

Xiang Zhang

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Education

Boston University, Boston, MA

Sept. 5, 2023 – May 16, 2025 (Expected)

MS in Computer Science Cum GPA: 4.0/4.0

- Courses: *Analysis of Algorithms, Operating Systems, Computer Language Theory, Web Mining and Graph Analytics, Database Management, Data Science with Python, Advanced Machine Learning and Neural Networks, Advanced Programming Techniques*

Zhengzhou University, Zhengzhou, China

Sept. 1, 2018 – Jun. 22, 2022

Bachelor of Engineering in Chemical Engineering and Technology

- Courses: *Supervised Machine Learning, Neural Networks and Deep Learning, Advanced Machine Learning*

Professional Skills

- **Programming Languages:** Python, C++, SQL, R, Swift, Kotlin, Java
- **Frameworks & Libraries:** PyTorch, TensorFlow, Keras, OpenCV
- **Technical Expertise:** Data Analysis, Machine Learning, Natural Language Processing (NLP), Computer Vision
- **Certificates:** Coursera – Natural Language Processing - a Deep Learning AI Specialization; Deep Learning; Explainable AI (XAI); Generative AI with Large Language Models; Recommender Systems; Parallel, Concurrent, and Distributed Programming in Java; Causality Inference
Machine Learning Engineering for Production (MLOps); IBM Data Science
edX - Tiny Machine Learning (TinyML) Professional Certificate (HarvardX)
Microsoft Certified: Azure AI Engineer Associate

Publication

- **Xiang Zhang**, Khatoon Khedri, and Reza Rawassizadeh. 2024. [Can LLMs substitute SQL? Comparing Resource Utilization of Querying LLMs versus Traditional Relational Databases](#). In *Proceedings of the 62nd Annual Meeting of the Association for Computational Linguistics (Volume 4: Student Research Workshop)*, pages 34–41, Bangkok, Thailand. Association for Computational Linguistics.
Link: <https://arxiv.org/abs/2404.08727>
- **Xiang Zhang**, Eugene Pinsky, S&P-500 vs. Nasdaq-100 price movement prediction with LSTM for different daily periods, *Machine Learning with Applications*, 2025, 100617, ISSN 2666-8270.
Link: <https://doi.org/10.1016/j.mlwa.2024.100617>
- **Xiang Zhang**, Eugene Pinsky. Comparing Algorithmic Trading Strategies by Analogies to Machine Learning. *Submitted to Algorithmic Finance (Journal)*. (Under revision)

Research Projects

AIOS: Research on LLM Integration and Multi-Agent Collaboration

Sept. 2024 – Present

Collaboration with the Rutgers University Team

- Contributed over 3000 lines of code, enhancing the system's performance, reliability, and scalability;
- Developed SEEACT Agent with asynchronous messaging and context-based response algorithms, improving task efficiency by 30% and reducing error rates by 15%;
- Expanded system capabilities by adding configuration management, advanced error logging, and streamlined API key handling;
- Implemented features enabling local agent uploads, browser support, and file downloads, boosting adaptability and processing speed by 20%;
- Provided extensive documentation and corrected bugs, increasing developer experience.
- GitHub: <https://github.com/agiresearch/AIOS> / <https://github.com/agiresearch/Cerebrum>

Recognizing Fitness Activities on Mobile Phones with the Assistance of Large Language Models (LLMs) May 2024 – Present

Individual Author & Research Assistant | Master Thesis | Advisor: Dr. Reza Rawassizadeh, Boston University

- Applied YOLOv7 and MyPose models to accurately detect and categorize a variety of gym activities, such as weight lifting and treadmill running, using the built-in sensors of iOS devices, such as accelerometers and gyroscopes;
- Utilized optical flow techniques to capture motion dynamics, improving the precision of detecting activities like squats and lunges by analyzing continuous movement patterns;
- Processed and optimized sensor data by filtering noise and normalizing signals, ensuring that data is segmented into meaningful chunks representing different physical activities to enhance model performance;
- Integrated large language models to enable immediate and personalized activity feedback, such as tracking repetitions and suggesting rest intervals based on detected exercise intensity.

Evaluated Large-Scale AI Models for SQL Query Substitution

Sept. 2023 – Jun. 2024

1st Author & Research Assistant | Advisor: Dr. Reza Rawassizadeh, Boston University

- Evaluated the performance of AI models such as Llama 2, Optimus, and Mistral in executing natural language queries, comparing their resource efficiency and accuracy with traditional SQL databases;
- Analyzed the energy consumption of large language models during query processing, further validating the low resource utilization and low energy efficiency of the Llama-2 (7B) model;

- Investigated the trade-off between accuracy and resource use, clarifying that while the AI model has improved accuracy in query interpretation, the high computational cost reduces its utility;
- Created custom Python scripts to measure execution time, CPU, and memory usage during query processing, enabling accurate comparisons between AI models and SQL databases in resource-constrained settings.

S&P vs. Nasdaq Price Movement Prediction with LSTM for Different Daily Period

Oct. 2023 – Nov. 2024

Individual Author & Research Assistant | Advisor: Dr. Eugene Pinsky, Boston University

- Applied Long Short-Term Memory (LSTM) networks to predict financial market movements, specifically focusing on S&P 500 and Nasdaq indices;
- Implemented feature engineering techniques to capture complex market dynamics, enabling the LSTM model to extract from financial time series data, contributing to improved investment strategies and portfolio management;
- Conducted a comprehensive analysis by experimenting with various hyperparameters and stacking multiple LSTM layers with dropout, enhancing the model's ability to predict stock market trends and demonstrating the effectiveness of these techniques in handling complex financial datasets;
- Published findings advance the application of deep learning in finance, providing insights into how AI-driven models enhance decision-making in financial markets and offering practical tools for investors to navigate market complexities.

Comparing Algorithmic Trading Strategies by Analogies to Machine Learning

Feb. – Jun. 2024

1st Author & Research Assistant | Advisor: Dr. Eugene Pinsky, Boston University

- Developed a novel Return Efficiency Index that established a link between trading strategy returns and machine learning classification accuracy;
- Applied k-Nearest Neighbors (k-NN) to design quantitative trading strategies, emphasizing the utility of machine learning algorithms in financial market prediction;
- Provided a geometric interpretation of the Index, similar to ROC, simplifying trading strategy comparisons;
- Enhanced AI-driven financial analysis by integrating technical analysis with machine learning.

Internship Experience

Basys.ai, Cambridge, MA

Oct. 2023 – Jan. 2024

Software Engineer Intern

- Analyzed Electronic Health Records (EHR) using OpenAI's ChatGPT to generate structured outputs, including variable names, relevant data, and decision aids to support physicians' medical decisions and treatment planning effectively;
- Designed and developed frontend interfaces and backend logic, contributing to the entire project lifecycle from patient symptom descriptions to treatment outcome generation;
- Participated in the logic design and business processing of backend code, ensuring seamless integration between patient inputs and AI-generated outputs;
- Played a key role in the end-to-end development process, including handling complex data processing tasks and managing project directories and dependencies.

Social Engagement

JPMorgan Chase & Co. - Software Engineering Job Simulation | Forage Internship

Oct. – Nov. 2023

- Established a local development environment to resolve repository issues;
- Built an interface with stock price data feeds, then leveraged the Perspective library to create dynamic charts to visualize real-time trading data.

KPMG - Data Analytics Consulting Virtual Internship | Forage Internship

Mar. 2023

- Processed and analyzed three datasets of customers (demographics, addresses, and three-month transactions);
- Mapped the age distribution of customers using Pivot and found that the majority of customers were in the 50-60 age range, with a sharp decline in the number of customers in the 30-39 age range;
- Used RFM Analysis to filter out the top 1000 highest-priority customers to analyze and derive detailed insights about customer preferences and behavior.

CAFA Protein Function Prediction | Kaggle Competition

Jul. – Aug. 2023

- Developed an AI model trained on protein amino acid sequences and other data, leading to a better understanding of protein function by researchers;
- Used cutting-edge T5 and ProtBERT embeddings in MLP and 1D CNN models for protein sequence analysis;
- Implemented a comprehensive training pipeline using PyTorch Lightning, optimizing model performance with techniques such as dropout regularization and learning rate scheduling;
- Performed rigorous validation and testing to achieve competitive F1 scores and AUC metrics, resulting in a **Silver Medal (Top 4.5%)** in the competition.

Toxic Comment Classification Challenge | Kaggle Competition

May – Jun. 2023

- Used TfidfVectorizer to build a multi-headed model to extract meaningful features from text data;
- Implemented and fine-tuned multiple classifiers, including Logistic Regression, Multinomial Naive Bayes, and Support Vector Machines (SVM), to effectively handle various toxic comment categories;
- Conducted detailed evaluation using ROC curves and AUC metrics to optimize model performance, ensuring robust and reliable predictions across different toxicity labels;
- Utilized advanced techniques such as CalibratedClassifierCV for probability calibration, improving the predictive accuracy of the actual dataset by 3%.