Ivan Lau | Curriculum Vitae

National University of Singapore, School of Computing
https://ivanphlau.github.io/ ivanphlau@gmail.com

CURRENT RESEARCH INTERESTS

Theoretical and algorithmic aspects of machine learning and optimization

EDUCATION

Simon Fraser University **Burnaby, BC, Canada**
M.Sc. in Mathematics September 2019 - August 2021

CGPA: 4.07/4.33
Thesis: Nonuniform Compressed Sensing Schemes with Sublinear Measurements, Sublinear Time, and Low Entropy (awarded Certificate with Distinction)
Advisor: Jonathan Jedwab
Thesis committee members: Ben Adcock, Weiran Sun (Chair), Paul Tupper (Examiner)

University of Edinburgh **Edinburgh, United Kingdom**
B.Sc. (Hons) in Computer Science and Mathematics September 2015 - June 2019

Degree classification: First-Class Honours
Informatics Honours Project: Hermitian Spectral Theory of Mixed Graphs
Mathematics project: Left Braces and the Solutions of the Yang-Baxter Equation (awarded best project)

EMPLOYMENT

National University of Singapore **Singapore, Singapore**
Research Assistant, Department of Computer Science January 2024 - Present

Rice University **Houston, TX, United States**
Research Assistant, Department of Electrical and Computer Engineering May 2023 - December 2023

Rice University **Houston, TX, United States**
Teaching Assistant, Department of Electrical and Computer Engineering August 2023 - December 2023

National University of Singapore **Singapore, Singapore**
Research Assistant, Department of Computer Science September 2021 - August 2022

Simon Fraser University **Burnaby, BC, Canada**
Research and Teaching Assistant, Department of Mathematics September 2019 - August 2021

University of Edinburgh **Edinburgh, United Kingdom**
Teaching Assistant, School of Informatics September 2017 - May 2019

University of Edinburgh **Edinburgh, United Kingdom**
Research Intern, Laboratory for Foundations of Computer Science June 2018 - August 2018

RESEARCH EXPERIENCE

Rice University **Houston, TX, United States**
Ph.D. student, Department of Electrical and Computer Engineering August 2022 - Present

Supervisors: César A. Uribe and Shiqian Ma
Description: Studied decentralized optimal transport and decentralized equitable optimal transport problems [2]. We proposed an algorithm with an iteration complexity of $O(1/\epsilon)$, which matches existing centralized first-order approaches.

National University of Singapore **Singapore, Singapore**
Research Assistant, Department of Computer Science September 2021 - August 2022

Supervisor: Jonathan Scarlett
Description: Studied model-based group testing [5] and infinite-armed bandits [3]. In the model-based group testing, we showed that the number of tests can be significantly decreased by leveraging the structural dependencies between the items. In the infinite-armed bandits, we consider a bandit problem in which there are a number of groups each consisting of infinitely many arms, and the goal is to identify the group whose distribution has the highest quantile of interest (e.g., median).

Simon Fraser University **Burnaby, BC, Canada**
Mathematics Master's Thesis, Department of Mathematics September 2019 - August 2021

Supervisor: Jonathan Jedwab
Description: Designed compressed sensing schemes which simultaneously achieve low measurement complexity, fast recovery algorithm, and low entropy. Thesis was awarded Certificate with Distinction and led to a publication [1].

University of Edinburgh **Edinburgh, United Kingdom**
Undergraduate Mathematics Project, School of Mathematics September 2018 - April 2019

Supervisor: Agata Smoktunowicz
Description: Studied the algebraic structures related to Yang-Baxter equation. I resolved a question asked by Cedó, Gateva-Ivanova and Smoktunowicz. Project was awarded William and Isabella Dick Fourth Year Project Prize, and led to a publication [4].

University of Edinburgh **Edinburgh, United Kingdom**
Informatics Honours Project, School of Informatics September 2018 - April 2019

Supervisor: He Sun
Description: Studied the spectral theory of directed and mixed graphs in Hermitian representations, as an attempt to circumvent the inconvenience caused by the complex eigenvalues in the conventional binary adjacency matrix representation.

PUBLICATIONS

In Pipeline

6. Hooman Zabeti, Nick Dexter, **Ivan Lau**, Leonhardt Unruh, Ben Adcock, Leonid Chindelevitch. Group Testing Large Populations for SARS-CoV-2, Preprint, 2021.

Journal Papers

5. **Ivan Lau**, Jonathan Scarlett, Yang Sun. Model-Based and Graph-Based Priors for Group Testing, *IEEE Transactions on Signal Processing*, 2022.

4. **Ivan Lau**. An Associative Left Brace is a Ring. *Journal of Algebra and Its Applications*, 19(09): 2050179, 2020

Conference Papers (Full Length)

3. **Ivan Lau**, Yan Hao Ling, Mayank Shrivastava, Jonathan Scarlett. Max-Quantile Grouped Infinite-Arm Bandits, *International Conference on Algorithmic Learning Theory* (ALT), 2023.

Conference Papers (Other)

2. **Ivan Lau**, Shiqian Ma, César A. Uribe. Decentralized and Equitable Optimal Transport, accepted to American Control Conference (ACC) 2024.

1. **Ivan Lau** and Jonathan Jedwab. Construction of binary matrices for near-optimal compressed sensing. *IEEE International Symposium on Information Theory* (ISIT), pages 1612–1617, 2021.

TALKS

Groups, Rings and Associated Structures 2019 — **Spa, Belgium**
From the YBE to the Left Braces — June 2019

TEACHING EXPERIENCE

Rice University

Random Signals (Teaching Assistant)	Fall 2023

Simon Fraser University

Calculus Workshop (Teaching Assistant)	Fall 2020
Applied Calculus Workshop (Teaching Assistant)	Summer 2020
Computing with Linear Algebra (Teaching Assistant)	Spring 2020
Algebra Workshop (Teaching Assistant)	Spring 2020, Fall 2019

University of Edinburgh

Informatics 2B - Algorithms, Data Structures, Learning (Teaching Assistant)	Spring 2019
Informatics 2D - Reasoning and Agents (Teaching Assistant)	Spring 2019, Spring 2018
Algorithms and Data Structures (Teaching Assistant)	Spring 2019
Discrete Mathematics and Mathematical Reasoning (Teaching Assistant)	Fall 2018, Fall 2017
Informatics 1 - Cognitive Science (Teaching Assistant)	Spring 2018

AWARDS AND HONOURS

Rice University Department of Electrical and Computer Engineering Fellowship ($35000 USD)	2022
Simon Fraser University Department of Mathematics Certificate "With Distinction"	2021
Simon Fraser University Graduate Fellowship ($6500 CAD)	2020
Simon Fraser University Special Graduate Entrance Scholarship ($5000 CAD)	2019
University of Edinburgh William and Isabella Dick Fourth Year Project Prize	2019
Malaysian Computing Challenge (Perfect Score)	2014, 2013
Malaysian National Mathematical Olympiad (4th - 13th Place Bracket)	2013
International Competitions and Assessments for School (Gold Medal in Science)	2012

PROFESSIONAL ACTIVITIES

Reviewer for American Control Conference (ACC) 2024
Reviewer for International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2024