Liancheng Fang

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Education

Ph.D. in Computer Science — **Chicago, IL**
Department of Computer Science, University of Illinois Chicago — *2023/09 - present*

M.S. in Biomedical Data Science — **Madison, WI**
Department of Biostatistics and Medical Informatics, UW-Madison — *2019/09 - 2021/12*

M.A. in Mathematics — **Madison, WI**
Department of Mathematics, UW-Madison — *2018/09 - 2019/05*

B.S. in Mathematics and Applied Mathematics — **Guangzhou, China**
Department of Mathematics, Sun Yat-sen University — *2014/09 - 2018/07*

Writing sample

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

Industry Experience

United Sensing Technology — **Farmington Hills, MI**
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

Achieving zero fairness-utility trade-off in the long run
UIC Responsible and Reliable AI Lab — *2023/05-2023/10*

- 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
UW Computer Vison 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
CS 401: Introduction to Algorithms, Instructor: Prof. Sidiropoulos Anastasios *Spring 2024*
Department of Computer Science, University of Illinois at Chicago

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, Tensorflow, CUDA
- **Others:** MySQL, LaTeX, R, Matlab, Git, GCP

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: AAAI, ICDM.