SONGJIE XIE

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EDUCATION

ShanghaiTech University, Shanghai, China — Sep. 2020 - June 2023 (expected)
M.S. Candidate in Information and Communication Engineering
GPA: 3.59/4.0, Thesis Advisor: Prof. Youlong Wu

ShanghaiTech University, Shanghai, China — Sep. 2016 - June 2020
B.Eng. in Electronic and Information Engineering
GPA: 3.62/4.0

My research interests lie in **Information Theory** and **Machine Learning** with a focus on Trustworthy Machine Learning and Semantic Communication.

PREPRINTS AND MANUSCRIPTS

[a] **S. Xie**, J. Li, M. Ding, and Y. Wu. "Towards Privacy and Fairness: Non-Adversarial Representation Learning with Local Differential Privacy for Information Obfuscation" in preparation.

PUBLICATIONS

[**1**] **S. Xie**, Y. Wu, S. Ma, M. Ding, Y. Shi, and M. Tang. "Robust Information Bottleneck for Task-Oriented Communication with Digital Modulation." Accepted with minor revision by *IEEE Journal on Selected Areas of Communication (**JSAC**)*. [Paper] [Code]

[**2**] **S. Xie**, Y. Wu, K. Liao, L. Chen, C. Liu, H. Shen, M. Tang, and L. Sun. "Fed-SC: One-Shot Federated Subspace Clustering over High-Dimensional Data." in Proceedings of the *39th IEEE International Conference on Data Engineering (**ICDE 2023**)*, 2023, Anaheim, California, USA. [Paper] [Code]

[**3**] T. Rui, **S. Xie**, and Y. Wu. "On the Achievable Rate Region of the K-Receiver Broadcast Channels via Exhaustive Message Splitting." *Entropy* 23.11 (2021): 1408. [Paper]

RESEARCH PROJECTS

- **Information Extraction and Transmission from IID Observations** — Dec. 2022 -
  Research Assistant, work with Profs. Youlong Wu & Lizhong Zheng (MIT)
  Investigated how to extract task-relevant information from a data source and transmit it over noisy channels through a well-designed empirical distribution of input symbols. This project is still ongoing.

- **Task-oriented Communication with Digital Modulation** — Apr. 2022 - Oct. 2022
  Research Assistant, work with Profs. Youlong Wu, Yuanming Shi & Ming Ding (Data61, CSIRO)
  Proposed Robust Information Bottleneck (RIB), a theoretical framework formulating the informativeness-robustness tradeoff in task-oriented communication, and developed deep learning based JSCC schemes with digital modulation [1].

- **Federated Subspace Clustering** — Sep. 2021 - Apr. 2022
  Research Assistant, work with Profs. Youlong Wu, Haifeng Shen (Australian Catholic University) & Chengfei Liu (Swinburne University of Technology)
  Proposed Fed-SC, a one-shot federated subspace clustering scheme for high-dimensional data, with theoretical guarantees on the effectiveness of Fed-SC and verified that a notion of data heterogeneity can benefit the federated subspace clustering [2].

- **The Achievable Rate Region of the K-Receiver Broadcast Channels** — Sep. 2020 - May 2021
  Research Assistant, supervised by Prof. Youlong Wu
  Verified the performance of the exhaustive message splitting scheme by deriving the inner bound on the capacity region of 3-receiver DM-BC [3].

- **Transcriptional Regulation Network Reconstruction** Jul. 2019 - Sept. 2019
  Research Intern, advised by Dr. Zhengtian Yu (Novartis Institutes for BioMedical Research)
  Investigated data-driven frameworks for constructing the epigenetic landscape from single-cell RNA-seq data to recover the pseudotime ordering and find cell clusters of different developmental stages.

TEACHING AND SERVICE

Teaching Assistant ShanghaiTech University
Teaching recitations, correcting homework and holding office hours

- EE240: Digital Communication Fall 2022
- EE150: Signals and Systems Spring 2020

Technical Assistant ShanghaiTech HPC
Managing HPC clusters for scientific applications, and giving technical support and tutorials.

HONORS AND AWARDS

2019 Undergraduate Scholarship in ShanghaiTech University
2019 Merit Student of ShanghaiTech University
2019 First Team Prize in Novartis Young Explorer Program
2018 The Third Prize of The National Undergraduate Electronic Design Contest

TECHNICAL STRENGTHS

Programming Languages	Python, Java, C/C++, MATLAB
Framework & Toolchain	PyTorch, TensorFlow, OpenCV, Git, CVX
Misc	LaTeX, SQL