

# Bryan Zang

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## EDUCATION

University of Waterloo — Bachelor of Mathematics

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Majors in Honours Statistics and Honours Computational Mathematics

Minor in Computing

- **Relevant courses:** Probability Theory, Computational Statistics, Neural Networks, Life History & Survival Analysis, Advanced Regression, Estimation & Hypothesis Testing, Stochastic Processes, Databases, Linear/Nonlinear Optimization, Graph Theory, Generalized Linear Models
- **Extra Curricula:** Photography Club, Waterloo Rocketry, Data Science Club, Stats Club, Waterloo Blockchain

## SKILLS

- **Programming:** Python, SQL, R, Java, Matlab, Julia, JavaScript, LaTeX, HTML/CSS
- **Technologies:** Numpy, Pandas, sci-kit, PyTorch, TensorFlow, Excel, Azure, Jupyter
- **Languages:** Mandarin Chinese, English

## PROJECTS

### Implementing and Comparing Optimal Survival Tree Algorithm

- Compared the optimal survival tree algorithm (OST) with a traditional Cox proportional hazards regression model and a tree model resulting from random survival forest methods.
- Measured results using **Harrel's C Statistic**, **Area Under Curve (AUC)**, and **Dynamic AUC**.
- Computed Kaplan-Meier curves and life tables for explanatory data analysis (EDA).

### Spatial Models for Canadian Temperature Inference

- Compared different spatial models to explain annual Canadian temperature for statistical inference.
- Built models using **spline-based regression**, **polynomial regression**, and **General Additive Models (GAMs)**.
- Measured results using Generalized Cross Validation score (GCV) and R-squared.

### Graphify

- Compiles a selection of graphical properties given an input image of a mathematical undirected graph.
- Applied graph theory concepts such as bipartition, trees, chromatic number, and planarity.
- Utilized **matplotlib** and **OpenCV** for image processing and **networkx** and **numpy** to compute the graph characteristics.

### Simplex Implementation

- Implemented various theories and computations from *A Gentle Introduction to Optimization* (Guenin, Konemann, and Tuncel).
- Applied theories including **Simplex algorithm**, **Bland's Rule**, **two-phase Simplex**, and **duality theory**.

### Tumor Modeling with HTC's and iNKT Cells

- Extended and analyzed an existing differential equations (DE) system describing the interactions between tumor cells, helper T cells, and CD8+ cells.
- Conducted **phase plane analysis**, **Hopf Bifurcation**, and **apoptosis analysis**.
- Simulated results for computational analysis based on predator-prey physics.

### Stock Trend Predictor

- Used SwiftUI to develop an iOS app that employs several APIs to search and retrieve stock information.
- Built a **RESTful API** using **AWS Gateway API** and a **Flask** framework to handle **HTTP** requests.
- Utilized **AWS Lambda** to download relevant stock data, run a prediction model trained using **machine learning (ML)** forecasting techniques, and store outputs in **AWS DynamoDB**.

### Whiteboard.io

- Created a digital whiteboard intended for multiple users to simultaneously use.
- Developed front-end environment with **HTML**, **CSS**, and **JavaScript**.
- Included features such as saving drawing, undo function, clear canvas function, brush size, and brush color.

## CERTIFICATIONS

- **Microsoft Certified: Azure AI Fundamentals** — *Microsoft*
  - Recognized for fundamental knowledge of machine learning (ML) and artificial intelligence (AI) concepts and related Microsoft Azure services.
  - Applied concepts towards natural language processing (NLP), facial recognition, object detection, and image classification.
  - Familiarized with technologies such as Kubernetes and topics like basic cloud concepts.