Jeffrey Kam

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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 conjectjure 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*

- Details to be filled.

University of Waterloo - Symbolic Computation Group May 2020 - present
Undergraduate Research Assisstant (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 Janurary 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

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 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 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, LaTeX
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.

[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.

[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.