Tian Bai

Undergraduate student at McGill University   Montreal, Canada
tian.bai3@mail.mcgill.ca — +1 (514) 441-2550 — www.linkedin.com/in/tian-bai — https://www.github.com/tian-bai

EDUCATION

McGill University, #Montreal, #Canada   09.2021 — 12.2024
Bachelor of Science in Honours Mathematics and Computer Science   Cumulative GPA: 4.00/4.00
Minor: Statistics

ACADEMIC EXPERIENCE

McGill University   Montreal, Canada
Research Assistant   05.2024 — Present

- Model-free selection inference, conformal prediction and applications in drug discovery and development
- Selected to receive Science Undergraduate Research Award (SURA)
- Supervisor: Prof. Archer Yi Yang

McGill University, MILA   Montreal, Canada
Research Assistant   01.2024 — Present

- Machine learning modeling for single-cell velocity analysis
- Supervisor: Prof. Jun Ding, Prof. Archer Yi Yang

Lady Davis Institute for Medical Research, McGill University   Montreal, Canada
Research Assistant   09.2023 — Present

- Developed multiple Machine Learning (ML) models for triage acuity prediction in hospitals
- Evaluated performance of ML models versus the Canadian Triage Acuity Scale (CTAS) using ROC-AUC, PR-AUC
- Investigated importance of predictors using SHapley Additive exPlanations (SHAP) approach
- Supervisor: Prof. Lars Grant

McGill University   Montreal, Canada
Research Assistant   11.2022 — 04.2023

- Created a software for low-latency distance approximation in C and presented a demo
- Worked with microcontrollers (ESP32) and corresponding development environment (ESP-IDF) for testing
- Integrated accelerometer, magnetometer, and gyroscope with ESP32 for pathfinder development
- Gained experience working with Raspberry Pi (model 3 and 4)
- Supervisor: Prof. Muthucumaru Maheswaran

WORK EXPERIENCE

Vffice, Inc.   Longueuil, Canada
Software Developer Intern   05.2023 — 08.2023

- Developed Microsoft Business Central extensions in AL language for building customized management platform
- Collaborated with functional consultants to ensure custom solutions integrate seamlessly with different systems
- Maintained source code repository using Git, Git Bash and Microsoft Azure DevOps services
- Supervisor: Yisheng Cao

PERSONAL PROJECTS

Stochastic Variance Reduction Applied to RL Algorithms   02.2024 — 04.2024

- Applied SVRG, AdaSVRG methods on various Reinforcement Learning (RL) algorithms including Actor-Critic, SAC, with the goal to reduce variance and enhance training
- Benchmarked performance of RL algorithms with various optimizers
- Stochastically variance reduced methods could lead to more stable training process and better asymptotic behavior

Simple Ray Tracer in C++   10.2023 — 12.2023

- Developed a ray tracer that supports diffuse reflection, specular reflection and refraction with multiple types of materials
- Incorporated modern C++ feature such as smart pointers while adhering to OOP design and principles
- Improved image rendering performance through C++ multithreading

MLP/CNN Models for the FashionMNIST dataset 09.2023

- Implemented Multilayer Perceptron (MLP) and Convolutional Neural Network (CNN) models in Python from scratch
- Employed techniques such as Adagrad and ADAM for model training, and cross-validation for hyper-parameter tuning
- Calculated essential performance metrics including precision, recall and F1 score for a thorough evaluation of the model

Simple User-Level Threading Library in C 10.2022 — 11.2022

- Created a user-level threading library with an FCFS thread scheduler and two types of handlers for tasks and file IO
- Utilized generic queue and context-switch-related functions
- Learned multiple designs of thread schedulers, and gained experience in multi-threaded programming

PUBLICATIONS

Manuscript
In Progress

- Grant, Lars; Diagne, Magueye; Aroutiunian, Rafael; Hopkins, Devin; Bai, Tian; Kondrup, Flemming; Clark, Greg, Machine learning outperforms the Canadian Triage and Acuity Scale (CTAS) in predicting early critical illness in the Emergency Department.

SELECTED ADVANCED COURSES

Bachelor's Courses

- MATH 680 Computation Intensive Statistics*
- COMP 551 Applied Machine Learning*
- COMP 579 Reinforcement Learning*
- MATH 523 Generalized Linear Models*

- MATH 455 Honours Analysis 4
- MATH 457 Honours Algebra 4
- COMP 421 Database Systems
- MATH 447 Introduction to Stochastic Processes

*Graduate Courses

CERTIFICATES

Microsoft Certified: Azure Data Engineer Associate 06.2023

- Design and implement data storage
- Develop data processing
- Secure, monitor, and optimize data storage and data processing

Microsoft Certified: Azure Developer Associate 08.2023

- Develop Azure compute solutions; develop for Azure storage
- Implement Azure security; Monitor, troubleshoot, and optimize Azure solutions
- Connect to and consume Azure services and third-party services

AWARDS

Science undergraduate research award (SURA) Montreal, Canada
15 weeks of full-time research under the supervision of a professor, with financial support
Amount: $8700 03.2024

Tomlinson Engagement Award for Mentoring Montreal, Canada
For the Helpdesk Tutor positions
Amount: $300 12.2023, 03.2024

A. D. Pelletier Scholarship in Mathematics and Statistics Montreal, Canada
Amount: $4400 09.2023

Robert W Wilson Scholarship Montreal, Canada
Amount: $2500 09.2022

Dean's Honour List Montreal, Canada
A maximum of the top 10% of continuing students in each faculty is named to the Dean's Honour List 09.2022, 09.2023

OTHER EXPERIENCES

McGill University   Montreal, Canada
CSUS (Computer Science) Helpdesk Tutor   01.2024 — 04.2024

- Help students tackle their assessments and understand coursework through effective teaching techniques

McGill University   Montreal, Canada
Math Helpdesk Tutor   09.2023 — 12.2023

- Actively answering and discussing mathematics problems with students
- Enhance students' understanding of specific math knowledge and learn mutually

McGill University   Montreal, Canada
Teaching Assistant - Grader   09.2023 — 04.2024

- (Fall 2023) Grader for MATH 350 Honours Discrete Mathematics taught by Prof. Sergey Norin
- (Winter 2024) Grader for MATH 457 Honours Algebra 4 taught by Prof. Henri Darmon

EXTRACURRICULAR ACTIVITIES

- Contestant, Compete McGill (competitive programming club at McGill). Team ranked 5th in the 2023 NAQ contest.
- Presentation on Mo's algorithm.
- Presentation on Advanced Dynamic Programming techniques.

SKILLS

- **Programming: C/C++, Python, HTML, Javascript, Java, C#, R, SQL, OCaml**
- **Software/Tool: Git, Visual Studio, Eclipse, Powershell, Microsoft Azure, Rstudio, PyTorch, Tensorflow, Scikit-learn**