YUE SUN

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Google Scholar page: https://scholar.google.com/citations?hl=en&user=IxBPfiYAAAAJ

EDUCATION

University of Washington — Seattle, WA, US
Ph.D. in Electrical Engineering — 2016.9 - 2022.3
Thesis: *Nonconvex Optimization and Model Representation with Applications in Control Theory and Machine Learning*
Papers are published in *NeurIPS, TSP, ICASSP, CDC, L4DC, DCC, OJ-CSys, ICML workshop*

Tsinghua University — Beijing, China
Bachelor of Engineering in Electronic Engineering — 2012.8 - 2016.7

Skills: Java(big data - Spark, Kafka), C/C#/C++, Python(Pytorch, TensorFlow), ML/DL/AI, NLP/BERT/LLM/GPT, CV/CNN/Resnet, RL, Optimization, CUDA, Algorithm/Data Structure, Cloud(AWS, Azure), SQL, Git, Linux

WORKING EXPERIENCE

Microsoft, BingAds, Software Engineer — Redmond, WA, US
Project: Advertisement Recommendation — 2022.4 - present

- Built and maintained the pipelines of user embedding generation model using users' behavior, Ad category feature generation and Ad embedding serving, and user to Ads ranking service (**Java - Spark**, **Kafka**, **SQL**, **C#**, **Object Storage**, **ID Hash Table**). The pipelines serve daily 10B users, 1B MS users and 0.5B events.
- Led the design of, and implemented the unified Ad index generation pipeline and the interface with near real time Ad recommendation (**SQL**, **C#**, **Java - Spark**, **Kafka**). It supplies millions of demands.
- Led the user income prediction project. Trained BERT based models for user income prediction by user web behavior, with the help of LLM/GPT labeling pipeline (**SQL**, **Python/Pytorch - NLP**, **CUDA**, **Azure**). Increased AUC by 0.1.
- Applied BERT for embeddings of URL/user/Ads and modeled URL-Ads recommendation (user-blind recommendation) by maximum apriori estimator and online learning. Carried out validation of models for analysis (**SQL**, **C#**, **Python/Pytorch - NLP**, **CUDA**, **Azure**).
- Set up the flightings and performed analysis of flighting metrics. Produced and analyzed statistics of filtration and selection for customer support (**SQL**, **C#**).

Nokia Bell Labs, Math & ALGO Bell Labs Summer Intern — Seattle, WA, US
Project: Audio Echo Cancellation with Sparse Coefficients — 2021.6 - 2021.8
Host: Shirin Jalali

- Reframed audio echo cancellation (signal processing) problem as online LS and implemented SGD, APA, IML.
- Combined with sparsity of the parameters and applied RIP property into algorithm analysis. Derived and implemented proportionate algorithms and regularized algorithms for sparse coefficient estimation.

Google, Software Engineering Intern (PhD) — Mountain view, CA, US
Project: Online Learning for Entropy Coding in Next-generation Video Codec — 2019.6 - 2019.9
*First authored paper in **DCC 2020**, with a **Patent**. Host: Jingning Han*

- Implemented online update algorithm for probability estimation for entropy coding.
- Generalized baseline algorithm by maximum apriori estimator with online optimization for adaptive learning.
- Implemented experiments on real dataset and the compressed file is 2% smaller than baseline (**C++ & Python**).

RESEARCH EXPERIENCE

University of Washington, Research Assistant — Seattle, WA, US
Project: Towards Understanding the Role of Representation Dimension in Meta-Learning — 2020.9 - 2022.3
*First/second authored paper in **NeurIPS 2021, TOPML 2021, ICASSP 2021**, Advisor: Maryam Fazel*

- Demonstrated the procedure and obtained statistical guarantee (sample complexity & error) of meta-learning.
- Obtained guarantee of meta-learning accuracy in the overparametrized regimes, theoretically proved the double descent phenomenon and verified it by numerical experiments.
- Generalized to non-linear models, e.g., multiple class classification, validated on image (CNN/Resnet) and text (LSTM/attention/transformer) classification with MAML as baseline (**Python/Pytorch, AWS**).

Project: Learning Linear Dynamical System via Regularization   2018.10 - 2022.3
First authored paper in **OJ-CSys, L4DC 2020 (oral)**, *Advisor: Maryam Fazel*

- Proposed Hankel nuclear norm (low rank) regularization that learns with provably fewer data and smaller error.
- Implemented regularized method on Daisy, Gym and Mujoco dynamical systems and observed the advantage in input sensitivity, simplicity of tuning parameters, training data size and estimation error (**Python/Pytorch**).

Project: Policy Gradient Descent in Control and Reinforcement Learning   2018.10 - 2022.3
First authored paper in **CDC 2022, CDC 2021**, *Advisor: Maryam Fazel*

- Generalized the optimal global convergence rate of non-convex policy optimization to a family of control problems.
- Proposed the connection between policy optimization in RL and convexification method in control theory.

Project: Perturbed Gradient Descent Method for Non-convex Optimization   2017.9 - 2017.12
First authored paper in **NeurIPS 2019, ICML workshop 2018**, *Advisor: Maryam Fazel*

- Derived convergence rate of noisy gradient descent method for nonsmooth nonconvex optimization problems and extended approximation strategy to Riemannian metric.
- Applied to image processing task where the retraction operator is trained by conditional GAN (**Python/Tensorflow**).

Ohio State University, Research Assistant   Columbus, OH, US
Project: Phase Retrieval and Low Rank Matrix Completion   2015.7 - 2015.9
First/second authored papers in **TSP, ICASSP 2016**, *Advisor: Yuejie Chi*

- Reproduced the derivation and conduced performance test for various phase retrieval algorithms.
- Derived an extension of Wirtinger Flow. Analyzed the advantages against outliers.

PUBLICATIONS

1. Shirin Jalali, Carl Nuzman and **Yue Sun**, "Incremental maximum likelihood estimation for efficient adaptive filtering", arXiv preprint arXiv:2209.01594 (2022).

2. **Yue Sun**, Samet Oymak and Maryam Fazel, "Finite Sample Identification of Low-order LTI Systems via Nuclear Norm Regularization", in IEEE Open Journal of Control Systems (OJ-CSys).

3. Yang Zheng, **Yue Sun**, Maryam Fazel and Na Li, "Escaping High-order Saddles in Policy Optimization for Linear Quadratic Gaussian (LQG) Control", in 61st Conference on Decision and Control (CDC 2022).

4. **Yue Sun**, Adhyyan Narang, Ibrahim Gulluk, Samet Oymak and Maryam Fazel, "Towards Sample-Efficient Overparameterized Meta-Learning", in 35th Conference on Neural Information Processing Systems (NeurIPS 2021) & 2021 Workshop on the Theory of Overparameterized Machine Learning (TOPML).

5. **Yue Sun** and Maryam Fazel, "Learning Optimal Controllers by Policy Gradient: Global Optimality via Convex Parameterization", in 60th Conference on Decision and Control (CDC 2021) & 2021 INFORMS Annual Meeting.

6. Ibrahim Gulluk[†], **Yue Sun**[†], Samet Oymak and Maryam Fazel, "Sample Efficient Subspace-Based Representations for Nonlinear Meta-Learning", in 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).

7. **Yue Sun**, Samet Oymak and Maryam Fazel, "Finite Sample System Identification: Improved Rates and the Role of Regularization", (**oral**) in 2020 Conference of Learning for Dynamics and Control (L4DC).

8. **Yue Sun**, Jingning Han and Yaowu Xu, "Online Probability Model Estimation for Video Compression", in 2020 Data Compression Conference (DCC). **Patent**: Probability Estimation for Entropy Coding (WO 2021/092531 A1).

9. **Yue Sun**, Nicolas Flammarion and Maryam Fazel. "Escaping from Saddle Points on Riemannian Manifolds," in 33rd Conference on Neural Information Processing Systems (NeurIPS 2019).

10. **Yue Sun** and Maryam Fazel. "Escaping Saddle Points Efficiently in Equality-constrained Optimization Problems", in ICML Workshop on Modern Trends in Nonconvex Optimization for Machine Learning, 2018.

11. Yuanxin Li, **Yue Sun** and Yuejie Chi. "Low-Rank Positive Semidefinite Matrix Recovery From Corrupted Rank-One Measurements". IEEE Transactions on Signal Processing 65.2 (2017): 397-408 (TSP).

12. **Yue Sun**, Yuanxin Li and Yuejie Chi. "Outlier-Robust Recovery of Low-Rank Positive Semidefinite Matrices from Magnitude Measurements", in 2016 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP).

13. Zhong Hua, Yixin Su, **Yue Sun** and Xin Wang, "Handwritten Numeral Recognition Algorithms and Implementation Based on the Multifunction Touch Screen", in 2014 Asia-Pacific Congress on Sports Technology and Engineering.

REVIEWING SERVICE

NeurIPS, ICLR, AISTATS, L4DC, ALT, ISIT, KDD, JMLR, SICON, TIT, TAC, TNNLS