

Liancheng Fang

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Education

Ph.D. in Computer Science

Department of Computer Science, University of Illinois Chicago

Chicago, IL

2023/08 - present

M.S. in Biomedical Data Science

Department of Biostatistics and Medical Informatics, University of Wisconsin-Madison

Madison, WI

2019/05 - 2021/12

M.A. in Mathematics

Department of Mathematics, University of Wisconsin-Madison

Madison, WI

2018/08 - 2019/05

B.S. in Mathematics and Applied Mathematics

Department of Mathematics, Sun Yat-sen University

Guangzhou, China

2014/09 - 2018/06

Writing sample

Liancheng Fang, Lu Cheng . Achieving Zero Fairness-Utility Trade-off in the Long Run. In submission.

Industry Experience

United Sensing Technology

Computer Vision Engineer-Autonomous Driving

2022/05-2023/08

- Access, validate and optimize the performance of BEV model for 3D object detection on zero-shot robustness.
- Implement and optimize the performance of self-supervised depth estimation model for fast inference using lightweight transformer.
- Collaborating with other research team to perform experiments on sensor fusion.

Projects

Mixed-type tabular data synthesis and imputation with score-based diffusion model

UIC Big Data and Social Computing Lab

2024/01-present

- Use transformer as denoising function to incorporate the permutation equivariant property of tabular data.
- Propose to use self-conditioning and discrete diffusion model to handle mixed type tabular data.
- Conduct experiments to benchmark SOTA tabular data sythesis and imputation methods on UCI datasets.

Achieving zero fairness-utility trade-off in the long run

UIC Responsible AI Lab

2023/08-2024/01

- Formalize fairness-utility trade-off in the context of MDP.
- Identify a necessary and sufficient condition on the population distribution under which there is zero fairness-utility tradeoff.
- Conduct experiments to use popular RL algorithm (e.g. PPO) to find an agent that pushes the population distribution toward the zero tradeoff regime.

Meta-learning contrastive representation for few-shot learning

UW Computer Vision group

2020/09-2021/12

- Conducted experiments which empirically verified the effectiveness of contrastive learning for few-shot learning.
- Conducted experiments to use several meta-learning approaches to fine-tune representations learned from contrastive learning, which further improve the performance.
- Develop theory to explain the above empirical finding based on a latent concept assumption.

A Riemannian optimization approach for Canonical Correlation Analysis

UW Computer Vision group

2020/01-2020/06

- Re-parametrize CCA problem as optimization problem on several specific matrix manifolds which has provable same optimum as original problem.
- Derive a riemannian stochastic gradient descent algorithm that achieve improved time complexity and comparable convergence rate compared to existing related work.

Fully tensorized Neural Network

UIW Computer Vision group

2019/03-2019/12

- Investigated traditional and modern types of Tensor Decompositions.
- Develop novel algorithms for approximate non-linear tensor arithmetics (e.g. ReLU).
- Investigated the performance of a fully tensorized neural networks compressed by Tensor Train decomposition in which all forward/back propagation is in Tensor Train space.
- Achieved comparable accuracy with vanilla VGG on Imagenet but with much less number of parameters.

Teaching Experience

Teaching Assistant

ECE/CS 761: *Mathematical Foundations of Machine Learning*, Instructor: Prof. Ramya Korlakai Vinayak Spring 2021
Department of Electrical & Computer Engineering, University of Wisconsin-Madison

Teaching Assistant

Math234: *Calculus - Functions of Several Variables*, Instructor: Prof. Omer Mermelstein Fall 2020
Department of Mathematics, University of Wisconsin-Madison

Grader

Math714: *Computational Math I*, Instructor: Prof. Nan Chen Fall 2018
Department of Mathematics, University of Wisconsin-Madison

Technical Strengths

- **Programming Languages:** Python, C/C++, Java
- **Library:** Pytorch, Jax, CUDA
- **Others:** L^AT_EX, R, Matlab, Git, GCP, MySQL

Talk

Hybrid methods for well-mixed chemical reaction systems, undergraduate symposium, April 13, 2018, University of Wisconsin-Madison.

Contrastive learning for few-shot learning, Biostatistics and Medical Informatics Seminar, December 10, 2021, University of Wisconsin-Madison.

Academic Service

External Conference Reviewer: AAAI2023, ICDM2023