Dong Liu 刘董

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EDUCATION

University of Science and Technology of China (USTC)　　　　　　　　　　**Hefei, China**

- **School of the Gifted Young**
- Bachelor of Science Degree Expected　　　　　　　　　　　　　　　　09/2021-07/2025
- Major: Mathematics and Applied Mathematics, Track: Probability and Statistics
- Current Overall GPA: 4.13 / 4.30; Grade Ranking: 1 / 161
- Language Proficiency:
    TOEFL 101: R30 / L28 / S21 / W22
    GRE 331: 162V + 169Q + 4W
- Scholarships:
    National Scholarship (Top 2% at School of the Gifted Young)　　　　　09/2023
    National Scholarship (Top 2% at School of the Gifted Young)　　　　　09/2022
    2021 Freshman Entrance Scholarship, Gold Award　　　　　　　　　09/2021
- Honors:
    S.T Yau College Student Mathematical Contest, Winners' Prize (Ranked 10th Overall)　06/2024
    National College Student Mathematics Competition Mathematics, First Prize　12/2023
    China Undergraduate Mathematical Contest in Modeling, Second Prize　11/2022
    National College Student Mathematics Competition Mathematics, Second Prize　12/2021
- TA Experience: Assisted Prof. Caifeng Tu at School of Mathematical Sciences, in　03-07/2024
    Mathematical Analysis(B2)

RESEARCH INTERESTS

Deep Learning, Convex Optimization, ADMM, Federated Learning, Reinforcement Learning, Machine Learning, Informative Missing.

PROGRAMMING SKILLS

10 years' experience with C/C++. Skilled in Python, R and MatLab. Familiar with Linux and Bash.

PUBLICATION

- *Distributed Learning via Inexact Dual Generalized ADMM.* **Will be Submitted to ICML 2025.**
- *FedIDA: A Federated Framework for non-smooth Composite Optimization.* **Will be Submitted to ICML 2025.**
- *Optimizing the Cost-Benefit of Diagnostic Tests in Clinical Decision-Making.* **Submitted to JMLR in December 2024.**
- **Dong Liu**. (2023). *Analysis of Maximum Interval of Existence for an Initial Value Problem of an Ordinary Differential Equation*. Warming Volume 66. [I solved a previously unsolved problem given by the teacher in the Differential Equations class, and published the related findings in *Warming*, the journal of School of Mathematical Sciences USTC.]

RESEARCH EXPERIENCE

Sequential Lab Test (at Harvard University)　　　　　　　　　　　　**Cambridge, MA**
Under the supervision of Prof. Tianxi Cai, collaborating with a Postdoc　　　03/2024-Present

- Proposed a novel framework to optimize the sequential design of laboratory tests on real data. (Reinforcement learning)
- Independently completed the code writing and testing
- **A paper titled *Optimizing the Cost-Benefit of Diagnostic Tests in Clinical Decision-Making* is to be submitted to JMLR.**

Federated Learning: A Class of Symmetric ADMM-like Algorithms   **Hefei, China**
(Note: **received funding from the first NNSFC Youth Student Program**)
Under the supervision of Prof. Xueqin Wang, serving as the program lead   09/2023-Present
- Proposed a class of symmetric ADMM-like algorithms for federated learning
- Transformed a class of primal-dual algorithm into distributed algorithms
- Proved the convergence of our algorithm, both distributed version and federated version
- Wrote a lot of codes for the project, including our method and various benchmarks
- **A paper titled *Distributed Learning via Inexact Dual Generalized ADMM* is to be submitted to ICML 2025.**
- **A paper titled *FedIDA: A Federated Framework for non-smooth Composite Optimization* is to be submitted to ICML 2025.**

Establishing a Multimodel Biomedical LLM Based on UK Biobank Data   **Hefei, China**
Under the supervision of Prof. Xueqin Wang, serving as a team member   10/2023-Present
- Practical experience with fine-tuning Llama-3
- Studied the up-to-date framework of Multimodel LLM, such as BLIP-2

PROJECTS EXPERIENCE
Kinetics Analysis and Maximum Power Output Design for Wave Energy Converters
China Undergraduate Mathematical Contest in Modeling (CUMCM)   09/2022
- Established two kinetic models targeting specific simplified wave energy converters and optimized the damping coefficient for the maximum average output power
- Improved the hill climbing algorithm and obtained a maximum output power of 323.489 W

***Electromagnetism A* Course Project**   2022 Spring
Improving the Helmholtz Coils Magnetic Field Uniformity
Under the supervision of Prof. Haijun Pan and Prof. Qing Lin
- Introduced new coils (number=n, initial value=2) to the Helmholtz coils to generate absolutely uniform magnetic fields
- Utilized the Comsol software to simulate the increasing uniformity in the axisymmetric areas between coil pairs when assuming n approaches the infinity

***Freshman Seminar* Course Project**   2022 Spring
Research on Freely Falling Jet Fluids Breaking Points Positions
Under the supervision of Prof. Zhenyu Li
- Investigated even "jet flows" from fixed openings based on Bernoulli differential equation and Young-Laplace equation

STUDENT ACTIVITIES
Student Union of School of the Gifted Young, USTC   03/2022-07/2023
Member of the Academic Department
- Participated in organizing two note-taking contests and hosted a lecture on mathematical analysis