Curriculum Vitae - Chuqiao Huang

Personal Information

Chuqiao (Cordelia) Huang

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Education

M.S. Applied Mathematics, Columbia University, United States *Sep 2023 - Feb 2025*

- Cumulative GPA: 4.00/4.33
- Key Coursework: Partial Differential Equations, Numerical Analysis, Optimization, Stochastic Analysis, Deep Learning, Natural Language Processing

B.S. Applied Mathematics, University of California San Diego, United States *Sep 2018 - Jun 2022*

- Cumulative GPA: 3.86/4.00 (*cum laude*)
- Key Coursework: Real Analysis, Probability & Statistics, Computational Statistics, Linear Algebra, Abstract Algebra, Object-Oriented Programming

Research Experience

Visiting Student Mohamed bin Zayed University of Artificial Intelligence, UAE *Oct 2025 - Present*

Advisor: Professor Ekaterina Kochmar.

- Identified the critical gap that current LLM-based math tutors lack systematic error diagnosis: they solve problems accurately but cannot identify where or why a student's reasoning fails.
- Tackled the challenge of operationalizing fuzzy pedagogical categories which traditionally suffer from poor inter-annotator agreement: existing frameworks conflate distinct cognitive breakdowns (e.g., misreading constraints vs. incorrect modeling strategies) and lack verifiable definitions.
- Designed 25-subtype hierarchical taxonomy grounded in Newman's error analysis and Blum-Leiß modeling cycle; operationalized classification by representing problems as semantic graphs and solutions as expression trees, where errors manifest as structural divergences (for example, missing nodes indicate comprehension failures, invented nodes reveal flawed strategies).
- Established annotation protocol on MR-GSM8K (725 instances) and VtG (611 instances) datasets; conducting inter-annotator agreement study to create gold-standard benchmark for evaluating whether structured taxonomies improve LLM error localization over zero-shot baselines.

Data Scientist Internship Kuaishou Technology, China *Jul - Sep 2025*

- Developed a robust trend detection framework for A/B test metrics using Mann-Kendall, Modified Mann-Kendall (HR98), Sen's slope, and OLS with Newey-West HAC, optimizing for autocorrelation and small-sample conditions; adopted for platform-wide drift monitoring.
- Implemented CUPAC (ML extension of CUPED) for variance reduction: trained multivariate models on pre-experiment data with cross-fitting, achieving up to 5% traffic reduction and improved MDE sensitivity over baseline CUPED in LT7 experiments.
- Validated the platform's CUPED module through 5,000+ simulation trials, quantifying variance reduction across metric types prior to large-scale deployment.

Visiting Student Academy of Mathematics and Systems Science, CAS, China *Jul - Sep 2024*

Advisor: Professor Jialin Hong.

- Developed and optimized numerical schemes for stochastic wave equations with additive noise using spectral methods combined with exponential integrators; implemented Monte Carlo simulations with 10,000+ trajectories to verify theoretical convergence rates and quantify variance reduction in high-dimensional settings.
- Achieved strong convergence order $O(\tau^{1/2})$ matching theoretical bounds while maintaining numerical stability.

Course Project Columbia University, United States *Jan - May 2024*

Advisor: Professor Ching-Yung Lin.

- Investigated the challenge of "persona drift" in Large Language Models (LLMs), addressing the inherent limitation where models fail to sustain coherent personality constraints across multi-turn dialogues and revert to generic, homogenized responses.
- Developed a dual-component architecture combining BERT-based memory selection with Llama3-8B response generation, grounded in the Big Five personality model. Created a novel dataset of 128 personas spanning all 32 personality combinations, and adapted the Big Five Inventory (BFI) as an automated evaluation protocol using GPT-4.
- Achieved 81.6% average personality alignment accuracy across five dimensions, with 95.5% on Openness; demonstrated that memory-augmented generation improves consistency by 7.5% over baseline prompting approaches.

Course Project University of California San Diego, United States *Mar - Jun 2021*

Course Project for MATH 185: Computational Statistics.

- Analyzed a cohort of 49,938 ICU admissions (47,596 patients) from 2008 to 2011 to examine changes in the proportion of elderly ($\geq$ 80 years) ICU patients and their associated outcomes.
- Applied regression analysis to model the relationship between age and mortality, adjusting for preexisting conditions, and interpreted the odds ratios of seven estimated regression effects using advanced R programming techniques.

Technical Skills

Programming: Python, Java, MATLAB, R, SQL

Machine Learning & AI: Supervised/unsupervised learning, deep learning, reinforcement learning, fine-tuning (full fine-tuning, LoRA, PEFT), prompt engineering

Frameworks & Libraries: PyTorch, TensorFlow, scikit-learn, Keras, Hugging Face Transformers, NLTK, SpaCy

Web Development: Flask (API integration, model deployment), HTML/CSS (basic)

Areas of Expertise: Natural Language Processing, Numerical Methods, Statistical Learning, A/B Testing, Time Series Analysis

Tools & Platforms: Git, Docker, Jupyter, Google Cloud Platform (GCP), LaTeX

Languages: Mandarin (native), English (fluent) , Japanese (intermediate)

Teaching Experience

Math Tutor Haddee Education, Remote *Jan 2025 - Present*

- Tutor K-12 and college students in Algebra, Calculus (AP AB/BC), and college-level mathematics; provide targeted SAT/ACT test preparation focusing on quantitative reasoning.

Teaching Assistant Columbia University, United States *Jan - May 2024*

Course: APMA E4990: Introduction to Mathematics of Data Science.

- Graded weekly assignments and led weekly discussion sections for 20+ students, clarifying advanced mathematical concepts and fostering deeper understanding.

Grader University of California San Diego, United States *Feb 2021 - Mar 2022*

Courses: Vector Calculus, Differential Equations, Differential Geometry

- Evaluated student assignments and provided timely, constructive feedback to support learning and academic progress.

Work Experience

AI Development Internship Haddee Education, United States *Feb - Jul 2025*

- Contributed to backend AI development for Haddee's educational platform by training and applying supervised fine-tuning (SFT) to models.
- Improved model accuracy and relevance in handling queries about college admissions, academic programs, and coursework through iterative evaluation and prompt optimization.

Data Analyst Internship China Life Capital Investment Co., Ltd, China *May - Jul 2024*

- Built financial modeling tools (IRR analysis, cash flow optimization) for real estate and energy portfolio assessment; conducted policy research on affordable housing and consumption tax reforms to inform investment strategy.