XINYU (CINDY) ZHANG

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EDUCATION

Boston University Boston, MA
Master of Computing & Data Science, GPA 3.80/4 Expected Dec 2024

- Required courses: Deep Learning, Cloud Computing, Randomized Algorithms.

University of International Business and Economics Beijing, China
Bachelor of Engineering, Department of Data Science, GPA 3.3/4 Sep 2019 - Jun 2023
Bachelor of Economics, Department of Financial (International Business and Trade) (Double Major)

RESEARCH INTERESTS

Generative AI, AI Applications, Mathematical Reasoning with LLMs, AI in Data Science and Economics

PUBLICATIONS

AI-driven review systems: Evaluating LLMs in scalable and bias-aware academic reviews
Keith Tyser, Ben Segev, Gaston Longhitano, **Xin-Yu Zhang**, Zachary Meeks, Jason Lee, Uday Garg, Nicholas Belsten, Avi Shporer, Madeleine Udell, Dov Te'eni, Iddo Drori
Submitted, AAAI under review, 2024

Solving the International Mathematical Olympiad, Harvard's Mathematics PhD Qualifying Exams, and MIT's EECS curriculum at a human level
Iddo Drori, Ben Segev, Gaston Longhitano, **Xin-Yu Zhang**, Keith Tyser, Ryan Nie, Chunhao Bi, Ayush Sharma, Mao Mao, Uday Garg, Shreyas Sudarsan, Seunghwan Hyun, Bargav Jagatha, Shivacharan Oruganti, Zack Meeks, Xi Chen, Akshat Gurbaxani, Abhaya Shukla, Ori Kerret, Nicholas Belsten, Avi Shporer, Madeleine Udell
In Progress, 2024

RESEARCH EXPERIENCES

Research Assistant @ BU Dept. of Computer Science Dec 2023 - Present
Supervisor: Professor Iddo Drori
Project Focus: Participated in research on quantizing and fine-tuning various large language models (LLMs), including Gemma, LLaMA, and Phi, to evaluate and rank responses based on human preferences.

- Fine-tuned LLMs to predict which responses would be preferred by humans in pairwise comparisons.
- Developed advanced techniques to improve response quality and alignment with human preferences.
- Successfully applied these models in LMSYS Kaggle competition, showcasing the ability to fine-tune and deploy models effectively.

Research Assistant @ BU Faculty of Computing & Data Science Feb 2024 - Present
Supervisor: Professor Dokyun Lee
Project Focus: Citation Network Analysis in AI

- Analyzed citation relationships within the AI field, including crawling 190k paper datasets, 200k author datasets and 30k institution datasets.
- Built a citation network to map the influence of major companies on AI research and innovation.
- Conducted network analysis to understand how prominent companies shape AI development and research trends.

ACADEMIC PROJECTS

Deep Learning for Precise Subtitle Segmentation Mar 2024 - May 2024

- Developed a deep learning-based solution for precise subtitle segmentation using sentence transformers, attention-based neural text segmentation, and hierarchical LSTM models.
- Created an automated video-to-text conversion pipeline, followed by token labeling for effective subtitle segmentation based on syntactic and semantic cues.
- Fine-tuned on the MuST-Cinema dataset, supporting multilingual and multi-format subtitle generation with a focus on enhancing readability, timing accuracy, and content coherence.

- Compared model performance with proprietary tools like CapCut, demonstrating superior accuracy in subtitle synchronization and overall viewer experience.

Exploring Gender Bias in Large Language Models Sep 2023 - Dec 2023

- Conducted a systematic analysis of gender bias across GPT-3, GPT-3.5, and GPT-4 models, as well as Google Bard, using the WinoBias dataset comprising 3,160 sentences.
- Uncovered and documented a comparative analysis showing Google Bard's higher inclination towards gender bias relative to GPT-4, offering critical insights for AI ethics.
- Employed advanced data analytics techniques for bias assessment, including statistical analysis and trend comparison. Utilized Python for data manipulation and visualization.
- Revealed a notable increase in accuracy from GPT-3.5 (50%) to GPT-4 (91%). Highlighted GPT-4's advanced capabilities in complex sentences processing and gender-neutral language processing.
- Quantified a 7% reduction in gender bias from GPT-3 to GPT-4, and observed a 10% greater bias in Google Bard.

Fine-Tuning LLMs for Real Analysis Problems Sep 2023 - Dec 2023

- Engineered and fine-tuned GPT-3.5-turbo model, specifically designed to tackle complex mathematical problems from the Harvard Math Entrance Exam.
- Curated a unique dataset from mathematics textbooks, extracted theorems and definitions. Formed a knowledge base, enabled nuanced understanding and interpretation of advanced mathematical concepts.
- Integrated GPT-4 to leverage the Lemma Finder's output, enhancing the model's ability to provide accurate solutions and proofs for advanced mathematical problems.
- Let model accurately answered 2 out of 3 complex real analytic questions from the 2023 Fall Exam, surpassing the detail and accuracy of standard GPT-4 responses.

Racial Disparities in Bus Commute Times in Boston Sep 2023 - Dec 2023

- Investigated Boston's bus commute time disparity, revealing that Black riders spend 64 more hours annually on buses than White riders, underscoring significant racial disparities in public transit.
- Processed 8 years of commuter data from the American Community Survey (2014-2021), each dataset encompassing approximately 60,000 records, to assess the impact of COVID-19 on commuting patterns.
- Analyzed the impact of COVID-19 on bus commute disparities using linear regression models. Found that pandemic slowed down the decreasing trend of disparity in 2020 and 2021.
- Calculated a 6.98% difference in commute time disparities in 2020 and a more substantial 20.92% in 2021, indicating that the pandemic's effects on commute patterns may have extended into 2021.

Research on Restaurant Review Behavior Difference Jan 2023 - May 2023

- Web scraped Beijing and Shanghai restaurant reviews of top 100 restaurants, each with a size of 50k comments. Variables including name, type, tagging of stores and content, scoring of reviews.
- Examined the sentiment tendency of reviews initially by using NLP libraries such as snownlp/jieba. Then used sentiment dictionaries and BERT methods to improve the accuracy of judgments.
- Compared the reviews of two cities in terms of ratings and focus points of comments, and found that users in Beijing pay more attention to cost-effectiveness, while users in Shanghai focus more on the atmosphere.

SKILLS

- **Python**: Extensive experience in data analysis, building machine learning models, and data visualization using libraries such as Matplotlib and Seaborn.
- **Tableau**: Expertise in visualizing complex data sets to derive actionable insights through interactive dashboards and storytelling.
- **SQL**: Skilled in managing large-scale data operations, writing complex queries, and optimizing database performance for analytics and reporting.
- **Google Cloud Platform**: Proficient in deploying models on GCP, managing cloud resources, and utilizing BigQuery for scalable data analysis.
- **PyTorch & Transformers**: Experienced in fine-tuning large language models (LLMs) for NLP tasks, applying techniques like LoRA for efficiency and domain-specific adaptation.