Haoran Li

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Education

Ph.D. in Mathematics, University of Maryland, Expected Graduation Fall 2024 (GPA 4.0/4.0)
- Courses: Applied Stochastic Processes, Scientific Computing, Time Series Analysis, Mathematical Methods in Machine Learning

B.S. in Mathematics and Applied Mathematics, Sun Yat-sen University, Graduated Jun 2018 (GPA 3.7/4.0)
- Majored in **Software Engineering** (Aug 2013 - Jun 2014), top 5% student
- Courses: Data Structures and Algorithms, Objective-Oriented Programming, Data Mining

Skills

Programming: LaTeX,Python, C++, C, SQL, R, MATLAB, Julia, HTML, Javascript, VBA, Scala
Framework: scikit-learn, Tensorflow, PyTorch, Keras, Linux, Git, AWS
Skills: Stochastic calculus, Statistical analysis, Regression analysis, Time series analysis, NLP, Monte Carlo simulation, Pipeline, A/B testing

Experience

Software Engineer Intern, Wolfram|Alpha, Remote — Jun 2023 – Aug 2023
- Developed step-by-step functions to solve sums of 7 types of series in Mathematica, utilizing Visual Studio 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 outcomes.
- Initiated pull requests, sought peer reviews, iteratively refining codes 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 – May 2023
- Constructed models for integral motivic cohomology with multiple polylogarithms and associated Hodge structures. Proved pertinent theorems. Devised algorithms and developed Mathematica packages for computations.

Instructor & Teaching Assistant, University of Maryland, College Park, MD — Sep 2018 – Dec 2024
- Developed comprehensive lecture notes and slides for each class session.
- Created exams, quizzes, homework assignments, MATLAB projects.
- Held regular office hours and review sessions.
- Proficient in using Canvas, Gradescope and Matlab Grader.
- Managed and maintained my teaching page

Projects

Home Credit - Credit Risk Model, Kaggle — Apr 2024 - May 2024
- Developed a binary classification model which predict customer loan defaults, maximizing AUC scores.
- Utilized a custom differentiable loss function based on the Wilcoxon-Mann-Whitney statistic.
- Conducted correlation analysis on 500 different features, categorized and combined types, eliminated redundancies, and engineered new features, yielding a refined dataset of aggregated features.
- Constructed an ensemble of LightGBM, XGBoost and CatBoost models with the custom loss function, achieving over 90% accuracy and an AUC score of 0.80 using the average prediction.

TED talk Classification, Johns Hopkins University, INMAS Machine Learning Workshop — Feb 2023 - Apr 2023
- Employed the re package for pruning and preprocessing TED talk texts, breaking them into smaller segments.
- Applied Word2Vec to convert words into vectors and used a bag-of-words model for average representations.
- Generated 2D graphs of the word vectors, conducting correlation investigation and clustering analyses.
- Built a three-layered neural network model on 2,000 TED talk texts, capable of labeling them based on categories such as “Technology”, “Entertainment” and “Design”. Attained approximately 80% accuracy.
- Fine-tuned a BERT model for the same classification task, achieving 85% accuracy and F1 score of 0.78.

Instacart Basket Analysis, 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 each specific customer group, obtained 91% accuracy predictions based on an appropriate cutoff of the likelihoods of future repurchases of various items.

Publications & Preprints

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:2211.08337

Awards & Honors

- Aziz Osborn Gold Medal in Teaching Excellence, University of Maryland
- 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