

Tianyang Xu

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New York, NY - 10025, United State

EDUCATION

- **Columbia University** Sep 2023 - Present
Master in Operation Research New York, NY, US
 - GPA: 3.88/4.0
 - Relevant coursework: Natural Language Processing | Modern Recommendation system | Optimization Methods and Models | AI, Games, Market | Machine Learning for FE and OR | Stochastic models | AI Applications in Finance | Research Training
- **University of Colorado Denver** Sep 2019 - Jun 2023
Bachelor of Art in Economics Denver, CO, US
 - Grade: 3.92/4.0
 - Minor in Mathematics
 - Relevant coursework: Analytical Geometry and Calculus | Applied Linear Algebra | Statistical Theory | Probability Statistics with Computer Applications
- **China Agricultural University** Sep 2019 - Jun 2023
Bachelor of Art in Economics Beijing, BJ, CN
 - GPA: 3.79/4.0
 - Minor in Data Science
 - Relevant coursework: Game Theory Economic Apps | Principles of Economics: Microeconomics | Principles of Economics: Macroeconomics | Big Data Analysis and Visualization | Artificial Intelligence | Big Data Mining

RESEARCH AND TEACHING EXPERIENCE

- **Research assistant at Lehigh University** May 2024 - Present
Lair Lab
 - Conducted advanced research in Large Language Models (LLM) and led projects in cutting-edge areas, including Multimodal LLM reasoning, Retrieval-Augmented Generation (RAG), and AI-driven Digital Twin technologies.
- **Anomaly Detection in Financial Data Analysis** Feb 2024 – May 2024
Project Collaborated with Wellington Management Company
 - Led a project to optimize and validate anomaly detection models for financial data analysis, integrating algorithm voting with HMM and neural networks to enhance robustness and usability, achieving notable improvements in detecting critical transitions.
- **Undergraduate Tutor at Columbia University** March 2024 – May 2024
Class in Probability and Optimization
 - Selected to provide 1-on-1 tutoring in Probability and Optimization, delivering tailored support to enhance student comprehension and collaborating with faculty to address academic challenges.

PROJECTS AND IN-PROGRESS PUBLICATIONS P=PROJECT, S=IN SUBMISSION, I=IN PROGRESS, * = EQUAL CONTRIBUTION

- **Thinking Before Looking: Improving Multimodal LLM Reasoning via Mitigating Visual Hallucination**   [S.1] Aug 2024 - Nov 2024
 - Zheng, Haojie*, **Tianyang Xu***, Hanchi Sun, Shu Pu, Ruoxi Chen, and Lichao Sun.
 - Proposed the "Thinking before looking" paradigm and developed the VIC framework to address cross-modal reasoning biases, enhancing robustness and zero-shot performance in multimodal models.
 - Submitted to CVPR 2025
- **TotalGraph RAG: Unlocking Superior Search Quality with Fine-Grained Graph Priors and Advanced Graph Algorithms**  [I.1] Sep 2024 - Present
 - First Author
 - Proposed a novel RAG database that fully transforms documents into a graph structure, leveraging graph algorithms like community detection, PPR, and HNSW to improve performance in query-focused summarization and multi-hop question answering.
 - Planned Submission to ICML 2025
- **Digital Twins: An Artificial Intelligence (AI) Perspective** [I.2] June 2024 - Present

- Co-first Author
- Conducted a pioneering survey on AI technologies in digital twins, providing a broad review of methodologies, industry applications, and identifying future research directions at the AI-digital twin intersection.
- Planned Submission to Nature Machine Intelligence
- **Explainable and Robust GNN for Spatiotemporal Prediction** [P.1] June 2024 - Aug 2024
 - Worked as a Research Assistant at the DitecT Lab, Columbia University
 - Improved GraphWaveNet to process multivariate spatiotemporal data, enabling more accurate and interpretable traffic flow predictions for the New York area, with enhanced model robustness and explainability.
- **Online Learning Algorithms for Portfolio Management** [🔗][P.2] Oct 2023 - Dec 2023
 - Conducted in-depth research on online learning algorithms for dynamic portfolio management, introducing Regret Matching and evaluating algorithmic performance using S&P500 and NYSE data, achieving superior adaptability during market volatility.
- **Appearance and Career Ease in China** [P.3] Mar 2023 - May 2023
 - Collaborated on a pioneering study examining the impact of physical appearance on career advancement in China, revealing that physical attractiveness can reduce weekly working hours for equal salary, underscoring the "beauty premium" in the labor market.
- **Optimization of Trading Strategy in Gold and Bitcoin Investments** [P.4] Mar 2023 - May 2023
 - Led a financial analysis project optimizing trading strategies for gold and bitcoin, refining the Flow and Trade System (FTS) with a customized sigmoid function to adjust predicted returns and applying Monte Carlo simulations to enhance profitability and manage risk using extensive historical data.

WORK EXPERIENCE

- **Smart Steps Digital Technology Co.,Ltd.** Beijing, China
Assistant Analyst May 2022 - Aug 2022
 - Developed models and conducted data analysis using POI, imagery, and signaling data for multiple projects across diverse industries, collaborating on analysis reports and maintaining weekly communication with clients to align on requirements and solutions.
- **China United Network Telecommunications Corporation** Beijing, China
Intern Jan 2022 - Mar 2022
 - Assisted in analyzing and organizing bidding documents for an electronic company as part of a six-member team, supporting the creation of strategic bidding materials to secure bid success.
 - Conducted a ten-year market analysis to develop a bidding score estimation table, predicting competitors' score ranges based on historical data and industry insights.
- **Zhuoxindahua Appraisal Co., Ltd.** Beijing, China
Assistant Jun 2021 - Aug 2021
 - Contributed to over ten asset appraisal projects, both domestic and international, conducting due diligence on target companies and liaising with key stakeholders to assess economic activities and market conditions

SKILLS AND INTEREST

- **Programming Languages:** Python, R, SQL, HTML
- **Data Science & Machine Learning:** SPSS, STATA, Pytorch, sk-learn, scipy
- **Other Tools & Technologies:** Linux, Github
- **Interest:** Photography, Writing, Traveling, Reading

HONORS AND AWARDS

- **Honorable Mention, Mathematical Contest In Modeling, 2022**
- **The third Prize scholarship, University of Colorado, 2021**
- **Sports Awards scholarship, China Agricultural University, 2021**
- **Outstanding representative, CAUICCA(MUN), 2021**