

SKILLS

Programming	Python, C++, SAGE, Scheme
Tools	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.

[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.