Keming Miao

xbtmkmmm@mit.edu mxbtum@gmail.com 617-417-8602

Education

Massachusetts Institute of Technology 2023 – present
Major: Mathematics & Computer Science / Artificial Intelligence *Current GPA: 5.0/5.0*

Princeton International School of Math and Science 2019 – 2023
Taken college-level courses in Linear Algebra, Statistics, Organic Chemistry, & Molecular Biology *GPA: 3.99/4.0*

The High School Affiliated to Renmin University of China 2016 - 2019

College Coursework

2023 Fall Courses: CS Programming in Python, Computational Thinking and Data Science, Multivariable Calculus, Physics: Electricity and Magnetism, Principles of Chemical Science
2024 Spring Courses: Programming (Python), Probability and Random Variables, Real Analysis, Linear Algebra, Introduction to Linguistics, Principles of Macroeconomics (Registered as Listener)
2024 Fall Courses: Algorithms, Statistics for Applications, Machine Learning, Differential Equations, Theory of Computation

Skills

Programming: Python, C & C++ (self-taught), HTML & CSS, LaTeX
Mathematics: Probability, Statistics, Linear Algebra, Computation Theory, Differential Equations
AI & ML: Machine Learning, Neuro Network
Languages: English, Mandarin

Work Experience

Undergraduate Researcher | *Braatz Group, Massachusetts Institute of Technology* Sep, 2024 - Present
- Working in MIT ChemE department under prof. Richard Braatz & Postdoctoral Associate Yanchen Wu
- Aim to develop sophisticated models that assists the manipulation & optimization of lipid-nanoparticle formation & manufacturing process
- Using Python programming to create a robust coding framework for simulating thermodymamics models based on mathematics, physics & chemistry principles
- Adopting AI tools to propose and implement strategies for optimizing nanoparticle production.

Linear Algebra Course Grader | *Massachusetts Institute of Technology* Sep, 2024 - Present
- Grader of Massachusetts Institute of Technology Linear Algebra (18.06) class for 300+ people
- Provide weekly - biweekly feedback and suggestions to homework & assignment

Extern | *Citadel & Citadel Securities* May - Aug, 2024
- Studied & accomplished technical projects in back-end programming with Python
- Learned & applied front-end development and design with HTML and CSS & Flask web microframework
- Participated in financial market training, & engaged with Citadel executives & employees through one-on-one mentorship & activities.
- Completed a project on providing financial suggestions to customers by analyzing stock data & creating models to predict stock trends, made a website to visualize the results

Undergraduate Researcher | *Julia Lab, Massachusetts Institute of Technology* Feb - May, 2024
- Researched in Computer Science, Machine Learning, and Applied Mathematics in CSAIL Julia Lab, MIT
- Project focused on improving currently known approaches to achieve higher-order Automatic Differentiation with Julia programming language
- Studied scientific machine learning through physics-informed Neuro Networks, discrete dynamics, ODEs, Automatic Differentiation, etc..
- Researched for more accurate root-finding & approximation algorithms under higher derivatives
- Codes and future works will contribute to the current repository of GitHub.

Selected Research & Project

Project on Autofilling E-Mails' PDF Attachments (With Partners) | *HackMIT @ MIT* Sep, 2024

- Designed & implemented website that scans & analyzes JSON-formatted email data for attachments to autofill, sign, & send them back to the users
- Used python to scan the input data for PDF, check, process & decode them
- Used python to analyze & extract fields needs to be filled, & coded to send information to chatGPT. Used OpenAI API to assist filling forms & make assumptions on fields without sufficient information
- Coded to allow website returning processed PDF to users
- Presented at HackMIT. Available at: https://github.com/graceyc/Hackmit

Project on Stock Price Prediction (With Partner) | *Citadel & Citadel Securities* June, 2024

- Used API to retrieve past data of stock & analyzed the RSI, MACD indicator
- Retrieved past news information and performed sentiment analysis
- Predicted stock trend and provided financial suggestions to users
- Built website that includes founder information, financial tools & education, buy/sell advice, graph visualizations of stock trend & prediction, & source code
- Available at: https://replit.com/@dannelll/Citadel-Final-Project

Research on Applied Math & CS | *Julia Lab, Massachusetts Institute of Technology* 2024 - Present

- Supervised by Professor Alan Edelman and PhD Candidate Songchen Tan
- Project focused on improving currently known approaches to achieve higher-order automatic differentiation with Julia programming language
- Aim to improve scaling behavior & efficiency of the program by calling specialized numerical LA library.
- Investigated types of primitives needed to improve the efficiency of the program & implemented them.
- Applied research results into physics-informed neural networks, and benchmark their performances.

Research on Number Theory | *Princeton International School of Math and Science* 2022 - 2023

- Investigated the sum of the numbers of prime factors of two integers with a constant sum
- Programmed with python to find partitions of integers from 1 - 1,000,000 and went through data analysis
- Reviewed 10+ references & proceeded on directions related to arithmetic sequence
- Explored the direction of arithmetic sequences & done relative mathematical proofs

Research on Constructive Mathematics | *With Dartmouth professor Vladimir Chernov* 2022

- Proved that there is no algorithm to the Optimal Work Assignment in Constructive Mathematics
- Learned constructive mathematics knowledge systematically
- Determined & generalized algorithms & cost matrices to the Optimal Work Assignment
- Paper published in European Journal of Econ & Mangt Sci #2 2022

Research on Graph Theory 2022 - 2023

- Connected Graph Theory to geometry & focused on the Reconstruction Conjecture
- Discussed variants & lemmas, as well as examples of non-reconstructable graph subclasses

Selected Awards

U.S.A. Mathematical Olympiad (USAMO) 2021, 2022

- 2 times USAMO qualifier
- U.S.A. National Top 150 in 2022, invited to the Mathematical Olympiad Award Ceremony
- Ranked Top 5 among all females in New Jersey in USAMO selection 2 consecutive years
- Was awarded the Jane Street Certificate of Excellence & the Akamai Certificate of Excellence

MIT Math Prize for Girls 2020, 2022

- Was invited to this contest 4 times
- Honorable Mention (ranked top 25) in 2022
- Was invited to the Math Prize for Girls Olympiad in 2022

Girls in Math at Yale 2021, 2022

- National 4th place in 2021

Leadership and Service

Linear Algebra Course @ MIT | *Grader, TA* 2024 - Present
Grade homework for 300+ students in the class. Provide individual feedback & point out & comment on mistakes in solutions for each individuals

High School Math Team | *Leader, Lecturer, & Coordinator* 2020 - 2023
Provided biweekly lectures and organized group discussions & practices for 50+ team members

Online Math Meet Competition | *Founder, Organizer* 2022 - Present
Proposed problems, graded test papers, & hosted award ceremonies, attracted 120+ participants per year

Online STEM tutor | *Math Lecturer* 2022 - 2023
Gave 12+ lectures to 40+ students; Help them prepare for math competitions; Find & propose problems; Write class handouts; Answer questions after class