My Blog
Google Scholar
Github
LinkedIn

Stephen Lu

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Education

McGill University — Montreal, Canada
B.Sc. in Honours Computer Science; ***GPA: 4.00/4.00*** — *Aug 2021 – Dec 2024*
Minor Degree in Mathematics; ***GPA: 4.00/4.00*** — *Aug 2022 – Dec 2024*

- **Awards:** Schulich Leader Scholarship (80 000$), Emily R Crawford Scholarship (1 000$), Laurie Hendren Memorial Scholarship (1 925$), Dean's Honour List
- **Coursework:** Representation Learning, ML in Genomics & Healthcare, Reinforcement Learning, Causal Inference, Honours Discrete Mathematics, Probability, Statistics, Spectral Graph Theory, Combinatorial Optimization
- **Exchange Semester at the National University of Singapore (Winter 2023)**

Professional Experience

BigHat Biosciences — San Mateo, California
Machine Learning Intern — *May 2024 – Aug 2024*

- Developed fitness conditional generative models inspired from recent literature to improve antibody variant design
- Improved sample diversity, thermostability, and binding affinity using phage display & CFPS screening data

Hero AI — Toronto, Ontario
Co-Founding Engineer — *Jun 2020 – Sep 2022*

- Designed a server-side rendering library that produces interactive React components from static JSON schemas, enabling the team to deliver near real-time frontend updates through a low-code platform.
- Hired and onboarded three full-time frontend developers and organized weekly scrum, sprints, and code reviews.
- Deployed dashboards, mobile app, and web app to 80 000+ yearly patient users and 5 000+ hospital staff users.

Research Experience

MILA - Supervised by Prof. Jian Tang — Montreal, Quebec
Research Intern — *Sep 2024 – Present*

Publication: Structure Language Models for Protein Conformation Generation

- Ran experiments comparing our method to existing conformer generation methods, achieving 20-100x speedup
- Setup appropriate baselines such as AlphaFlow, MSA subsampling, and ConfDiff

MILA - Supervised by Prof. Yoshua Bengio & Dr. Michał Koziarski — Montreal, Quebec
Research Intern — *Feb 2024 – May 2024*

Publication: Cell Morphology-Guided Small Molecule Generation with GFlowNets

- Trained multimodal embedding models (GMC, CLIP) on transcriptomics, cell morphology, and mol. structures
- Used GMC latent space to guide GFlowNets for diverse molecular candidate generation and scaffold hopping
- Benchmarked methods against soft-RL algorithms (Soft Q-Learning, Soft Actor-Critic)

McGill University - Supervised by Dr. Emmanuel Bengio — Montreal, Quebec
Undergraduate Researcher — *Oct 2023 – Feb 2024*

Publication: QGFN: Controllable Greediness with Action Values

- Implemented RL baselines (DDQN, A2C, SAC) on synthetic (hypergrid, bitseq) and real tasks (qm9, fragSEH)
- Ran ablation experiments to validate effect of GFlowNet variant parameters in different environment settings
- Developed **gen** and **vis** libraries to standardize and streamline training runs and plots

The Hospital for Sick Children - Supervised by Dr. Devin Singh — Toronto, Ontario
Collegiate Researcher — *Oct 2020 – Jul 2021*

Publication: From Clinic to Computer and Back Again (Curr Treat Options Peds)

- Explored time-series regression methods to forecast emergency room wait-times and patient inflow.
- Trained multi-modal neural network from triage data (textual, categorical, scalar) to screen for respiratory illnesses.

Awards & Honours

Laurie Hendren Memorial Scholarship (1 925$)	*2024*
8VC Fellowship (2 500$)	*2024*
Schulich Leader Scholarship - Undergrad (80 000$)	*2021-2024*
Emily R Crawford Scholarship (1 000$)	*2022*
Loran Scholarship Finalist - Undergrad (2 000$)	*2021*
Youth Can Innovate Award (8 000$)	*2019*
The Actuarial Foundation of Canada Award (1 000$)	*2019*
Canada Wide Science Fair - Silver Medal	*2019*
Expo-Sciences Hydro-Quebec (1 500$) - 1st place in Quebec	*2019*
Full Ride Scholarship to University of Quebec Network (Declined)	*2019*

Projects

Technical Blog | *Website* *2023-Present*

- A technical blog where I document my learning process on machine learning, math, and software development.
- Some highlight posts include variational autoencoders, semantic gpt3 embeddings, and network science.

Real Estate Portfolio | *GitHub* | *Website* *2023*

- Professional real estate agent portfolio written in Rust and SvelteKit
- The project highlight is a multi-threaded filewatcher service in Rust that updates the agent's listings every day.

React Dynamic Renderer | *GitHub* | *npm* *2022*

- Built and published a public npm package for dynamic rendering of ReactJS components from JSON templates.
- Package has around ∼100 weekly downloads on the npm package registry.

Skills

Programming: Python, JavaScript, Typescript, Rust, C++, Java, OCaml, SQL, Bash
Data Analysis: Jupyter, Pandas, Numpy, PyTorch, PyTorch-Lightning, Hydra, Wandb, Scanpy
Frontend Frameworks: React, SvelteKit, Vanilla HTML & CSS, Dash, Plotly, Android Studio, XCode
Backend Frameworks: Flask, NodeJS, Rust Rocket, Rust Diesel, Celery
Other: Git, Docker, AWS, Oracle Cloud, Unix, Linux, Nginx

Languages

Native: English, French
Fluent: Standard Mandarin Chinese
Working Proficiency: Spanish

Press

McGill Reporter. Relations Office (2021, August 31). *Six McGill students receive Canada's largest STEM scholarships*

LaPresse. n.a. (2019, 16 April). *LaPresse tête d'affiche: Élève honoré Stephen Lu*