Xianliang Li

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Research Interest

Optimization for machine learning, from the perspective of loss landscape (loss function, learning model, etc.), optimizer design (focusing on theoretical performance and convergence analysis), and learning rate scheduler. My goal is to propose practical, self-consistent frameworks for machine learning and to develop specific, effective optimization methods.

Education

University of Chinese Academy of Sciences *Sep. 2022 - Present*
Master's Degree in Computer Science
Advisors: Assoc. Prof. Sheng Xu

Sun Yat-Sen University *Sep. 2018 - Jun. 2022*
Bachelor's Degree in Physics
Advisor: Assoc. Prof. Shangfei Liu

Publications

3. **Time-of-Arrival Simultaneous Sensor and Target Localization with Dynamic Optimal Sensor Placements.**
   Xianliang Li, Sheng Xu, K. C. Ho.
   Under Review, 2024.

2. **Systematical Sensor Path Optimization Solutions for AOA Target Localization Accuracy Improvement with Theoretical Analysis.**
   Sheng Xu, Bing Zhu, **Xianliang Li**, Xinyu Wu, Tiantian Xu.
   IEEE Transactions on Vehicular Technology, 2024.

1. **3D Source Tracking Using a Position-unknown AOA Sensor with Measurement Drift and UAV Moving Direction Optimization**
   Rongrong Xu, Sheng Xu, Bing Zhu, **Xianliang Li**, Mingxue Cai.
   IEEE International Conference on Real-time Computing and Robotics, 2024.

Research Experience

On the Performance Analysis of Momentum Methods in Stochastic Optimization *Mar. 2024 - Present*
Team Leader

- Conducted theoretical performance analysis from the signal processing perspective for the momentum-based optimizer.
- Developed an optimized momentum-based method, with numerical experiments validating the theoretical claims and demonstrating remarkable performance.
- Preparing a manuscript for submission to ICLR 2025.

Path Optimization and Target Localization Problems using TOA/AOA Sensors *Jul. 2023 - Present*
Advisor: Assoc. Prof. Sheng Xu, *Shenzhen Institute of Advanced Technology* and Prof. K. C. Ho, *University of Missouri*

- Derived theoretical performance enhancements using position-unknown sensors with inter-sensor measurements.
- Developed a new, effective, and fast-converging algorithm based on SPSA and Adam for optimal sensor placement, with theoretical analysis supporting improved performance.
- Designed a compound localization framework for real-world applications.
- Submitted two journal papers and one conference paper; one journal manuscript is in progress.

A Wheel-track Transformation Mobile Platform *Nov. 2023 - Apr. 2024*
Advisor: Assoc. Prof. Sheng Xu, *Shenzhen Institute of Advanced Technology*

- Participated in developing a control module of the wheel-track robot using the PX4 flight controller and the Maxon controller.
- Gained knowledge and skills in hardware and robotic systems.

N Body Gravitational Simulation of Giant Planets in the Solar System *Nov. 2021 - Apr. 2022*
Advisor: Assoc. Prof. Shangfei Liu, *Sun Yat-sen University*

- Undergraduate Thesis.
- Reproduced the formation process of Uranus and Neptune in the solar system using REBOUND.
- Acquired knowledge and skills in astrophysics and C programming.

Technical Skills

Programming: MATLAB, Python, C/C++.
DevOps and AI Framework: Git, PyTorch.
Language: Cantonese, Mandarin, English.