Chunyin, SIU (Alex)

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Summary

- Data analyst specializing in non-Euclidean data (manifold learning, network analysis and topological data analysis) since 2017

- Developed 2 algorithms, published 3 journal articles and 3 preprints, made 1 YouTube video

- Collaborated with mathematicians, statisticians and computer scientists, and mentored 4 undergraduates

- Embrace challenging data analysis tasks, and enjoy collaboration with people with diverse backgrounds and sharing our results with a wider audience

Education

Cornell University, Ithaca, NY   *2019 – present*
PhD Applied Mathematics; supervised by Prof Gennady Samorodnitsky

The Chinese University of Hong Kong, Hong Kong   *2017 – 2019*
MPhil Mathematics; supervised by Prof Ronald Lui

The Chinese University of Hong Kong, Hong Kong   *2013 – 2017*
BSc Mathematics; Minor in Economics

Research and Professional Experiences

Internship at Lawrence Berkeley National Laboratory   *Summer 2023*

- mentored by Dr Dmitriy Morozov, funded by the NSF MSGI program

- built a neural network to learn the adsorption values of zeolite crystals from their topological features

- partially verified a conjecture on the universality of a topological quantity on these datasets

Doctoral Thesis Research on Scale-Free Complexes   *Summer 2022 – Present*

- ran simulations on a virtual machine to identify the topological properties of scale-free complexes

- established theoretical guarantees and submitted the findings to an academic journal

- presented our findings in 3 workshops, and was invited to give talks at Chicago, Perdue and Seville

- developing a GitHub repo with simulation codes and a Jupyter tutorial

- mentored an undergraduate for 1 year and supervised her on literature review and programming

Doctoral Thesis Research on Small Density Vacuums   *Spring 2020 – Summer 2022*

- developed a methodology to robustly identify small density vacuums in datasets and submitted a manuscript to an academic journal

- implemented the method and maintained a GitHub repo with codes and a Jupyter tutorial

- presented our findings in 7 workshops / conferences

- made a YouTube video on our method

- mentored an undergraduate for 2 year and supervised him on literature review and programming

Master Thesis Research on Image Segmentation *Fall 2017 – Summer 2019*

- developed an algorithm to segment convex objects in 2D images and implemented the method
- published an article in an academic journal

Other Research Activities

- collaborated and coauthored journal articles with mathematicians and computer scientists on such topics as computational geometry, fractal analysis and knot theory (preprint)

TEACHING EXPERIENCES

Course Administrator *Spring 2023*

- coordinated test accommodations for students with time conflicts and students with disabilities in a 500-student course between the lecturers, the university administration and the students
- maintained the assignment submission system

Teaching Assistant *Fall 2022, Fall 2017 – Spring 2019*

- held weekly recitations
- developed recitation notes when needed
- graded assignments and exams

Undergraduate Mentorship *Spring 2020 – Present*

- led directed reading programs with 4 undergraduates
- coauthored with 2 mentees

SELECT AWARDS AND HONORS

Croucher Scholarship for Doctoral Study *2019/2020*
Annually, 9 – 16 Hong Kong scholars pursuing an overseas doctoral degree in science, medicine or technology are selected.

Sir Edward Youde Memorial Fellowship *2017/2018*
Annually, 3 – 5 fellows in Hong Kong are selected from the postgraudate students nominated by the heads of their institutions.

PROFESSIONAL SERVICES

student representative of the Colloquium Committee, CAM, Cornell *Fall 23 – Spring 24*
officer of SIAM Student Chapter, Cornell *Fall 22 – Spring 24*

PUBLICATIONS

* denotes entries with alphabetically listed authors.

<u>C. Siu</u>, G. Samorodnitsky, C. Yu, and R. He. "The Asymptotics of the Expected Betti Numbers of Preferential Attachment Clique Complexes". Submitted.

<u>C. Siu</u>, G. Samorodnitsky, C. Yu, and A. Yao. "Detection of Small Holes by the Scale-Invariant Robust Density-Aware Distance (RDAD) Filtration". Submitted.

* <u>C. Siu</u>, and R. Strichartz. "Geometry and Laplacian on Discrete Magic Carpets". *Journal of Fractal Geometry*, 2023.

H. Law, <u>C. Siu</u>, and R. Lui. "Decomposition of Longitudinal Deformations via Beltrami Descriptors". *Journal of Scientific Computing*, 2021.

<u>C. Siu</u>, H.L. Chan, and R. Lui "Image Segmentation with Partial Convexity Shape Prior Using Discrete Conformality Structures". *SIAM Journal on Imaging Sciences*, 2020.

* J. Li, and <u>C. Siu</u>. "An Elementary Approach on Left-Orderability, Cables of Torus Knots and Dehn Surgery". Preprint.

COURSES TAUGHT

MATH 1920 Multivariable Calculus for Engineers, Cornell, head teaching assistant	*Spring 23*
MATH 1920 Multivariable Calculus for Engineers, Cornell, teaching assistant	*Fall 22*
MATH 2020 Advanced Calculus II, CUHK, teaching assistant	*Spring 19*
MATH 4060 Complex Analysis, CUHK, teaching assistant	*Fall 18*
MATH 2010 Advanced Calculus I, CUHK, teaching assistant	*Spring 18*
MATH 1510 Calculus for Engineers, CUHK, teaching assistant	*Spring 18*
MATH 1540 University Mathematics for Financial Studies, CUHK, teaching assistant	*Fall 17*

UNDERGRADUATE MENTEES

Rongyi He, currently Cornell Master student	*Summer 22 – Summer 23*
Luis Hoderlein, currently Yale PhD student	*Spring 22 – Summer 22*
Tom Shi, currently Cornell undergraduate student	*Spring 22*
Andrey Yao, currently Madison PhD student	*Fall 20 – Spring 22*

ADDITIONAL INFORMATION

Natural languages	English, Chinese (Cantonese, Mandarin)
Programing	MATLAB, Python, Bash, R