Enmao Diao

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Ambitious, Creative, Curious, Honest, Passionate
Distributed Machine Learning, Efficient Machine Learning
Signal Processing, Artificial General Intelligence
To develop ground-breaking ML methods and cutting-edge AI applications

Education

- **Duke University** | *Ph.D. in Electrical Engineering* May 2018 – Sep 2023
- **Harvard University** | *M.S. in Electrical Engineering* Aug 2016 – May 2018
- **Georgia Institute of Technology** | *B.S. in Computer Science (highest honor)* Aug 2013 – May 2016
- **Georgia Institute of Technology** | *B.S. in Electrical Engineering (highest honor)* Aug 2012 – May 2016

Experience

- **Postdoctoral Researcher**
  Duke University Sep 2023 – Jan 2024
  - Developed Efficient and Collaborative Methods for Distributed Machine Learning and Artificial General Intelligence
  - Advised by Prof. Vahid Tarokh and Prof. Jie Ding
- **Research Assistant**
  Duke University May 2018 – Sep 2023
  - Studied Distributed Machine Learning and developed Federated Learning and Assisted Learning frameworks
  - Studied Efficient Machine Learning and developed Deep Learning methods for data and model compression
  - Advised by Prof. Vahid Tarokh and Prof. Jie Ding

  Harvard University Aug 2016 – May 2018
  - Developed theoretical foundations of the limit of machine learning from a statistical efficiency perspective
  - Developed an efficient algorithm to compute the "degree of freedom" for general nonlinear models to reduce the computation of cross-validation by several orders of magnitudes
  - Advised by Prof. Vahid Tarokh and Prof. Jie Ding

  Georgia Institute of Technology May 2014 – May 2016
  - Developed melody extraction algorithm for monophonic pitch transcription in mobile applications
  - Developed Cellular Neural Network on FPGA with Verilog
  - Advised by Dr. Udit Gupta, Prof. Elliot Moore and Prof. Hyesoon Kim
- **Applied Scientist**
  Amazon Jan 2022 – Sep 2022
  - Studied Semi-Supervised and Personalized Federated Learning and developed its applications for Alexa devices
  - Developed Pytorch based pipeline for internal research development
  - Collaborated with other scientists to study various topics on Federated Learning including fairness, asynchrony, side information, and model compression
  - Advised by Prof. Jie Ding and Dr. Tao Zhang

- **Project Manager**
  Duke Data+ Program May 2019 – Aug 2019
  - Led a team of full-time undergraduate students working on summer research projects that developed algorithms for speech emotion recognition and emotional speech generation

- **Teaching Assistant**
  Duke University Aug 2019 – May 2020
  - Instructed students in learning and implementing deep learning and audio signal processing algorithms

  Georgia Institute of Technology May 2015 – Aug 2015
  - Instructed students in learning FPGA, oscilloscope, and implementing a processor with VHDL

Publication

- Y. Zhe, **E. Diao**, **ESC: Efficient Speech Coding with Cross-Scale Residual Vector Quantized Transformers**, *arXiv*
- S. Moushegian, S. Wu, **E. Diao**, J. Ding, T. Banerjee, V. Tarokh, **Robust Score-Based Quickest Change Detection**, *arXiv*
- Y. Zhang, **E. Diao**, D. Huston, T. Xia, **A PixelCNN Based Method for Rough Surface Clutter Reduction in GPR B-scan Images**, *IEEE Radar Conference*
- Y. Zhang, **E. Diao**, D. Huston, T. Xia, **A Data Efficient Deep Learning Method for Rough Surface Clutter Reduction in GPR Images**, *IEEE Transactions on Geoscience and Remote Sensing*
- **E. Diao**, T. Banerjee, V. Tarokh, **Large Deviation Analysis of Score-based Hypothesis Testing**, *IEEE Access*
- **E. Diao**, Q. Le, S. Wu, X. Wang, A. Anwar, J. Ding, V. Tarokh, **ColA: Collaborative Adaptation with Gradient Learning**, *arXiv*
- S. Wu, **E. Diao**, T. Banerjee, J. Ding, V. Tarokh, **Quickest Change Detection for Unnormalized Statistical Models**, *IEEE Transactions on Information Theory*
- K. Varma, **E. Diao**, T. Roosta, J. Ding, T. Zhang, **Once-for-All Federated Learning: Learning From and Deploying to Heterogeneous Clients**, *KDD 2023 Workshop*
- S. Wu, **E. Diao**, T. Banerjee, J. Ding, V. Tarokh, **Robust Quickest Change Detection for Unnormalized Models**, *UAI 2023*
- **E. Diao**, T. Eric, J. Ding, Z. Tao, **Semi-Supervised Federated Learning for Keyword Spotting**, *ICME 2023*
- **E. Diao**, G. Wang, J. Zhang, Y. Yang, J. Ding, V. Tarokh, **Pruning Deep Neural Networks from a Sparsity Perspective**, *ICLR 2023*
- S. Wu, **E. Diao**, T. Banerjee, J. Ding, V. Tarokh, **Score-based Change Point Detection for Unnormalized Models**, *AISTATS 2022*
- Q. Le, **E. Diao**, X. Wang, A. Anwar, V. Tarokh, J. Ding, **Personalized Federated Recommender Systems with Private and Partially Federated AutoEncoders**, *Asilomar 2022*
- L. Collins, **E. Diao**, T. Roosta, J. Ding, T. Zhang, **PerFedSI: A Framework for Personalized Federated Learning with Side Information**, *NeurIPS 2022 Workshop*
- **E. Diao**, J. Ding, V. Tarokh, **SemiFL: Communication Efficient Semi-Supervised Federated Learning with Unlabeled Clients**, *NeurIPS 2022*
- **E. Diao**, J. Ding, V. Tarokh, **GAL: Gradient Assisted Learning for Decentralized Multi-Organization Collaborations**, *NeurIPS 2022*
- S. Wu, **E. Diao**, K. Elkhalil, J. Ding, V. Tarokh, **Score-based Hypothesis Testing for Unnormalized Models**, *IEEE Access*

- **E. Diao**, V. Tarokh, J. Ding, **Decentralized Multi-Target Cross-Domain Recommendation for Multi-Organization Collaborations**, *arXiv*
- **E. Diao**, J. Ding, V. Tarokh, **Multimodal Controller for Generative Models**, *CVMI 2022*
- M. Mohammadreza, **E. Diao**, V. Tarokh, B. Andrew, **Emulating Spatio-Temporal Realizations of Three-Dimensional Isotropic Turbulence via Deep Sequence Learning Models**, *AAAI 2022 Workshop*
- M. Mohammadreza, **E. Diao**, V. Tarokh, B. Andrew, **Dimension Reduced Turbulent Flow Data From Deep Vector Quantizers**, *Journal of Turbulence*
- M. Mohammadreza, **E. Diao**, V. Tarokh, B. Andrew, **A Physics-Informed Vector Quantized Autoencoder for Data Compression of Turbulent Flow**, *DCC 2021*
- **E. Diao**, J. Ding, V. Tarokh, **HeteroFL: Computation and Communication Efficient Federated Learning for Heterogeneous Clients**, *ICLR 2021*
- J. Ding, **E. Diao**, V. Tarokh, **On Statistical Efficiency in Learning**, *IEEE Transactions on Information Theory*
- J. Wang, M. Xue, R. Culhane, **E. Diao**, J. Ding, V. Tarokh, **Speech Emotion Recognition with Dual-Sequence LSTM Architecture**, *ICASSP 2020*
- **E. Diao**, J. Ding, V. Tarokh, **DRASIC: Distributed Recurrent Autoencoder for Scalable Image Compression**, *DCC 2020*
- S. Wu, **E. Diao**, J. Ding, V. Tarokh, **Deep Clustering of Compressed Variational Embeddings**, *DCC 2020*
- **E. Diao**, J. Ding, V. Tarokh, **Restricted Recurrent Neural Networks**, *IEEE BigData 2019*
- J. Ding, **E. Diao**, V. Tarokh, **A Penalized Method for the Predictive Limit of Learning**, *ICASSP 2018*

Award

- **Student Travel Award** | IEEE BigData 2019 — Dec 2019
- **ECE Senior Scholar Award** | Georgia Institute of Technology — Apr 2016
- **President Undergraduate Research Award** | Georgia Institute of Technology — Jun 2015