Tong Yang

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Research Interests:
Optimization, Machine Learning Theory

Education

Peking University Sep 2022–Current
M.S. in Data Science

University of California, Berkeley Jan 2022–May 2022
Exchange Program, GPA: 4.0/4.0

Xi'an Jiaotong University Sep 2018–July 2022
B.S. in Mathematics (Honors Program), GPA: 4.01/4.3, Major rank:1/50

Research & Project Experience

Research Topic: Algorithm Design for Solving Variational Inequalities
Jan 2022–Current, University of California, Berkeley
Collaborators: Michael I. Jordan, Tatjana Chavdarova, Matteo Pagliardini

- Worked on the project *solving variational inequalities via a first-order interior point-based method* with Tatjana Chavdarova and Michael I. Jordan. This paper has been accepted by *NeurIPS 2022* Workshop *OPT*. The full version was submitted to *ICLR 2023*. (https://arxiv.org/abs/2206.10575)
  1. Designed a new algorithm whose convergence rate could match the theoretical lower bound of this algorithm under mild conditions.
  2. Verified the theoretical results on several experiments (e.g. GANs).
  3. Current scores on *ICLR 2023* are 8, 6, 6, 6. (All towards acceptance.)
- Improved the previous work with Michael I. Jordan, Tatjana Chavdarova, and Matteo Pagliardini. This work was submitted to *AISTATS 2023*. (https://arxiv.org/abs/2210.15659)
  1. Derived a way to relax the assumptions in the previous work while maintaining the same convergence rate.
  2. Gave the *first* analytically derived last-iterate convergence rate for general monotone variational inequalities.
  3. Managed to finish the book-long proofs (about 40 pages) within a week.

Research Topic: Cascade Optimization for Inverse Problems with Entropy-Preserving Hyperparameter Tuning
July 2022–Current, New York University
Collaborators: Qi Lei, Quan Zhang, Tianci Liu

- Proposed an automated and principled framework to solve inverse problems with deep generative models. We are going to submit this work to *ICML 2023*. (https://arxiv.org/abs/2210.13983)
  1. Designed a cascade optimization algorithm that has a global convergence rate to efficiently reconstruct images in inverse problems.

2. Developed a method to solve a bilevel optimization problem for automated hyperparameter tuning.

Research Topic: Efficient Algorithms for Finding Points on High-dimensional Convex Polyhedron
Sep 2021–Jan 2022, Peking University
Advisor: Zhouchen Lin

- My first project on optimization and machine learning theory.

1. Studied convex analysis with a focus on interior point methods and common first-order methods.
2. Designed a new interior-point point algorithm to find a point on a high-dimensional convex polyhedron efficiently.

Research Topic: Multi-task Self-supervised Object Detection and Other Tasks in Machine Learning
June 2020–Jan 2022, Xi'an Jiaotong University
Adviser: Junmin Liu

- This is my first deep learning project.

1. Reproduced classical backbones in Computer Vision, such as ResNet, the Transformer, and Vision Transformer (ViT) using Pytorch.
2. Reproduced two-stage object detection networks using Pytorch, including R-CNN, Fast R-CNN, and Faster R-CNN, etc.
3. Studied different self-supervised object detection models.
4. Designed new auxiliary tasks for two-stage multi-task self-supervised object detection models.

Competition Experience

- The first prize of China Undergraduate Mathematical Contest in Modeling in Shaanxi division, 2019.
- The first prize of China Undergraduate Mathematical Contest in Modeling in Shaanxi division, 2020.
- Honorable Mention of Mathematical Contest In Modeling, 2020.
- The second prize of The Chinese Mathematics Competitions (Mathematics Group), 2019.
- The first prize of Campus Mathematical Contest in Modeling, 2019.
- The second prize of Campus Collegiate Programming Contest, 2021.

Scholarships & Awards

- Outstanding Student of Xi'an Jiaotong University (2%), 2018-2019, 2019-2020, 2020-2021.
- National Encouragement Scholarship (3%), 2018-2019.
- HIWIN Scholarship (1%), 2019-2020.
- ZhuFeng Scholarship (1%), 2018-2019,2019-2020.
- National Scholarship (2%), 2020-2021.