Jiayang Zou

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Education

2023–Present **Master Student of Engineering**, Department of Electronic Engineering
Shanghai Jiao Tong University, Shanghai, China
Major in Information and Communication Engineering
Advised by Prof. Jia Wang
GPA: 3.86/4.0

2019–2023 **Bachelor of Engineering**, Department of Electronic Engineering
Shanghai Jiao Tong University, Shanghai, China
Major in Information Engineering, Minor in Mathematics
GPA: 3.82/4.3 (89.4/100)

Research Interest

My research lies broadly in **information theory**, **optimal transport** and their **applications in statistics**. In addition, it is intriguing for me to apply new mathematical tools to solve **corresponing mathematical problems in information theory**. I am particularly focused on the differential properties of information along Fokker-Planck (FP) and jump-diffusion channels, as well as applying optimal transport theory to rate-distortion problems. My recent work focuses on **strong data processing inequalities (SDPI)** along the FP channels, existence of solutions to rate-distortion problems, and the analysis of privacy mechanisms via the **shifted composition rule**. I am also interested in various topics around **Gaussian completely monotone conjecture** and **phase transitions** in rate-distortion optimal reconstruction distributions.

Publications & Preprints (Google Scholar)

Jiayang Zou, Luyao Fan, Jiayang Gao, Jia Wang. "Convexity of Mutual Information along the Fokker-Planck Flow." IEEE International Symposium on Information Theory (ISIT 2025).

Luyao Fan, **Jiayang Zou**, Jiayang Gao, Jia Wang. "Differential Properties of Information in Jump-diffusion Channels." IEEE International Symposium on Information Theory (ISIT 2025).

Tianyi Zheng, **Jiayang Zou**, Peng-Tao Jiang, Hao Zhang, Jinwei Chen, Jia Wang, Bo Li. "Bidirectional Beta-tuned Diffusion Model." IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI).

Jiayang Zou, Luyao Fan, Jiayang Gao, Tianyi Zheng and Jia Wang. "On Strong Data Processing Inequalities of Generalized Relative Fisher Information." *Submitted to IEEE Transactions on Information Theory (TIT). Under Review.*

Jiayang Zou, Luyao Fan, Jiayang Gao, and Jia Wang. "Rate Distortion Theory for General Sources: Existence of Optimal Reconstruction via the Concentration-Compactness Principle." *Manuscript in preparation for submission to IEEE ISIT 2026.*

Jiayang Zou, Luyao Fan, Jiayang Gao, Jia Wang. "A Revisit to Rate-distortion Theory via Optimal Weak Transport." *Arxiv:2501.09362, 2025.*

Jiayang Gao*, Tianyi Zheng*, **Jiayang Zou**, Fengxiang Yang, Shice Liu, Luyao Fan, Zheyu Zhang, Hao Zhang, Jinwei Chen, Peng-Tao Jiang, Bo Li, Jia Wang. "C^2FG: Control Classifier-Free Guidance via Score Discrepancy Analysis." *Submitted to The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2026). Under Review.*

Research Experience

2025-Present **Yale Stat & DS**, Remote Collaborator with Prof. Sinho Chewi.

- Research on differential privacy for noisy gradient descent with momentum via the study of the shifted composition rule applied to underdamped Langevin dynamics.

2023-Present **SJTU EE**, Master student advised by Prof. Jia Wang.

- Conducted research on differential properties of information along Fokker-Planck and jump-diffusion channels, including proving the convexity of mutual information along the Fokker-Planck flow under certain conditions (ISIT 2025).
- Developed new existence theorem for rate-distortion problems for general sources using the concentration-compactness principle in optimal transport theory.

Honors and Awards

2024, 2025 The First Prize Scholarship for Graduates

2023 The First Prize in The Chinese Mathematics Competitions (CMC)

2022 The First Prize in The Chinese Mathematics Competitions (CMC)

2021 The First Prize in The Chinese Mathematics Competitions (CMC)

2021 The Second Prize Scholarship for Undergraduates

2021 Meritorious Winner of Mathematical Contest in Modeling (MCM)

2020 The Second Prize Scholarship for Undergraduates

Skills

Programming: Python, PyTorch, Matlab, LaTeX

Language: Mandarin (native), English (IELTS: 7.0)

Services

Journal Reviewer **IEEE Transactions on Information Theory (TIT)**

IEEE Transactions on Communication (TCOM)

Conference Reviewer **IEEE International Symposium on Information Theory (ISIT)**

Teaching

2024 TA for *EE 453: Elements of Information Theory.*

2024, 2025 TA for *ICE 6211: Optimal Transport Theory.*

Seminar Talks and Presentations

2025 ISIT 2025, Ann Arbor (Michigan), USA. Oral presentation: *Convexity of Mutual Information along the Fokker-Planck Flow.*

Substituted by Prof. Shun Watanabe due to late issuance of visa.

2025 ISIT 2025, Ann Arbor (Michigan), USA. Oral presentation: *Differential Properties of Information in Jump-diffusion Channels.*

Substituted by Prof. Chao Tian due to late issuance of visa.