Yuchen Zheng

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EDUCATION

Columbia University，New York, USA
Master of Science in Electrical Engineering, Fu Foundation School of Engineering and Applied Science 09/2024 - 01/2026
Relevant Coursework: Natural Language Processing ,Deep Learing ,Reinforcement Learning ,Signal Processing
Xidian University, Xi'an, China 09/2020 - 06/2024
Bachelor of Science in Information Engineering, School of Communication Engineering (Overall GPA: 3.7/4)
Relevant Coursework: Advanced Mathematics ,Linear Algebra ,Graph Theory ,Physics ,Data Structure and Algorithm Design ,Database System ,Introduction to Data Mining ,Machine Learning

PUBLICATIONS

Yu Li, Yuchen Zheng, Giles Hamilton-Fletcher, Marco Mezzavilla, Yao Wang, Sundeep Rangan, Maurizio Porfiri, Zhou Yu, John-Ross Rizzo ,**Exploring the Use of VLMs for Navigation Assistance for People with Blindness and Low Vision 2025**

RESEARCH EXPERIENCE

Market Demand Forecasting with Machine Learning and Time Series Models
Undergraduate Research Assistant, supervised by Prof. Nan Cheng 09/2022 - 01/2023

- Project Focus: 1) Investigated automotive aftermarket demand forecasting using machine learning and time series models.
- Key Achievements: 1) Developed an accurate algorithmic framework for automotive aftermarket demand forecasting，addressed demand prediction at various granularity levels. 2) Proposed an inventory forecasting method with tracking schemes and seasonal effects. 3) Innovatively integrated machine learning and time series models for improved accuracy.
- Learning Outcomes: *1) Data Skills:* Proficient in handling and preparing demand data and external features. *2) Model Application:* Applied machine learning and time series models effectively. *3) Tuning and Evaluation:* Implemented hyperparameter tuning and model evaluation using various metrics.

Design and implementation of text classification scheme based on NLP
Undergraduate Research Assistant, supervised by Prof. Wenping Ma 12/2023 - 03/2024

- Project Focus: 1) Research text classification based on NLP, and study TextRCNN and TextRNN+Attention models. Improve classification accuracy through attention mechanism and model fusion.
- Key Achievements: 1) Designed and optimized TextRCNN, integrating CNN and RNN structures to improve text classification accuracy.2) Implemented TextRNN+Attention, introducing an attention mechanism to enhance feature extraction from sequential data. 3) Conducted extensive experiments, with the TextRCNN model achieving 91.27% classification accuracy, outperforming traditional models.
- Learning Outcomes: *1) Model Implementation: Proficient in developing and optimizing deep learning models (TextCNN, TextRNN, TextRCNN, TextRNN+Attention) using PyTorch. 2) Data Processing: Experienced in handling text classification datasets, including tokenization and word embedding techniques.*

Research on Interpretable Quantification Technology of Biometrics Based on Causal Inference
Algorithm Engineer Intern, Institute of Automation, Chinese Academy of Sciences 04/2024 – 06/2024

- Project Focus: 1) Researched interpretable quantification of biometric features based on causal inference, focusing on optimizing adversarial attack methods and analyzing their impact on model interpretability.
- Key Achievements: 1) Collected, organized, and reproduced mainstream adversarial attack methods such as FGSM, PGD, and CW, performing optimization tests. 2) Built a dataset containing 100+ types of adversarial samples, analyzed the impact of different attack methods, and improved model robustness.3) Combined causal inference theory to optimize attack and defense strategies, conducted experimental analysis, and completed visualization reports.
- Learning Outcomes: *1) Adversarial Attack: Mastered mainstream methods such as FGSM, PGD, and CW, optimized attack strategies, and improved the diversity and effectiveness of attack samples.2) Model Optimization: Applied causal inference principles to improve the interpretability and robustness of biometric recognition.*

Exploring the Use of VLMs for Navigation Assistance for People with Blindness and Low Vision
Research Assistant, supervised by Prof. Zhou Yu 10/2024 – 01/2025

- Project Focus: 1) Investigated the potential of Vision-Language Models (VLMs) to assist individuals with blindness and low vision (pBLV) in navigation tasks.2) Evaluated state-of-the-art VLMs, including closed-source models (GPT-4V, GPT-4o, Claude-3.5-Sonnet) and open-source models (Llava-v1.6-mistral, Llava-onevision-qwen).3) Designed pBLV-specific prompts to assess the models' ability in ambient obstacle counting, relative spatial reasoning, and wayfinding-related scene understanding.
- Key Achievements: 1) Developed a systematic evaluation framework for testing VLM capabilities in navigation-specific tasks.2) Conducted large-scale experiments analyzing model performance in real-world navigation scenarios.3) Identified key limitations in existing VLMs, including spatial reasoning biases and object-counting inconsistencies.4) Provided actionable insights for improving VLM applications in assistive navigation technologies.
- Learning Outcomes: *1) Model Evaluation and Optimization: Deeply study the performance of VLMs in navigation tasks, master model performance metrics, and explore strategies to improve the model's spatial reasoning capabilities.2) Multimodal AI Applications: Combining computer vision and natural language processing technologies to explore the application potential of VLM in real-world scenarios and optimize its practicality in assisted navigation.*

HONORS AND AWARDS

- First Prize (M) in the Mathematical Contest in Modeling and Interdisciplinary Contest in Modeling (MCM/ICM) 2023
- Special Prize in the Microcontroller System Design Competition at Xidian University 2023

SKILLS AND HOBBIES

- **Programming Skills:** Proficient in Python, C++, with extensive coding experience in designing and implementing complex algorithms and data structures.
- **Database Management:** Skilled in relational database management systems, particularly MySQL, with expertise in designing and optimizing databases.
- **Hobbies and Interests:** 1) Lifelong soccer fan, promoting a healthy lifestyle. 2) An astronomy enthusiast, exploring the unknown starry sky.