Steven Liu

+1 (519)721-5934 | bingfanliu36@gmail.com | LinkedIn Link

WORK EXPERIENCE

Applied Scientist | *Amazon.com, Canada* Sep. 2025–Present

- Integrated **LLM** systems and **prompt engineering** methods to analyze **Alexa** model failures using production defect traffic, achieving 97% diagnostic accuracy and improving **voice/NLP** robustness across diverse home environments.
- Generated large-scale **synthetic privacy**-compliant data for LLM post-training (SFT), improving downstream prediction accuracy.

Applied Scientist Intern | *Amazon.com, United States* Jun. 2024–Sep. 2024

- Analyzed 2B+ log entries to identify position bias in legacy ranking model, redefining the method to **group-wise position-aware recommendation** system.
- Implemented a **Transformer-**based **personalized recommender** that ranks full product lists for **100M**+ users.
- Deployed the solution end-to-end on **AWS** (S3, IAM, SageMaker) with automated CI/CD pipelines.
- Delivered a **5-10 %** lift in top-k Precision, Recall, and NDCG, yielding >**$400M** annual revenue impact.

Machine Learning and MLOps Engineer Intern | *Celayix Software, Canada* Sep. 2023–May 2024

- Migrated codebase from TensorFlow1 to **TensorFlow2,** leveraging **AWS** (S3, Lambda, Step Functions, SageMaker) services.
- Integrated Neural **Collaborative Filtering** (CF) for shift **recommendation**, saving clients up to **$2600** per employee annually.
- Wired automated rollouts through the TeamCity **CI/CD** pipeline, enabling zero-downtime weekly updates of the model.

Statistical Consultant Intern | *SFU Big Data Hub, Canada* May 2023– Dec. 2023

- Improved rock-sample clustering accuracy by **7% (Silhouette score)** using **DBSCAN** and density-based feature engineering.
- Processed **audio** recordings from language exams with functional regression, achieving **98% R-square** for rating estimation.

Quantitative Model Developer | *Scotiabank, Canada* Jun. 2021–Aug. 2022

- Led the development of a **machine learning** pipeline for **stress-testing** 90% of bank products valued at **$32B**.
- Selected the top 10 risk features to quantify impacts on bank solvency under **tail risk scenarios**.
- Engineered backend algorithms to reconcile bank balance sheets for assets exceeding **$1.3T**.

Founding Data Analyst | *Yumi Organics, Canada* May 2021–Aug. 2022

- Built interactive **data dashboards** for sales analysis across 100+ cities, driving a 20% revenue increase to **$5M**.
- Analyzed KPIs, supply chain and campaign, aiding company success and CEO recognition as **Forbes 30 Under 30** in 2023.

Statistician | *McGill University Health Centre, Canada* Nov. 2020–May 2021

- Designed a **recommendation** algorithm for kidney transplantation reducing the odds of graft loss by 10%.
- Discovered 500+ critical genetic variables linked to transplant failure using Cox and **network clustering** (WGCNA) models.
- Performed **statistical hypothesis testing** on genetic variable distribution across 10 provinces and diverse ethnic groups.

Machine Learning Researcher - Signal Data Processing | *University of Waterloo, Canada* Sep. 2019–Aug. 2020

- Developed an **SVM-based** classifier for binary **classification** with signal input data, achieving 87% classification accuracy.
- Identified 64 neural features for drug addiction classification using **EEG signals**.

Data Scientist Intern | *United Nations, Remote* Jun. 2019–Sep. 2019

- Forecasted poverty levels for 5 impoverished countries using a **CNN-**backbone model with satellite **images** in **PyTorch**.
- Achieved 83% accuracy in predicting severe rainfall events using **PCA** and **Random Forest**.

EDUCATION

Doctor of Philosophy, Statistics | *Simon Fraser University* Sep. 2022–Aug. 2025
Master of Mathematics, Statistics | *University of Waterloo* Sep. 2019–Aug. 2020
Bachelor of Arts, Honors Economics Joint Honors Mathematics | *University of Waterloo* Sep. 2016–Apr. 2019

SKILLS

Programming Languages/Software: Python, R, Java, C, SQL, PyTorch, TensorFlow, Keras, Scikit-learn, Pandas, Numpy, Matplotlib, AWS, Git, Bitbucket, TeamCity, PySpark, PowerBI and Tableau.

Technical Skills: Machine Learning, Computer Vision, Recommender System, Generative AI, Data Science, Deep Learning, LLM, Time Series Analysis, Experimental Design, Causal Inference, Data Visualization, LLM Post-training.

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PROJECTS

3D Computer Vision - TensoRF Replication
- Replicated TensoRF for modeling 3D object based on the influential ECCV 2022 paper achieving PSNR score of 30.

Fraud Detection – A Semi-Supervised Learning Approach
- Implemented an auto-encoder model in PyTorch that detected 99% of fraudulent records while addressing label imbalance.

Experimental Design / AB Testing
- Applied response surface method to reduce simulated Netflix users' average browsing time by 20%.

PUBLICATIONS

Dynamic Prediction of Large Vision Language Model (LVLM) with Continual Test Time Adaptation, *In Progress*
- Designed a continual test time adaption framework for dynamic prediction on censored streaming data.

Causal Inference in Estimating Time-varying Treatment Effect with Unobserved Confounders, *In Progress*
- Addressed endogeneity in time-varying treatment effect estimation by proposing a two-stage copula model.

FunKAN: A Kolmogorov-Arnold Network for Signal-to-Signal Learning using Functional Data Analysis, *In Progress*
- Proposed a KAN-based network for function-to-function learning with signal-based inputs and outputs.

LongSurvMamba: A State-space Model for Survival Prediction using Longitudinal Images, *Submitted to Neurocomputing*
- Introduced a state-space model for interpretable survival prediction through sequential image analysis.

SurvLonFormer: Survival Prediction using Longitudinal Images based on Transformer, *Submitted to Statistics in Medicine*
- Engineered a Transformer model to analyze sequential medical images (MRI, CT scans) for Alzheimer's Disease prediction.

Multistate Modeling of Antimalarial Medication Adherence and Mortality, *Accepted by Lupus (2025)*
- Identified determinants of state transitions of patients receiving medication with censored data.

LoFPCA_Cox: Dynamic Risk Prediction with Time-varying Images, *Accepted by Canadian Journal of Statistics (2025)*
- Proposed a semi-parametric method for survival risk prediction using time-varying images and incomplete labels.

Optimal Subsampling for Generalized Additive Models for Large Scale Datasets, *Statistics and Computing (2025)*
- Introduced an efficient sampling method for parameter estimation in GAMs applied to large-scale datasets.

Transformer-based Position Aware Item Recommender, *Amazon Machine Learning Conference (2024)*
- Developed a Transformer-based, position-aware recommender that mitigates position bias for list-wise item recommendations.

L1-regularized Functional Support Vector Machine, *Statistics and Its Interface (2024)*
- Engineered an L1-regularized SVM tailored for signal inputs, including ultrasound, audio, EEG, ECG and fMRI data.

The Calculated Panel of Incompatible Epitopes in Equitable Access to Transplantation, *American Transplant Congress (2021)*
- Proposed the cPIE statistic to enhance identification of blood and epitope-compatible donors.

Towards National Organ Sharing: Fair Distribution of Eplets in Canada, *American Transplant Congress (2021)*
- Analyzed epitope frequency strategies to ensure regional and national HLA compatibility.

Is Equitable Access to Transplantation Possible in the Era of HLA Epitope Compatibility, *American Transplant Congress (2021)*
- Investigated the impact of ancestry on transplantation outcomes using frequency-based hypothesis testing.