Chen-Yang Su | Ph.D. Student

McGill University
Quantitative Life Sciences
550 Rue Sherbrooke Ouest
Montréal, Quebec, H3A 1E3, Canada

chen-yang.su@mail.mcgill.ca
chenyangsu.github.io
GitHub / Linkedin / Google Scholar
chenyangsu

(Last updated: September 7, 2022)

Summary

- **Research Interests**: Health economics, Applications of AI & Machine Learning to improve health care and clinical decision-making.
- **Programming Skills**: Python, C, Java, MATLAB, R, OCaml, Git, Shell, PyTorch, Scikit-Learn

Education

Ph.D., Quantitative Life Sciences, McGill University, Montreal, Canada — Sep 2022–
1st year rotations: **Alton Russell** (Sep - Dec 2022);
Advisors: *to be determined*

M.Sc., Computer Science, McGill University, Montreal, Canada — Sep 2020–May 2022
Advisors: **Brent Richards** (Departments of Medicine, Human Genetics, Epidemiology and Biostatistics) & **Joelle Pineau** (School of Computer Science / Facebook AI Research (FAIR) / Mila - Quebec AI Institute).
Thesis: *Identifying a proteomic signature for COVID-19 outcomes*

B.Sc., Joint Major in Computer Science & Biology, McGill University, Montreal, Canada — Sep 2016–May 2020
Faculty of Science Dean's Multidisciplinary Undergraduate Research List

Work Experience

Data Science Intern (Computer Vision Science Team), Hinge Health, Montreal, Canada — May 2022–Sep 2022
Manager: Colin Brown, Louis Harbour (Computer Vision Team).
Research new advanced methods of exercise recognition and feedback: *Automatic Exercise Repetition Counting*. Hinge Health

Research Experience

PhD Rotation Student, McGill University, Montreal, Canada — Sep 2022–Dec 2022
Advisors: Prof. Alton Russell (McGill School of Population and Global Health).

Research Assistant, Lady Davis Institute at the Jewish General Hospital, Montreal, Canada — Jun 2020–Aug 2020
Advisors: Dr. Sirui Zhou, Prof. Brent Richards (Faculty of Medicine, Departments of Medicine (Endocrinology), Human Genetics, and Epidemiology and Biostatistics).

Research Intern, Mila - Quebec Artificial Intelligence Institute, Montreal, Canada — Feb 2020–Aug 2020
Worked in Prof. Joelle Pineau's lab with Dr. Wonseok Jeon on research in Inverse Reinforcement Learning and imitation learning. Outcome: 1 conference paper (also accepted as a workshop paper).

Research Intern, McGill University, Montreal, Canada — Jan 2020–Apr 2020
Population genetics research combining high replicate genetic simulation with performant composite likelihood inference on admixture tract distributions to infer the history of admixed populations. Advisors: Dr. Ivan Kryukov, Prof. Simon Gravel. Outcome: semester project thesis

Research Volunteer, McGill University, Montreal, Canada Aug 2019–Oct 2019

Supported a project on developing a polygenic risk score model to improve understanding of the role of genetics in complex diseases. Advisor: Prof. Yue Li

Research Intern, Kaohsiung Medical University, Kaohsiung, Taiwan May 2019–Jun 2019

Investigated ligand-receptor binding relationships through molecular docking techniques and performed basic computer drug screening and computational analysis on novel drugs. Conducted modeling and simulation analysis on viral proteins with ChemOffice and Discovery Studio. Advisor: Prof. Ying-Ting Lin.

Research Assistant, McGill University, Montreal, Canada May 2018–May 2020

Investigated the effect of cadherin isoforms on collective cell migration in endothelial cells. Combined wet lab experimental techniques (molecular cloning, time-lapse microscopy) & dry lab image analysis (edge detection, cell coordination) through MATLAB. Trained new lab members. Advisor: Prof. Arnold Hayer. Outcome: 2 semester project theses.

PROJECTS

Automatic Exercise Repetition Detection, Hinge Health, Montreal, Canada May 2022–Sep 2022

Implemented a dimensionality reduction approach and proof of concept for automatic detection of exercise repetitions on synthetic exercise videos from Infinity AI as well as real life videos. Exercises experimented on include the squat, standing side leg raise, standing hip extension, and side lying leg raise. Project was performed as part of the larger goal of exercise recognition and feedback during a summer internship at Hinge Health.

XPRIZE Pandemic Response Challenge, Competition, Montreal, Canada Oct 2020–Mar 2021

$500K, four-month competition (link, news article) that focuses on the development of AI and data-driven systems to predict COVID-19 infection rates and prescribe intervention plans that regional governments, communities, and organizations can implement to minimize harm when reopening their cities and restarting their economies. Worked in a team of 12 (website, article) on model development to predict COVID cases and deaths in regions around the world. Rank 1/104 teams for Phase 1, Phase 2 Finalist.

PUBLICATIONS

☐ *Journal Articles* (* denotes equal contribution)

[J7] **C.-Y. Su**, . . ., J. B. Richards, "Dynamic Protein Quantitative Trait Loci: assessing how COVID-19 infection affects the genetic regulation of circulating proteins," (*In progress*).

[J6] G. Butler-Laporte, Y. Farjoun, Y. Chen, M. Hultstrom, K. Liang, **C.-Y. Su**, . . ., J. B. Richards, "Increasing serum iron levels and its role in the risk of infectious diseases: a Mendelian randomization approach," **The American Journal of Clinical Nutrition** (*Submitted*).

[J5] S. Yoshiji, G. Butler-Laporte, T. Lu, J. Willet, **C.-Y. Su**, . . ., J. B. Richards, "Proteome-wide Mendelian randomization implicates nephronectin as an actionable mediator of the effect of obesity on COVID-19 severity," **Nature Metabolism** (*Submitted*). (medRxiv)

[J4] Y. Chen, T. Lu, I. Stewart, G. Butler-Laporte, T. Nakanishi, A. Cerani, K. Liang, **C.-Y. Su**, . . ., J. B. Richards, "Genomic atlas of the plasma metabolome prioritizes metabolites implicated in human diseases," **Nature Genetics** (*In revision*).

[J3] I. Paranjpe, P. Jayaraman, **C.-Y. Su**, . . ., G. N. Nadkarni, "Proteomic Characterization of Acute Kidney Injury in Patients Hospitalized with SARS-CoV2 Infection," **Nature Communications** (*In revision*). (medRxiv)

[J2] G. Butler-Laporte, E. Gonzalez-Kozlova, **C.-Y. Su**, . . ., J. B. Richards, "The dynamic changes and sex differences of 147 immune-related proteins during acute COVID-19 in 595 individuals," **Clinical Proteomics** (*Accepted*)

[J1] **C.-Y. Su***, S. Zhou*, E. Gonzalez-Kozlova*, . . ., J. B. Richards, "Circulating proteins to predict adverse COVID-19 outcomes," **Scientific Reports** (*Under Review*). (medRxiv)

☐ *Conference Papers*

[C1] W. Jeon, **C.-Y. Su**, P. Barde, T. Doan, D. Nowrouzezahrai, J. Pineau, "Regularized Inverse Reinforcement Learning," ICLR 2021 (Spotlight Presentation, (paper): 167/2977=5.57%)

☐ *Workshops*

[W1] W. Jeon, **C.-Y. Su**, P. Barde, T. Doan, D. Nowrouzezahrai, J. Pineau, "Regularized Inverse Reinforcement Learning," NeurIPS Deep Reinforcement Learning Workshop (DRLW) 2020

☐ *Abstracts*

[A5] **C.-Y. Su**, G. Butler-Laporte, S. Zhou, T. Nakanishi, J. B. Richards, "Determining the Dynamic Changes in the Genetic Regulators of Circulating Proteins during SARS-CoV-2 Infection," McGill Endocrine Retreat 2022.

[A4] **C.-Y. Su**, S. Zhou, E. Gonzalez-Kozlova, G. Butler-Laporte, E. Brunet-Ratnasingham, T. Nakanishi, W. Jeon, D. Morrison, L. Laurent, N. Kimchi, The Mount Sinai COVID-19 Biobank Team, J. Pineau, V. Mooser, N. D. Beckmann, E. Kenigsberg, E. Schadt, S. Kim-schulze, A. W. Charney, S. Gnjatic, D. E. Kaufmann, M. Merad, J. B. Richards, "Circulating proteins to predict adverse COVID-19 outcomes," American Society of Human Genetics 2021.

[A3] **C.-Y. Su**, S. Zhou, W. Jeon, V. Forgetta, J. Pineau, J. B. Richards, "Predicting COVID-19 Outcomes Using Proteomic Data," McGill Endocrine Retreat 2021.

[A2] **C.-Y. Su**, S. Zhou, W. Jeon, V. Forgetta, J. Pineau, J. B. Richards, "Predicting COVID-19 Outcomes Using Proteomic Data," 21st Annual McGill Biomedical Graduate Conference (AMBGC 2021). (Abstract Book pg. 55) (MJM Published Abstracts)

[A1] **C.-Y. Su**, S. Zhou, W. Jeon, V. Forgetta, J. Pineau, J. B. Richards, "Predicting COVID-19 Outcomes Using Proteomic Data," Rosalind and Morris Goodman Cancer Research Centre Annual Symposium 2021.

Technical Reports

[T5] **Su, C.-Y.** Automatic Exercise Repetition Counting in Exercise Recognition and Feedback, Summer Internship, Hinge Health, Montreal, QC, Canada, Aug 2022. *Supervised by Dr. Louis Harbour and Colin Brown*

[T4] **Su, C.-Y.** Inferring the History of Admixed Populations, COMP 401: Project in Biology and Computer Science, McGill University, Montreal, QC, Canada, April 2020. *Supervised by Dr. Ivan Kryukov and Prof. Simon Gravel*

[T3] **Su, C.-Y.** Regulation of Collective Endothelial Cell Migration by N-cadherin, BIOL 467: Independent Research Project 2, McGill University, Montreal, QC, Canada, April 2019. *Supervised by Prof. Arnold Hayer*

[T2] **Su, C.-Y.** Investigating the Role of Classical Cadherin Isoforms in the Control of Collective Cell Migration, BIOL 466: Independent Research Project 1, McGill University, Montreal, QC, Canada, December 2018. *Supervised by Prof. Arnold Hayer*

[T1] **Su, C.-Y.** Spatial Learning in Porcellio Scaber, the Common Sow Bug, International Baccalaureate: Extended Essay, July 2016. *Received 33 out of 36 possible points where 29 points is an A.*

Invited Talks and Presentations

[IT4] "Circulating proteins to predict adverse COVID-19 outcomes," American Society of Human Genetics, Oct 18-22, 2021. **Poster Presentation**. (*International*)

[IT3] "Circulating proteins to predict adverse COVID-19 outcomes," CIFAR Deep Learning & Reinforcement Learning (DLRL) Summer School (Virtual), Jul 26-31, 2021. **Poster Presentation**. (*International*)

[IT2] "Circulating proteins to predict adverse COVID-19 outcomes," Summer Reasoning and Learning (RL) Lab Mini Conference, McGill University (Virtual), Jun 17-18, 2021. **Lightning talk**.

[IT1] "Predicting COVID-19 outcomes using proteomic data," 21st Annual McGill Biomedical Graduate Conference (AMBGC 2021), Virtual, May 11, 2021. **Poster Presentation**. *Won 1st place under the "Genetics and Gene Expression" category* (poster).

Other Talks and Presentations

[OT5] "Dimensionality Reduction and Automatic Repetition Counting", Hinge Health, Sep 1, 2022. **Presentation**. *Presented my summer internship results to the computer vision science team (9 scientists). 80 min talk.*

[OT4] "Exercise Recognition and Feedback - Automatic Repetition Counting", Hinge Health, Aug 23, 2022. **Presentation**. *Presented a proof of concept to the CEO (Dan Perez) and the machine learning team (25 scientists) applying principal component analysis to the squat exercise to automatically count exercise repetitions. 10 min talk.*

[OT3] Computer Vision Reading Group, Hinge Health, Jul 4, 2022. **Presentation**. *Presented the paper "Applying a principal component analysis to movement coordination in sport" to the machine learning team ($\sim$ 25 scientists). 1 hour presentation. (slides).*

[OT2] "Dynamic Protein Quantitative Trait Loci," OAS1 Working Group Meeting, Virtual, Feb 25, 2022. **Presentation**. *Presented to major collaborators, researchers, and professors from Canada, UK, Germany, Sweden, and USA working on association of the OAS1 gene with COVID-19 outcomes.*

[OT1] "Predicting COVID-19 outcomes using proteomic data," Icahn School of Medicine at Mount Sinai Proteomics Meeting, Virtual, Mar 18, 2021. **Presentation**. *Presented to major collaborators, researchers, and professors at Mount Sinai (New York) working on plasma proteomics of COVID-19.*

Peer Review Experience

Peer Review (FAES 300: Independent Internship), McGill University Sep 2022

Reviewed an internship report by an undergraduate student (Emily Richardson) - *The Effectiveness of Environmental, Social, and Coporate Governance (ESG) Impact Assessments* - written as part of their FAES 300: Independent Internship course.

Summer Schools and Programs

[S6] Neuromatch Academy - Deep Learning (NMA-Deep Learning) (Virtual), Jul 11-29, 2022 (Declined). (Program)

[S5] Oxford Machine Learning (OxML) Summer School (Virtual), Jul 19-21, Aug 9-20, 2021. (Program). *"...15x more [applicants] than the number of seats that the school could offer; from 118 countries."*

[S4] Neuromatch Academy - Deep Learning (NMA-Deep Learning) (Virtual), Aug 2-20, 2021 (Declined). (Program)

[S3] CIFAR Deep Learning & Reinforcement Learning (DLRL) Summer School (Virtual), Jul 26-31, 2021. (Program)

[S2] STAQ Quantum Ideas Summer School, Duke University (Virtual), Jun 7-11, 2021. (Program). *Topics covered include: Fundamentals of Quantum Information, Quantum Algorithms, Trapped Ions, Superconductors, Spins in Semiconductors, Quantum Architecture, Quantum Error Correction.*

[S1] Quebec Scientific Entrepreneurship Program (QcSE), Online, May 19 - Sep 23, 2021. (Program)

Honors and Awards

Graduate Excellence Award ($3,000 CAD), McGill University 2022–2023

$3,000 CAD awarded in monthly installments of $250 CAD over 12 consecutive months by Quantitative Life Sciences

Graduate Excellence Award ($2,000 CAD), McGill University 2022–2023

One-time amount of $2,000 CAD awarded by Quantitative Life Sciences

Doctoral Training Award ($84,000 CAD), Fonds de recherche du Québec – Santé (FRQS) 2022–2026

Ranking: 2nd place in *Genetics, Genomics, Proteomics, Transcriptomics, Epigenomics, Bioinformatics, Clinical Genetics* category.

Quantitative Life Sciences Stipend Award ($25,000 CAD), Quantitative Life Sciences 2022–2023

$23,000 award with an additional $2,000 in "recognition of the excellence of your dossier, and our strong interest in admitting you."

LOJIQ Fellowship ($700 CAD), Quebec Scientific Entrepreneurship (QcSE) Jun–Sep 2021
Awarded for participation in the Quebec Scientific Entrepreneurship Program. Project title: 77655, NA Quebec / Scientific Entrepreneurship Program (QcSE) / The Quebec Research Fund (FRQ) - Summer 2021.

1st Place, 21st Annual McGill Biomedical Graduate Conference ($250 CAD), McGill University May 2021
Best poster presentation (3 min presentation, 2 min Q&A) under the "Genetics and Gene Expression" category.

LDI / TD Bank Studentship Award ($18,000+ CAD), Lady Davis Institute, Montreal, Canada Apr 2021–Mar 2022
Competition awards a minimum of $18,000 CAD for 1 year with $10,000 CAD supported by TD Bank.

Research Scholarship ($7,125 CAD), Mila - Quebec Artificial Intelligence Institute, Montreal, Canada May–Aug 2020
Awarded for 16-weeks of full-time research. Supervised by Dr. Wonseok Jeon and Prof. Joelle Pineau.

Faculty of Science Dean's Multidisciplinary Undergraduate Research List, McGill University May 2020
Recognizes graduating "*students who have participated in substantial and broad undergraduate science research*".

Science Undergraduate Research Award (SURA) ($7,000 CAD), McGill University (Declined) Mar 2020
Awarded for 16 weeks of full-time research and development activity under the supervision of a McGill Faculty of Science professor. Awarded by the Department of Biology.

Golden Key International Honour Society Jan 2017
By invite only to the top 15% in a program of study by GPA

Dean's Honour List, McGill University, Montreal, Canada 2017
Awarded to the top 10% in the Faculty of Science by GPA

Graduation Program Examinations Scholarship ($1,250 CAD), British Columbia, Canada 2016
Awarded to the top 5000 Grade 12 students in BC (based on their percentage score) on all five provincial exams.

Teaching

Teaching Assistant, COMP 202: Foundations of Programming, McGill University Sep 2022 - Dec 2022
Class size $\sim$ 800 students.

Tutor, Pathways to Education (Pointe-Saint-Charles), Montreal, Canada Jan 2022 - May 2022
3 hours a week of tutoring high school students from low-income communities (organization).

Teaching Assistant, COMP 202: Foundations of Programming, McGill University Sep 2021 - Dec 2021
Class size $\sim$ 500 students. Lead live sessions, graded and marked student presentations and assignments, hosted office hours and exam review tutorials.

McMedHacks, Hackathon Judge, McGill University Aug 2021
Invited as a judge for a 3-day Hackathon on deep learning in medical image analysis attended by 145 participants (30+ teams).

McMedHacks, Mentor, McGill University Jun–Jul 2021
Mentor for 356 participants (38 countries) attending the Medical Imaging Analysis and Deep Learning in Python Workshop (website). Tasks: created assignments, curated and answered student questions during workshops, and hosted TA sessions.

Service and Leadership

Co-Curricular Record, McGill University 2019–Present
"McGill's Co-Curricular Record (CCR) is a document that recognizes a student's involvement in learning opportunities outside the classroom." (Co-Curricular Record).

Graduate Funding Panel - Graduate Orientation Fellowship Sessions - FRQS, McGill University Aug 2022
Invited as a student speaker to give a 20 min presentation + 15 min Q&A during orientation week to 120+ incoming graduate students at McGill University on the FRQS application process and my own experience applying. Aug 24, 2022. (slides, recording).

Homeless Shelter Volunteer, Resilience Montreal Feb 2022–May 2022
5 hours a week of assisting with preparing and serving meals, organizing and distributing clothing/hygiene product, and keeping the environment clean and safe (organization).

Undergraduate Poster Showcase Mentor, Office of Science Education, McGill University Mar 2022
Mentored an undergraduate student (Eleanor Reilly): supported them with poster creation and provided feedback on their presentation and poster - *Macdonald Student-run Ecological Garden (MSEG)* .

Clinic Volunteer and Shadowing, Jewish General Hospital, Endocrinology Sep 2021–May 2022
3 hours a week of shadowing and assisting an endocrinologist in the clinic.

Mentor, Buddy Program, Mila - Quebec Artificial Intelligence Institute Aug 2021
Mentored new international graduate students joining Mila in Fall 2021. Showed students around campus and acted as a guide and first point of contact.

Babysitter, Montreal, Canada Aug 2021
In charge of taking care of two children aged 8 (female) and 6 (male). Responsibilities: feeding, changing clothes, monitoring and supervising closely while children play.

International Conference on Machine Learning (ICML), Volunteer (Virtual) 2020, 2021

Conference on Neural Information Processing Systems (NeurIPS), Volunteer (Virtual) 2020

19th Annual Re$earch Money (R$) Conference, Volunteer (Virtual) 2020

SKILLS21 Program Committee, SSMU Representative, McGill University, Montreal, Canada 2019–2020

Teaching & Learning Services Working Group Committee, SSMU Representative, McGill University, Montreal, Canada 2019–2020

Montreal AI Symposium (MAIS), Volunteer, Montreal, Canada 2018, 2020

Tzu Chi Foundation, Food Bank Volunteer, Vancouver, Canada 2014–2016

Leukemia and Lymphoma Society of Canada, Volunteer, Vancouver, Canada Sep 2015–2016

Marpole Community Centre, Volunteer (birthday parties & kids' open gym), Vancouver, Canada Dec 2014–Jun 2015

BMO Half Marathon, Volunteer, Vancouver, Canada Feb 2015

Girls Basketball City Championships, Team Ambassador, Vancouver, Canada Feb 2014–Mar 2014

VEX Robotics Competition, Volunteer, Vancouver, Canada Jan 2014–Jun 2014

CERTIFICATIONS

2022 Kevin Mitnick Security Awareness Training, Online - certificate Jun 2022

HIPAA: Hybrid Entities, Online - certificate Jun 2022

Combating Fraud, Waste, and Abuse (FWA), Online - certificate Jun 2022

YMCA Child Protection Policy and Procedures Orientation, Online - certificate Oct 2021

Oxford Machine Learning Summer School, Virtual - certificate Aug 2021

ICML Volunteer Certificate of Appreciation, Virtual - certificate 2020, certificate 2021 Aug 2020, Aug 2021

CIFAR Deep Learning and Reinforcement Learning Summer School, Virtual - certificate Jul 2021

FRQ DIS-EN: QcSE Discovery, Quebec Scientific Entrepreneurship Program (QcSE), Montreal, Canada - certificate Jun 2021

Personal Finance Essentials, McGill University Desautels Faculty of Management, Montreal, Canada - certificate Aug 2020

Past Certifications

Safe Use of Biological Safety Cabinets, McGill University, Montreal, Canada — May 2018–May 2021

Introduction to Biosafety, McGill University, Montreal, Canada — May 2018–May 2021

Hazardous Waste Management & Disposal, McGill University, Montreal, Canada — Jun 2018–Jun 2021

WHMIS, McGill University, Montreal, Canada — Aug 2018–Aug 2021

Personal Information

Languages
English (native), Chinese Mandarin (native), Taiwanese (native), French (basic knowledge).

Hobbies
Table Tennis, Gymnastics, Running, Calisthenics, Swimming, Yoga, Poetry, Music Production.

Canadian Citizen, Taiwanese Citizen