

Haoran Li

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PhD in mathematics with a strong foundation in mathematics and data science. Proficient in Python and C++ programming, capable of thinking critically and solving complex problems.

Education

Ph.D. in Mathematics, University of Maryland, Expected Graduation Fall 2024 (GPA 4.0/4.0)

B.S. in Mathematics and Applied Mathematics, Sun Yat-sen University, Graduated Jun 2018 (GPA 3.7/4.0)

- Majored in **Software Engineering** from Aug 2013 - Jun 2014 (GPA 3.7/4.0)

Skills

Programming: Python, C++, C, Javascript, MATLAB, Mathematica, MySQL, R

Framework: scikit-learn, Tensorflow, PyTorch, Linux, AWS

Skills: PDE, Statistics, Stochastic calculus, Time series analysis, Neural network, Monte Carlo simulation

Experience & Projects

Home Credit - Credit Risk Model, College Park, MD

May 2024

- Developed a binary classification model to predict customer loan defaults.
- Exploited a custom differentiable loss function based on the WMW statistic to maximize the AUC.
- Conducted correlation analysis on nearly 500 different features, categorizing and conforming feature types, eliminating redundant features, and engineering new features, resulting in a refined dataset of aggregated features.
- Constructed an ensemble of LightGBM models, XGBoost models and CatBoost models with a customized loss function that maximizes AUC, achieved over 90% accuracy and AUC score of 0.80 using the average prediction.

The Erdős Institute Data Science Bootcamp

Sep 2022 – Dec 2022

- Performed an in-depth exploratory analysis on 3,000,000 orders from over 20,000 Instacart customers.
- Employed PCA and KMeans clustering to categorize customers into 3 groups based on their shopping preferences.
- Developed a customized XGBoost model for specific customer groups, achieving prediction accuracies exceeding 91% with appropriate cut-off values to anticipate the likelihood of future repurchases of various items.
- Delegated tasks into subtasks for every team member and ensured timely and effective communication.

Software Engineer, Intern, Wolfram|Alpha

June 2023 – Aug 2023

- Developed step-by-step functions to solve partial sums and sums of 7 types of series in Mathematica, utilizing VS code and Sourcetree, worked within the established framework and protocol of the Wolfram|Alpha Math team.
- Devised efficient algorithms and appropriate code structures, ensuring adaptability not only to standard inputs but also to novel instances with desirable outputs.
- Initiated pull requests, sought peer reviews, iteratively refined them until gaining unanimous approval, and eventually incorporated selected implementations into the Wolfram|Alpha codebase for accessibility by end users.

Research Assistant, University of Maryland – College Park, MD

Sep 2020 – Dec 2024

- Worked on constructing a model for integral motivic cohomology and exploring the combinatorial properties of multiple polylogarithms. Developed a Mathematica package for symbolic computations related to the model.
- Authored and coauthored several scholarly papers focused on motivic models of multiple polylogarithms.

Publications & Preprint

The Lie coalgebra of multiple polylogarithms. Zachary Greenberg, Dani Kaufman, Haoran Li, Christian K. Zickert. J. Algebra, vol. 645, pp. 164-182.

Hopf algebras of multiple polylogarithms, and holomorphic one-forms. Zachary Greenberg, Dani Kaufman, Haoran Li, Christian K. Zickert. arxiv.org/abs/2203.11588 (Preprint)

Awards & Honors

- Second prize on the 5th Chinese Mathematics Competitions (CMC)
- First prize on China Undergraduate Mathematical Contest in Modeling (CUMCM-2016)
- Dean's Fellowship, University of Maryland
- Hauptman Summer Fellowship, University of Maryland
- Scholarship of Canadian Alumni Association (Hong Kong)
- First-Class Scholarships, Sun Yat-sen University
- Aziz Osborn Gold Medal in Teaching Excellence, University of Maryland