Paul **Liu**

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Education

PhD in Computer Science
Stanford, California

Stanford University — *2017–2022*

Thesis: *Submodular Optimization in Massive Datasets*

Advisors: Moses Charikar and Jan Vondrák

Masters in Computer Science
Vancouver, British Columbia

University of British Columbia — *2015–2017*

Thesis: Characterizing minimum-length coordinated motions for two discs

Advisor: David Kirkpatrick

Bachelors in Mathematics and Physics
Vancouver, British Columbia

University of British Columbia — *2010–2015*

Thesis: Searching for the vector-like quark TA – study of multivariate analysis techniques

Advisor: Alison Lister

Work Experience

Vatic Labs
New York, USA

Senior Quantitative Researcher — *August 2022 - Current*

High-frequency systematic futures trading.

ClutchApp ApS

Research and Technology Advisor — *June 2022 - Current*

Computer vision research and technology advisor for automated racket sport statistics (`https://www.clutchapp.io/`).

Computer Science Department, Stanford
Stanford, USA

Graduate Researcher — *Sept 2017 - June 2022*

Research in distributed computing models and large-scale graph algorithms. Full list of papers at `https://cs.stanford.edu/people/paulliu/papers/`.

Adobe
Toronto, Ontario

Computer Vision Research Intern — *July 2021 – September 2021*

Automated annotation and strategy system for racket sports. See `https://cs.stanford.edu/people/paulliu/badminton/` for more information.

Microsoft
Sunnyvale, USA

Applied Data Scientist Intern — *July 2020 – September 2020*

Created recommendation / selection algorithms for `msn.com`. Created streaming algorithms for Bing search leveraging recent research in determinantal point processes.

Microsoft
Sunnyvale, USA

Applied Data Scientist Intern — *July 2019 – September 2019*

Improved advertising relevance for search queries to the Bing search engine. Improved text classification accuracy by 15% (relative increase) through CNN-based models (to be implemented in production). Also showed promising gains in few-shot learning accuracy through Graph Convolutional Network models.

Adobe
Seattle, USA

Creative Labs Intern — *June 2018 – Sept 2018*

Worked on the simulation of water bubble sounds for graphics applications. Previous works takes weeks of compute time to generate realistic acoustical simulations of liquid sounds and leverages complicated but accurate CFD codes. In this project, we aim to create new algorithms that creates acoustically plausible water sounds while bringing computational speed closer to realtime.

Vital Mechanics
Vancouver, Canada

Research Engineer — *Jan 2014 – Aug 2017*

Produced mathematical models of the human body for digital simulations. As one of the first two engineers, my work varied widely, from setting up testing and CI infrastructure to building complex physical models and optimizing solvers for specialized large and sparse linear systems. This work was spun off into a Government of Canada funded startup (Vital Mechanics Research).

Computer Science Department, UBC *Vancouver, Canada*

Graduate Researcher *Jan. 2016 – Feb. 2018*

Research in 2-body coordinated motion. Given two robots on an obstacle-free plane and two destination points, what is the shortest path each robot should take so that the two robots are not within unit distance of each other? We have classified optimal motions for a large variety of cases and have fully solved the problem when the robots are simple geometric shapes.

Facebook *Menlo Park, USA*

Software Engineering Intern *May 2015 – Aug 2015*

Worked on statistical algorithms for detecting anomalies in time-series data. This algorithm was released to all Facebook engineers through a widely used computational backend for logging data. The algorithm was also taken up by internet.org, where it was used to detect abnormal patterns in traffic data.

Google *Los Angeles, USA*

Software Engineering Intern *May 2013 – Sept 2013*

Created a stochastic model for proposed ads by potential advertisers. Purpose of the model was to predict an ad's performance before the ad is released to the public. Additionally created pipelines to automatically validate accuracy of model.

Scientific Computing Lab, UBC *Vancouver, Canada*

NSERC Research Assistantship *May 2012 – May 2015*

Created a high-performance C++ software package for performing incomplete factorizations of symmetric indefinite matrices. The complete source code, as well as extensive documentation, can be found at `https://github.com/inutard/matrix-factor`.

Publications

See `https://cs.stanford.edu/people/paulliu/papers` for a complete list.

Service

Reviewer for Electronic Transactions on Numerical Analysis (**ETNA**, 2015), Symposium on Computational Geometry (**SoCG**, 2016), European Symposium on Algorithms (**ESA**, 2019), Innovations in Theoretical Computer Science (**ITCS**, 2021), Computer Vision and Pattern Recognition Conference – CVSports (**CVPR:CVSports**, 2023-2024).

Technical program member and reviewer for Multimedia Content Analysis in Sports (**ACM MMSports**, 2022).

Board member, First Ever Foundation (401c charity for badminton scholarships).

Teaching experience

CS 368 Algorithmic Techniques for Big Data *Stanford*

Teaching Assistant *2020*

CS 348C Computer Graphics: Animation and Simulation *Stanford*

Teaching Assistant *2019*

CS490, Problem Solving Seminar *University of British Columbia*

Instructor *2014*

Science One *UBC*

Teaching Assistant *2012*

Other

2016–2021 **Coach (5 year coaching award)**, ACM-ICPC Contest World Finals

2012–2014 **Canada Site Winner**, ACM ICPC Pacific Northwest Regionals

2013 **Finalist**, ACM ICPC World Finals

Pre-2013 **Bronze Medal**, International University Physics Competition, U. Chicago Invitational Contest, Google AI Contest (7th nationally), BC Ministry of Education Award (top provincially)