Kehan Luo (Genghis)

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| New York / Shanghai | Linkedin | Github | Personal Website

EDUCATION

New York University Shanghai Sep '22 - May '26

Junior | Major: Honors Mathematics & Data Science double major Shanghai / New York

- Overall GPA: **3.98**; Honors Mathematics/Data Science GPA: **4.00**
- Currently researching on **Machine Learning (diffusion model & transformer at NYU Center for Data Science), Optimization, PDE, Stochastic Analysis**
- Taken **PhD-level math courses** Introduction to PDE (taught by Prof. Lin Fanghua) and Numerical Methods I (taught by Prof. Benjamin Peherstorfer), Foundations of Machine Learning (taught by Prof. Mehryar Mohri) at **Courant Institute of Mathematics**
- Attended Mathematical Contest in Modeling **continuously for 5 years** from high school to undergraduate junior year. Won **Meritorious** prize for 2023 Winter Mathematical Contest in Modeling
- Completed a **Dean Undergraduate Research Fund (DURF) project on Modern Optimization Theories**, and a guided research on Linear Algebra Theories presented at NYUSH Spring 2024 Academic Symposium
- Worked as Learning Assistant for Fall 2023 Linear Algebra at NYU Shanghai and won outstanding prize

PROFESSIONAL EXPERIENCE

New Alliance Capital Jun '23 - Aug '23

Private Equity TMT Group Summer Intern Shanghai, China

- Generated in-depth and data-based industry analysis reports on Biomaterials, Thermal Materials, and New Energy Materials based on financial data to identify both **long-term** and **short-term** growth opportunities.
- Analyzed financial data to segment the thermal materials market, **pinpointed key growth factors**, crafted a **company filter** based on quantitive and qualitative factors and identified out around 20 candidate companies.
- Evaluated over 20 listed and unlisted companies, ranging from industry giants to startups, culminating in the construction of **one diversified portfolio for an investment proposal** as the final project.

PROJECTS

Dean Undergraduate Research Fund May '24 - Sep '24

Modern Optimization Theory and Applications in Optimal Control NYU Shanghai

Instructor: Prof. Vahagn Nersesyan

We initiate our project by studying fundamental Optimization tools, including First and Second Variation methods for single and multi-variable scenarios. We progress to exploring Optimal Control Theory, focusing on Controllability, the Bang-bang Principle, Linear TimeOptimal Control, the Pontryagin Maximum Principle, and Dynamic Programming. We adapt real-life examples and formulate numerical solutions and visualization to them. Our final investigation extend from Optimal Control Theory to its utilization in diverse fields such as Game Theory, Stochastic Calculus, and Partial Differential Equations. (final academic report)

Course Project on Foundations of Machine Learning Sep '24 - Dec '24

Adversarial Robustness Theory and Algorithms NYU

Instructor: Prof. Meyhar Mohri

By looking through recent works in adversarial robustness, we start by defining the question of what adversarial robustness is and why it is important. We then consider frameworks for training robust models, and survey theoretical results that provide insights into the fundamental trade-offs between accuracy and robustness. Specifically, Zhang et al. (2019) introduces **TRADES**, a theory-based algorithm for balancing this trade-off, and Awasthi et al. (2023) introduces a thorough theoretical framework for adversarial robustness theory. Overall, we examine recent advances that improve training by leveraging conditions such as classification-calibrated surrogate losses and the concept of *H*-consistency, thereby guiding the design of robust models that maintain strong theoretical guarantees. (detailed reports)

Guided Research Sep '22 - Feb '23

Unveiling the Roots of Matrices - A Generalization and Field Extension of the Square Root of Matrices NYU Shanghai

Instructor: Prof. Shengkui Ye

We first prove the Theorem: Any positive semi-definite symmetric real matrix has a unique positive semi-definite symmetric square root by polynomial matrices. Then we give a generalization from field ***R*** to ***C***, and from square root to k-th root. Finally, we demonstrate the Theorem: Any invertible complex matrix has a k-th root by Jordan Canonical Form and Taylor Expansion. Our proofs' validity and theorems' value are considered and discussed. These topics have significant applications in the field of Algebra and Lie Theory. (final poster)

LEADERSHIP ACTIVITIES

The 2023 Winter Mathematical Contest in Modeling Feb '23 - Feb '23

Team Leader | Meritorious prize

- Set up **mathematical and machine learning models** to solve data-driven real-life problems.
- Wrote Python and Matlab programs to run, analyze data, and present visualization.
- Wrote complete **30-pages formal essay** to present models and results **within 5 days**. (essay)

Math Club, NYUSH May '23 - Jun '24

President of Math Society at 2023-2024 Academic Year NYU Shanghai

- **Organized and led 9 club events** throughout the year, including designing and executing a unique college math competition "Mathodology"
- **Developed and managed the club's social media presence**, including WeChat official account, official website, Instagram, etc. **Established networks** with students, professors, and other clubs within and beyond the school, including at University of Pennsylvania.
- **Oversaw the club's overall budget**, ensuring optimal allocation of funds to maximize the effectiveness of each expenditure. (website)

TAMID Business Club, NYUSH Sep '22 - Dec '22

Leader | TAMID Business Pitch & Consulting Competition NYU Shanghai

- Completed financial analyses of a start-up company Global-E as **leader** of a team of four intercultural students.
- Drafted feasible **business blueprint** and conducted **market research** for an inexistent tech startup Finreal
- Presented results and investing recommendations to expert judges from NYU Global TAMID team.

The 2024 Digital Innovation Challenge Nov '23 - Dec '23

Leader | Top 10 Team NYU Shanghai

- Trained a personalized learning assistant model based on Large Language Models and gave presentation to over 500 audiences.

SKILLS

- Computer Skills: Python, MATLAB, C++, R, Microsoft (Word, Excel, PowerPoint)
  * Working Proficiency in English and Mandarin.

Certificates

Machine Learning Specialization, DeepLearning.AI Jul '24 - Sep '24

Supervised/Unsupervised Learning and Advanced Algorithms Coursera

Interests

- Reading, Travel (13 countries visited), Chinese GO, Basketball, Gym, Chess.