Hainan Xu

33 Dunfield Ave, Toronto, ON
647-685-6915 hainanxuu@gmail.com linkedin.com/in/hainan-xu/ github.com/HainanXu

Education

University of Toronto **Sep. 2023 – Jun 2024**
Master of Science, Statistics *Toronto, ON*

McMaster University **Sep. 2019 – Jun 2023**
Bachelor of Science in Mathematics and Statistics, summa cum laude *Toronto, ON*

Awards

James Stewart Research Award; Co-op Student of the Year Nominee (By Co-operators)

Professional Experience

University of Toronto **Sept. 2023 – Current**
Graduate Research Student, Supervisor: Prof. Jun Young Park *Toronto, ON*

- Developed harmonization methods for longitudinal neuroimaging data by modelling the temporal and spatial correlations.
- Performed parameter estimation using Method of Moments and Empirical Bayes.
- Proposed and examined multiple correlation structures under different experiment settings using simulations.
- Reproduced the results from prior papers and performd model validation.

The Co-operators General Insurance Company **Aug. 2023 – Sep. 2023**
Actuarial Intern *Toronto, ON*

- Investigated and developed rating differentials of different provinces that are being used in current business.
- Automated the reconciliation process and improved the efficiency of the team by developing Python scripts.
- Conducted tutorials as part of the new co-op onboarding process and facilitated the Co-operators - McMaster Workshop.

Research Projects

Hierarchical Modeling for Microbiome Data | *R: tidyverse, DADA2, phyloseq, DESeq2* **May 2022 - Apr. 2023**

- Analyzed data by combining unsupervised machine learning technique and statistical method called topic mixed modelling.
- Denoised the sequence reads, clustered them into ASVs, then performed differential abundance analysis.
- Implemented fit Latent Dirichlet Allocation to find microbiome communities (topics), then fitted the topics into a negative binomial mixed-effect model to estimate the effect sizes of the topics with hold-out samples.

Agent-based Modeling for Disease Transmission | *Python: NumPy, Matplotlib, SciPy, PyCX* **Dec. 2021**

- Generated 3,000 agents with various characteristics that could move and transmit disease within a confined space.
- Defined transition matrix of agents' states using SIRD model.
- Implemented MCMC to estimate the distribution of the infection process.
- Developed animation to visualize agents' spatial-temporal movements and change of state.

Publications

Hainan Xu, Daihai He. Modeling the Dynamics of a Ratio-Dependent Leslie–Gower Predator–Prey System with Strong Allee Effect. International Journal of Bifurcation and Chaos, 32, 2022, 1-18.

Yiming Fei, **Hainan Xu** et al. Seroprevalence and infection attack rate of COVID-19 in Indian cities. Infect Dis Model. 2022 Jun;7(2):25-32.

Technical Skills

Skills and Tools: Python (Pytorch, Scikit-learn), R, SQL, Git, PLINK, Rstan

Leadership / Extracurricular

Math & Stats Research Seminar **May 2022 – 09/2022**
Co-organizer *McMaster University*

- Co-organized weekly research seminars for students in Department of Mathematics and Statistics with Mike Cummings.